NEET 2026
WORK BOOK

BIOLOGY

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WORK BOOK

Chapter 01

BOTANY

BIOLOGICAL CLASSIFICATION

INTRODUCTION OF CLASSIFICATION, KINGDOM MONERA

1. Choose the correct with respect to earliest scientific classification

1) It was proposed by Aristotle

2) Plants were divided as trees, shrubs & herbs on the basis of their morphological characters

3) Animals were classified into two groups - with or without RBC

4) All of these

2. Choose the correct statement?

1) Bacteria are sole members of kingdom monera

2) Bacteria exist in coccus form only

3) Occurrence of bacteria is limited to some area.

4) Bacteria can't live in extreme habitat like desert

3. Choose the correct about blue green algae.?

i. Also known as cyanobacteria

ii. Presence of chlorophyll a and b are similar to green plants

iii. Photosynthetic autotroph

iv) May be unicellular, colonial or filamentous

v. Occur in aquatic as well as terrestrial

1) i, iii, iv, v

2) i, ii, iii, iv, v

3) i, ii, iv, v

4) iii, iv, v

4. Which of following statement is/are true?

1) Methanogens are present in gut of several ruminant animals like cow & buffaloes

2) Methanogens are responsible for production of biogas in ruminant animals

3) Methanogens are obligatory anaerobes

4) All the above

5. Match the column I & column II.

Column I		Column II	
i.	Halophiles	a.	Marshy area
ii.	Thermoacidophiles	b.	Salty area
iii.	Methanogens	c.	Hot springs

1) i) – c, ii) – b, iii – a

2) i) – c, ii) – a, iii – b

3) i) – b, ii) – c, iii – a

4) i) – b, ii) – a, iii – c

6. Here are few statement given below, Identify organism on basis of statement

i. Lack cell wall

ii. Smallest living cell known

iii. Can survive without oxygen

iv. Pathogenic in animal & plants.

1) Nostoc 2) Anabaena

3) Mycoplasma 4) Chlorella

7. Citrus canker is ?

1) Plant disease caused by bacteria

2) Human disease caused by bacteria

3) Pet disease caused by bacteria

4) Plant disease caused by fungus

8. Following features belong to

A. Presence of non-cellulosic polysaccharide aminoacid in cell wall

B. Complex in behaviour

C. Vast majority are heterotrophs

D. Many of them are pathogenic to plant and animals

1) Chrysophytes

2) Prions

3) Viroids

4) Bacteria

9. Which one is incorrect about reproduction in bacteria?

1) Mainly by binary fission

2) Spores are formed under unfavourable condition

3) Sexual reproduction by transfer of gamete

4) Sexual reproduction by adopting a primitive type of DNA transfer

10. Heterotrophic bacteria helps in

1) Curdling of milk

2) Production of antibiotic

3) Nitrogen fixation in leguminous plant

4) All of these

11. According to Whittaker's classification; the 5-kingdoms are

1) Plantae and Animalia

2) Monera and Protista

3) Fungi

4) All of these

12. Habitat in which thermoacidophiles can be seen

1) The stomach of many herbivores

2) Hot, alkaline

3) Hot, sulphur springs

4) Saline areas

13. Cyanobacteria with heterocyst are –

1) Only Nostoc

2) Only Anabaena

3) Both Nostoc and Anabaena

4) Vibrio cholera

14. An archebacteria that lives in extremely salty area is referred to as a –

1) Thermophile

2) Halophiles

3) Thermoacidophile

4) Methanogen

15. Based upon the shape, bacteria are grouped under how many categories?

1) 2 2) 3

3) 4 4) 5

16. According to Whittaker's classification, Chlamydomonas and Chlorella comes under

1) Monera 2) Fungi

3) Plantae 4) Protista

17. Cyanobacteria have

1) Chlorophyll a similar to higher plants

2) Different from chlorophyll of plants

3) Bacteriochlorophyll

4) Bacteriorhodopsin

18. Which of the following group of organisms are not included in the five kingdom system of classification

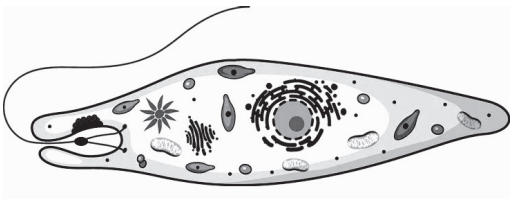
1) Chrysophytes, Viroids, Lichens

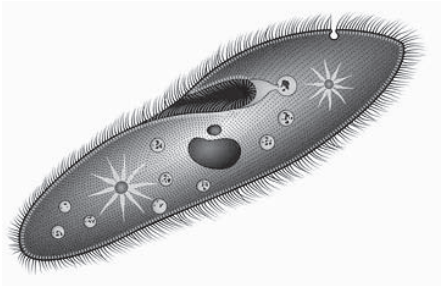
2) Bacteriophages, Dinoflagellates, Lichens

3) Viruses, Viroids, Lichens

4) Viroids, Slime moulds, Fungi

19. Identify the figures A, B and C given below.

A) 

B) 

C)

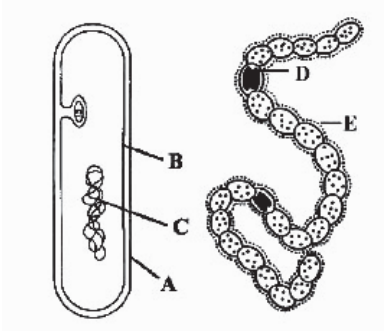
1) A-Euglena, B -Paramecium, C-Agaricus

2) A-Euglena, B - Planaria, C-Agaricus

3) A-Planaria, B- Paramecium, C-Agaricus

4) A-Euglena, B -Paramecium, C-Aspergillus

20. Refer to the given figures of bacteria cell and Nostoc and choose the option which shows correct label for the structures marked as A, B, C, D and E ?



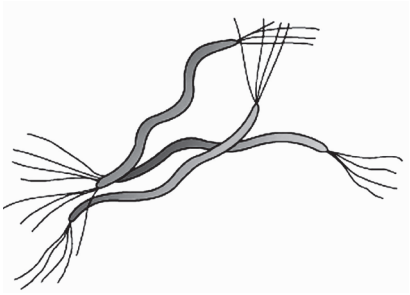
1) A-Cellwall B-Cell membrane, C- Heterocyst, D - DNA, E - Mucilagenous sheath

2) A- Cell wall, B- Cell membrane, C - DNA, D - Heterocyst, E - Mucilagenous sheath

3) A- Mucilagenous sheath, B – Cell membrane, C - DNA, D - Heterocyst, E - Cell wall

4) A- Cell membrane, B – Cell wall, C - DNA, D - Mucilagenous sheath, E – Heterocyst

21. Number of statement which are correct for given figure:



a) Belongs to kingdom protista

b) Belongs to kingdom monera

c) Is multicellular organism

d) Is an algae

1) 1 2) 3

3) 4 4) 2

22. Maximum nutritional diversity is found in the group

1) Fungi

2) Animalia

3) Monera

4) Plantae

23. Mycoplasma lack

1) Cell wall

2) Cell membrane

3) Cytoplasm

4) Flagella

KINGDOM PROTISTA, KINGDOM FUNGI

24. Based on the modes of nutrition, protists are grouped into

1) Plant protista, fungal protista and animal like protista

2) Chrysophytes, Dinoflagellates and Euglenoids only

3) Slime moulds and fungi only

4) Flagellated protozoans and protozoans

25. How many of the following does belong to Protista?

Amoeba, Spirogyra, Chlamydomonas, Chlorella, Paramecium

1) 5 2) 4

3) 3 4) 2

26. Photosynthetic protists are ?

1) Euglenoids, Diatoms and Dinoflagellates

2) Euglenoids and slime moulds

3) Diatoms and Zooflagellates

4) Desmids and Ciliates

27. Select the following statement that does not applicable to diatoms?

1) Diatom cell wall may be impregnated with silica

2) Cell wall forms two thin overlapping shells

3) Diatom is a chrysophyte

4) Diatom is multiflagellate

28. Dinoflagellates have?

1) A single flagellum in the transverse groove between the cell plates

2) A single flagellum in the longitudinal groove between the cell plates

3) Two flagella one lies longitudinally and the other transversely in a furrow between the wall plates

4) No flagella

29. Which of the following releases toxins that may even kill other marine animals like fishes?

1) Gonyaulax

2) Paramecium

3) Euglenoids

4) Sporozoans

30. Which of the following statements about Euglena is true?

1) Euglenoids are flagellates

2) Euglena placed in continuous darkness loses their photosynthetic activity and die

3) The pigments of Euglena are quite different from those of green plants

4) Euglena is a marine protista

31. Find the organism with respect to the following characters

i. Instead of a cell wall they have a protein rich pellicle making their body flexible.

ii. They have 2 flagella, a short and a long one.

iii. They have mixotrophic nutrition

iv. In light they are photosynthetic, but act as heterotroph (predating other smaller organism) when they are in dark.

v. They are connecting link between plants and animals.

The above statements are assigned to –

1) Dinoflagellates

2) Slime mould

3) Desmids and Diatoms

4) Euglena

32. Protozoans are not included in kingdom Animalia because?

1) Mostly asymmetrical

2) Unicellular eukaryotes

3) Heterotrophic nature

4) Multicellular prokaryotes

33. Which of the following is correct about Trypanosoma?

1) They are flagellated protozoan

2) They are parasite

3) They cause sleeping sickness

4) All of the above

34. Paramecium is

1) A ciliated protozoan

2) The coordinated movement of cilia helps the food to be steered into gullet

3) Has a cavity (gullet) that opens to the outside of the cell surface

4) All of the above

35. Which of the following is odd one with regards to fungal class ?

1) Toad stool

2) Puccinia

3) Alternaria

4) Mushroom

36. Coenocytic hypha is?

1) Uninucleate hypha

2) Multinucleate

3) Multinucleate hypha without septa

4) Hypha in coelom

37. Fungi show a great diversity in?

1) Morphology

2) Habitat

3) Both 1 and 2

4) Karyogamy

38. Select the correct statements below that correctly apply to the Kingdom Fungi?

1) Some fungi form beneficial interrelationships with plants

2) Certain fungi are natural sources of antibiotics

3) The fungal life cycle typically includes a spore stage

4) All

39. Dikaryophase formation is a specific characteristic of?

1) All fungi

2) Phycomyetes and ascomycetes

3) Only basidiomycetes

4) Ascomycetes and basidiomycetes

40. Fungi responsible for 'rust' in wheat

1) Alternaria

2) Puccinia

3) Agaricus

4) Ustilago

41.

Column I		Column II	
A.	Phycomycetes	I.	Sac fungi
B.	Ascomycetes	II.	Algal fungi
C.	Basidiomycetes	III.	Fungi imperfecti
D.	Deuteromycetes	IV.	Club fungi

The correct matching is

1) A-II, B-I, C- IV, D-III

2) A- II, B - IV, C - I, D – III

3) A- IV, B - I, C - II, D – III

4) A- IV, B - III, C - II, D – I

42. Which of the following spores are produced endogenously?

1) Zoospores and Conidia

2) Conidia and aplanospores

3) Aplanospores and zoospores

4) Aplanospore, zoospores and conidia

43. Which of the following is parasite on mustard?

1) Albugo

2) Puccinia

3) Yeast

4) Ustilago

44. I. It includes unicellular as well as multicellular fungi

II. In multicellular forms hyphae are branched and septate

III. Conidiophore produces conidia (spores) exogenously in chain

IV. Sexual spores are ascopores produced endogenously in Ascus

V. Fruiting body is called ascocarp

Which of the above characters are show by

1) Phycomycetes

2) Sac fungi

3) Club fungi

4) Fungi imperfecti

45. Which of the following is false about ascomycetes?

1) Mode of nutrition saprophytic, decomposer, coprophilous (growing on dung) and parasitic

2) Includes unicellular (e.g. yeast) and multicellular forms

3) Mycelium is coenocytic

4) Aspergillus, Claviceps, Neurospora are important members of Ascomycetes

46. Which of the following is correct about class Deuteromycetes?

1) Some members are saprophytes or parasites

2) A large number of members are decomposers of litter and help in mineral cycling

3) Alternaria, Colletotrichum and Trichoderma are deuteromycetes

4) All of the above

47. Which of the following is false about deuteromycetes?

1) They reproduce by asexual spores (conidia)

2) Mycelium is branched and septate

3) They have only parasitic forms

4) They have no sexual stage (perfect stage)

48. Nutritionally, protists are –

1) Photoautotrophs only

2) Heterotrophs only

3) Mixotrophs

4) Heterotrophs or autotrophs

49. Which among the following belongs to phytoplankton ?

1) Protozoan

2) Slime mold

3) Chrysophytes

4) Trypanosoma

50. Silica gel (Keieselghur) or Diatomite or Diatomaceous earth is obtained by –

1) Diatoms

2) Dinoflagellates

3) Euglenoids

4) Brown algae

51. Slime moulds are

1) Parasite

2) Do not produce fruiting bodies

3) Do not produce spores

4) Saprophytic protists

52. Cell fusion and zygote formation are methods of sexual reproduction in

1) Rhizobium

2) Diatom

3) Mycoplasma

4) Both 1 and 3

53. In Phycomycetes sexual reproduction occurs by-

1) Isogamy and Anisogamy only

2) Anisogamy only

3) Oogamus only

4) Isogamy, anisogamy and oogamy

54. Basidiomycetes include –

1) Mushroom, Toadstool, Puffball and Bracket fungi

2) smut fungi and rust fungi

3) Both 1 and 2

4) Bread mould, sac fungi and algal fungi

55. Fungi are classified on the basis of –

1) Morphology of mycelium

2) Development of fruiting bodies

3) Mode of spore formation

4) All of these

56. Which of the following is caused by Albugo?

1) White rust 2) Black rust

3) Red rust 4) Brown rust

57. Where does meiosis occur in mushroom?

1) Basidiospore

2) Basidium

3) Basidiocarp

4) Ascus mother cell

58. Ciliates differ from all other protozoans in

1) Using flagella for locomotion

2) Using pseudopodia for capturing prey

3) Both 1 and 2

4) Presence of thousands of cilia

59. Mycorrhiza is

1) a symbiotic association of plant roots and certain fungi

2) an association of algae with fungi

3) A fungus parasite on root system of higher plants

4) An association of Rhizobium with the roots of leguminous plants

60. Absorptive heterotrophic nutrition is exhibited by

1) Algae 2) Fungi

3) Bryophytes 4) Pteridophytes

61 . The imperfect fungi which are decomposers of litter and help in mineral cycling belong to

1) Phycomycetes 2) Ascomycetes

3) Deuteromycetes 4) Basidiomycetes

62. Which of the following is true about basidiomycetes:

A) Also called club fungi

B) Sex organs absent, but plasmogamy is brought about by fusion of two vegetative cells of different genotypes

C) Karyogamy and meiosis takes place in basidium

D) Basidiospores are produced exogenously

1) A and B are correct

2) B and C are correct

3) A, B, C and D all are correct

4) A, B and D are correct

KINGDOM PLANTAE, KINGDOM ANIMALIA

63. How many of the following does not includes kingdom plantae :

Algae, Fungi, Bryophyte, Bladderwort, Pteridophyta, Gymnosperm, Angiosperm

1) Zero 2) One

3) Two 4) Three

64. Life cycle of angiosperms plant have?

1) Diploid sporophyte & diploid gametophyte

2) Diploid gametophyte & haploid sporophyte

3) Diploid sporophyte & haploid gametophyte

4) Haploid sporophyte & haploid gametophyte

65. How many of following term is correct about Animalia-

Heterotroph, eukaryotic, prokaryotic, unicellular, multicellular, store food as glycogen, presence of elaborated neuromotor mechanism, embryological development

1) 6 2) 8

3) 5 4) 4

66. Select the false statement(s) –

1) Kingdom Plantae includes multicellular chlorophyll containing organisms

2) Plantae includes Bryophytes to Angiosperms; but not algae

3) Plantae shows alternation of generation.

4) All

67. Cuscuta belongs to which kingdom ?

1) Pteridophyte

2) Plantae

3) Algae

4) All of the above

68. Alternation of generation is seen in all except

1) Fucus

2) Sphagnum

3) Equisetum

4) Bacteria

69. Kingdom Animalia is characterised by –

1) Heterotrophic eukaryotic multicellular organisms having no cell wall in their cells

2) Reserve food - glycogen or fat

3) Holozoic nutrition

4) All of these

VIRUS, VIROID, PRION, LICHEN

70. Which of the following is correct about viruses ;

1) Acellular organism

2) They are not considered truly 'living'

3) Genetic material is either DNA or RNA never both

4) All of these

71. Viruses consist of

1) Protein coat

2) Genetic material

3) Cell organelles

4) Both 1 and 2

72. Symptoms of plant viral disease includes

1) Mosaic formation

2) Leaf rolling and curling

3) Yellowing and vein clearing

4) All of the above

73. Who showed that viruses could be crystallized

1) W.M. Stanley(1935)

2) M.W.Beijerinek (1898)

3) Dmitri Ivanowsky (1892)

4) M.W. Stanley (1898)

74. In general viruses that infect plants have

1) ds RNA 2) ss RNA

3) ds DNA 4) ss DNA

75. The protein coat called ___(A)___ made of small subunit called ____(B)____ that protect ____(C)____ of virus

1) A = capsomere, B = capsid, C= genetic material

2) A = capsid, B = capsomere, C = genetic material

3) A = capsid, B = capsomere, C = enzyme and mineral

4) A = capsomere, B = capsid, C = enzyme and mineral

76. Viroid was discovered by –

1) T.O. Diener (1971)

2) W.M. Stanley (1935)

3) T.O diener (1935)

4) W.M. Stanley (1971)

77. Prion cause

1) BSE in cattle and CJD in human

2) BSE in human and CJD in cattle

3) BSE and CJD cause in cattle

4) BSE and CJD cause in human

78. Mycobiont and phycobiont are ___&___ respectively

1) Autotrophic & heterotrophic

2) Autotrophic & autotrophic

3) Heterotrophic & autotrophic

4) Heterotrophic & heterotrophic

79. Choose the incorrect about BSE

1) It expanded as Bovine spongiform encephalopathy

2) Caused by prion

3) Its analogous variant is CJD

4) Its homologous variant is CJD

80. Lichen cannot grow in

1) Polluted area

2) Area where there is no pollution

3) Area where SO_2 is present

4) Both 1 and 3

81. Common cold or flu is

1) A viral disease

2) A bacterial disease

3) A protozoan disease

4) A fungal disease

82. Chemically viruses are –

1) Glycoproteins

2) Nucleoprotein

3) Nucleic acid

4) Lipoprotein

83. Which is the infectious component of the virus?

1) Lipid

2) Protein

3) Nucleic acid

4) 2 and 3

84. The subunit of capsid is called –

1) Core

2) Nucleotide

3) Amino acid

4) Capsomere

85. In 1971, T. 0. Diener discovered a new infectious agent that was smaller than viruses –

I. It causes potato spindle tuber disease

II. It is free RNA

III. Molecular weight of RNA is low

The above statements are assigned to –

1) Viruses

2) Viroids

3) Prions

4) Mycoplasma

86. '*Contagium vivum fluidum*' (infections living fluid) name given to fluid extract from infected tobacco plant was given by

1) Ivanowsky

2) Pasteur

3) Whittaker

4) Beijerinek

87. Viruses have

1) DNA enclosed in a protein coat

2) Prokaryotic nucleus

3) Single chromosome

4) Both DNA and RNA

88. Select the wrong statement

1) W.M. Stanley showed that viruses could be crystallized

2) The term 'contagium vivum fluidum' was coined by M.W. Beijerinek

3) Mosaic disease in tobacco and AIDS in human being are caused by viruses

4) The viroids were discovered by D.J. Ivanowsky

89. Difference between a Virus and a Viroid is

1) Absence of protein coat in viroid but present in virus.

2) Presence of low molecular weight RNA in viroid but in virus RNA is single stranded or double stranded.

3) Both 1 and 2

4) Virus is acellular but viroid is cellular

90. Viruses are non-cellular organisms but replicate themselves once they infect the host cell. To which of the following kingdom do viruses belong to?

1) Monera

2) Protista

3) Fungi

4) None of the above

91. Which of the following shows coiled RNA strand and capsomeres?

1) Polio virus

2) Tobacco mosaic virus

3) Measles virus

4) Retrovirus

92. Which statement is wrong for viruses?

1) All are intracellular parasites.

2) All of them have helical symmetry.

3) They have the ability to synthesize nucleic acids and proteins with the help of host cell.

4) Antibiotics have no effect on them

93. Capsomeres of TMV are arranged in a _____ manner

1) Helical

2) Polyhedral

3) Ellipsoid

4) Either 1 or 2

94. Lichens indicate

1) Parasitism

2) Predation

3) Mutualism

4) Commensalism

95. Name the virus which attacks a bacteria :

1) Bacteriophage

2) Adenovirus

3) Poliovirus

4) Reovirus

96. Free infective protein causes neurological disease

1) Prions 2) Viroids

3) Virus 4) Lichen

97. Viruses possess

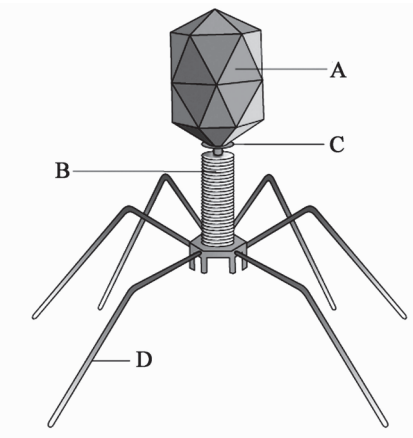
1) Ribosomes to synthesize protein

2) Organelle for its vital mechanism

3) Either DNA or RNA

4) Both DNA and RNA

98. Given below is the diagram of a bacteriophage. Identify A, B, C and D



	A	B	C	D
1)	Tail fibres	Head	Sheath	Collar
2)	Sheath	Collar	Head	Tail fibres
3)	Head	Sheath	Collar	Tail fibres
4)	Collar	Tail fibres	Head	Sheath

99. **Statement I :** In general, viruses that infect plants have single stranded RNA.

Statement II : Viruses that infect animals have either single or double stranded RNA or double stranded DNA.

1) Both statements are correct.

2) Statement I is correct & II is incorrect.

3) Statement I is incorrect & II is correct.

4) Both statements are incorrect

100. Which component synthesis food in lichen

1) Mycobiont

2) Fungi

3) Phycobiont

4) All of these

SAMPLE QUESTIONS

1. Who was the first to attempt a more scientific basis of classification?

1) Linnaeus

2) Aristotle

3) Whittaker

4) Bentham and Hooker

2. Aristotle classified plants in to herbs, shrubs and trees on the basis of

1) Anatomical feature

2) Morphological characters

3) Physiological characters

4) Biochemical characters

3. In which year Whittaker proposed the five-kingdom classification?

1) 1960

2) 1959

3) 1969

4) 1979

4. Which of the following are prokaryote

1) Vibrio cholera

2) Lactobacillus

3) Funaria

4) Both 1 and 2

5. What is the criteria used by Whittaker for classification?

a) Cell structure

b) Thallus organization

c) Mode of nutrition

d) Reproduction

e) Phylogenetic relationship

1) All except (e)

2) All except (a) and (b)

3) a, b, c, d and e

4) All except (c) and (d)

6. In earlier classification (like two kingdoms), the following are included in plant

a) Bacteria, blue green algae, fungus

b) Mosses and fern

c) Gymnosperms and angiosperm

1) (a) only

2) (b) and (c) only

3) (c) only

4) All of these

7. Most abundant microorganism are

1) Bacteria

2) Virus

3) Amoeba

4) Paramecium

8. Which of the following is incorrect about bacteria?

A) It is grouped under five categories on the basis of shape.

B) It can live in hot spring, deep ocean, snow and desert areas.

C) It can live as a parasite.

D) It is made up of cellulosic cellwall

1) (A) and (B) only

2) (A) and (D) only

3) (B) and (C) only

4) (C) and (D) only

9. Most of the bacteria are

1) Chemoautotrophs

2) Photoautotrophs

3) Heterotrophs

4) Holozoic

10. Archaebacteria can live in some of the most harsh habitats because of

1) Presence of mesosome

2) High power of multiplication

3) Special cell wall structure

4) All of these.

11. Following are present in gut of cows and buffaloes and is responsible for the production of methane from the dung of these animals.

1) Methanogen

2) Thermoacidophiles

3) Halophiles

4) All of these

12. Which of the following statements is true about cyanobacteria?

1) It is found in fresh water only.

2) It may be unicellular, colonial or filamentous.

3) They often form bloom in non-polluted fresh water bodies.

4) Colonies are not surrounded by gelatinous sheath.

13. Motile bacteria possess

1) Cilia

2) Flagella

3) Both 1 and 2

4) None of these

14. Which of the following is incorrect about Protista?

1) All are single cell eukaryotes

2) Some have flagella or cilia

3) Sexually reproduce by cell fusion and zygote formation

4) All members of Protista are pathogenic

15. The boundaries are not well defined in kingdom

1) Monera

2) Protista

3) Fungi

4) Animalia

16. Which of the following is correct about chrysophytes?

I. Found in fresh and marine water

II. Macroscopic plankton

III. Cell walls are embedded with silica

IV. Most of them are photosynthetic

1) I and III only

2) I, III and IV only

3) I, II and IV only

4) I and IV only

17. Diatomaceous earth is used in

1) Polishing

2) Filtration of oils

3) Filtration of syrups

4) All of these

18. Red tide is because of

1) Desmids

2) Gonyaulax

3) Euglena

4) Red algae

19. Which of the following is true about gonyaulax?

1) Release toxin

2) Slow multiplication causing red tide

3) Heterotropic

4) Multicellular

20. Habitat of euglenoids is

1) Fresh river water

2) Stagnant fresh water

3) Marine water

4) All of these

21. Character belongs to slime moulds

A. Saprophytes

B. Forms plasmodium under favourable condition

C. Spores posses true walls

D. Spores are dispersed by water

E. Body moves along decaying twigs and leaves engulfing organic matter.

1) All except E

2) All except D

3) All except C and E

4) All except B

22. Protozoans are

A. Heterotroph

B. Parasites or predators

C. Protist

D. Believed to be primitive relative of animals

1) A and B only

2) B and C only

3) D and A only

4) All of these

23. Amoeboid protozoans

1) Live in fresh water, sea water or moist soil

2) Captures prey by using pseudopodia

3) Marine forms have silica shells on their surface

4) All of the above

24. Select the correct statement from the following for kingdom fungi

A. They are heterotrophic.

B. They show less diversity in morphology and habitat.

C. Yeast is a unicellular fungus.

D. They prefer to grow in warm and humid places.

1) A and D only

2) C and D only

3) A, C and D only

4) A and B only

25. The following features belongs to

A. Body consist of long, slender thread-like structures called hyphae.

B. Cell wall consist of chitin.

C. Cosmopolitan distribution

1) Ciliated protozoans

2) Slime moulds

3) Fungi

4) Euglenoids

26. Asexual reproduction in fungus occurs by spores through

1) Conidia

2) Sporangiospores

3) Zoospores

4) All of the above

27. Habitats of phycomycetes are

1) Aquatic

2) Decaying wood in moist and damp place

3) Obligate parasite in plant

4) All of these

28. The following features belongs to class

A. Mycelium branched and septate.

B. Asexual spores conidia produced exogenously.

C. Sexual spores produced endogenously.

D. Many members of this class are edible.

1) Ascomycetes

2) Phycomycetes

3) Basidiomycetes

4) Deuteromycetes

29. Unicellular ascomycetes is

1) Penicillium

2) Alternaria

3) Saccharomyces (yeast)

4) Agaricus

30. Karyogamy and meiosis occurs in basidium produces _____ basidiospores.

1) 1 2) 2

3) 3 4) 4

31. Basidiospores are produced on basidium

1) Endogenously

2) Exogenously

3) Both (1) and (2)

4) None of these

32. Find out the correct matching:

1) Ustilago–Smut

2) Puccinia–Rust

3) Agaricus–Mushroom

4) All are correct

33. Which of the following fungi only reproduce by asexual spores conidia?

1) Alternaria

2) Colletotrichum

3) Trichoderma

4) All of these

34. Sexual cycle in fungi involves

1) Plasmogamy

2) Karyogamy

3) Meiosis

4) All of these

35. Deuteromycetes are known as imperfect fungi because

1) Only sexual phase is found

2) Only asexual or vegetative phase are known

3) Both asexual and sexual phase are known

4) Reproduction in these fungi is absent

36. Which of the following are examples of insectivorous plants?

1) Bladderwort

2) Venus fly trap

3) Cuscuta

4) Both (1) and (2)

37. Life cycle in plant has generally two distinct phase the _____ sporophytic and the _____ gametophytic that alternate with each other. This phenomenon is called as alternation of generation.

1) diploid, diploid

2) diploid, haploid

3) haploid, diploid

4) haploid, haploid

38. The heterotrophic, eukaryotic, multicellular organisms without cell wall is included in the kingdom

1) Protista 2) Fungi

3) Plantae 4) Animalia

39. In animals, the stored food reserve is in the form of

1) Glycogen

2) Cellulose

3) Fat

4) Both (1) and (3)

40. In five kingdom classification of Whittaker, some acellular organisms are not included, they are

1) Virus

2) Viroids

3) Bacteria

4) Both (1) and (2)

41. Viruses are

1) Inert outside their specific host cell

2) Obligate parasite

3) Passes through bacteria proof filter

4) All above statements are correct

42. Potato spindle tuber disease is caused by

1) Virus 2) Viroids

3) Lichens 4) Fungi

43. Viroids are

1) Free infective protein

2) Free infective RNA

3) Free infective DNA

4) Free Polysaccharides

44. In lichens fungi provides to its partner :

1) Food, mineral nutrient, water

2) Water and mineral nutrients only

3) Shelter, water and mineral nutrient

4) Food, shelter, water

45. Lichens are

1) Pollution indicators

2) Symbiotic association between algae and fungus

3) Pioneer species in primary succession on rocks

4) All of the above

ANSWER KEY

1.	4	21.	1	41.	1	61.	3	81.	1
2.	1	22.	3	42.	3	62.	3	82.	2
3.	1	23.	1	43.	1	63.	2	83.	3
4.	4	24.	1	44.	2	64.	3	84.	4
5.	3	25.	2	45.	3	65.	1	85.	2
6.	3	26.	1	46.	4	66.	2	86.	4
7.	1	27.	4	47.	3	67.	2	87.	1
8.	4	28.	3	48.	4	68.	4	88.	4
9.	3	29.	1	49.	3	69.	4	89.	3
10.	4	30.	1	50.	1	70.	4	90.	4
11.	4	31.	4	51.	4	71.	4	91.	2
12.	3	32.	2	52.	2	72.	4	92.	2
13.	3	33.	4	53.	4	73.	1	93.	1
14.	2	34.	4	54.	3	74.	2	94.	3
15.	3	35.	3	55.	4	75.	2	95.	1
16.	4	36.	3	56.	1	76.	1	96.	1
17.	1	37.	3	57.	2	77.	1	97.	3
18.	3	38.	4	58.	3	78.	3	98.	3
19.	1	39.	4	59.	1	79.	4	99.	1
20.	2	40.	2	60.	2	80.	4	100.	3

SAMPLE QUESTIONS

1.	2	10.	3	19.	1	28.	1	37.	2
2.	2	11.	1	20.	2	29.	3	38.	4
3.	3	12.	2	21.	2	30.	4	39.	4
4.	4	13.	2	22.	4	31.	2	40.	4
5.	3	14.	4	23.	4	32.	4	41.	4
6.	4	15.	2	24.	3	33.	4	42.	2
7.	1	16.	2	25.	3	34.	4	43.	2
8.	2	17.	4	26.	4	35.	2	44.	3
9.	3	18.	2	27.	4	36.	4	45.	4

WORK BOOK

Chapter 02

PLANT KINGDOM

SYSTEMS OF CLASSIFICATION

1. The classification system given by Linnaeus was mainly based on :

1) Carpels 2) Androecium

3) Petals 4) Sepals

2. Which one of the following is not true about the artificial system of classification?

1) It was the earliest system of classification

2) This systems gave equal weightage to vegetative and sexual characteristics

3) In this system closely related species were separated since they were based on a few characteristics

4) Based on all observable characteristics

3. Natural system of classification consider :

1) External and internal features

2) Ultrastructure and anatomy

3) Embryology and phytochemistry

4) All of these

4. Classification based on evolutionary relationships of various organism is called :

1) Artificial system

2) Natural system

3) Phylogenetic system

4) Numerical Taxonomy

5. Classification on the basis of chemical constituent of the plant is known as :

1) Cytotaxonomy

2) Chemotaxonomy

3) Phylogeny

4) Numerical taxonomy

ALGAE : CHLOROPHYCEAE, PHAEOPHYCEAE, RHODOPHYCEAE

6. Haploid plant body produces gametes by :

1) Reduction division

2) Mitosis

3) Meiosis

4) Both 1 and 3

7. Which among the following photosynthetic pigments are dominant in green algae and they imparts grass green colour :

1) Chl. a & Chl. c

2) Chl. a & Chl. b

3) Chl. a & Chl. d

4) Phycoerythrin

8. Name the storage bodies found in the chloroplast of most of the green Algae :

1) Pyrenoids

2) Laminarin

3) Floridean starch

4) Mannitol

9. Read the following statements (A - D).

A) The chloroplast of green algae may be discoid, plate-like, reticulate, cup shaped, spiral or ribbon shaped.

B) The cell wall of green algae made up of outer layer cellulose and inner layer of pectose

C) Stored food material of green alga is starch only

D) Generally only one pyrenoid is present in all algal members

Find the correct statements from the above.

1) A & B are correct but C & D are incorrect

2) A & C are correct but B & D are incorrect

3) All statements are correct

4) B, C and D are incorrect but A is correct

10. Asexual motile spores of green Algae are :

1) Zoospores

2) Antherozoids

3) Aplanospores

4) Egg

11. The dominant, photosynthetic phase of Volvox is :

1) Free living diploid sporophyte

2) Free living haploid gametophyte

3) Short living multicellular sporophyte

4) Short living multicellular gametophyte

12. **Assertion :** Green Algae are considered as "Ancestors of land plants".

Reason : Due to similarity in photosynthetic pigment ie, chlorophyll a, chlorophyll b, stored food - starch and cell wall material - cellulose.

1) If both Assertion and Reason are true, the Reason is correct explanation of Assertion

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

13. Which method of vegetative reproduction is exhibited by chlorophyceae?

1) Budding

2) Regeneration

3) Fragmentation

4) by gemma formation

14. Which among the following is not an example of green algae?

1) Ulothrix 2) Volvox

3) Fucus 4) Spirogyra

15. The type of sexual reproduction found in green algae :

1) Isogamous

2) Anisogamous

3) Oogamous

4) All the above

16. The photosynthetic pigments of green algae are localised in :

1) Nucleus 2) Pyrenoid

3) Chloroplast 4) Cytoplasm

17. Match the following correctly :

a.	Chlorella	i.	Motile isogamy
b.	Volvox	ii.	Non-motile isogamy
c.	Spirogyra	iii.	Oogamous
d.	Ulothrix	iv.	Rich in protein

1) a-iv ; b-iii ; c-ii ; d- i

2) a-i ; b-iv ; c-ii ; d- iii

3) a-iv ; b-ii ; c-iii ; d- i

4) a-i ; b-ii ; c-iii ; d- iv

18. The green alga showing anisogamous sexual reproduction is :

1) Spirogyra 2) Ulothrix

3) Eudorina 4) Volvox

19. Select the filamentous green alga from the following :

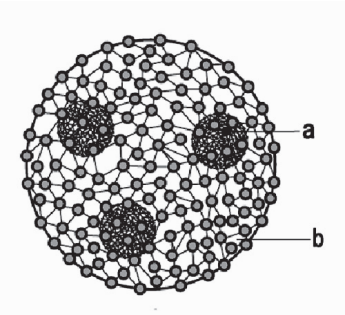
1) Chlorella

2) Chlamydomonas

3) Ectocarpus

4) Ulothrix

20. Recognize the figure and find out the correct matching :



1) Volvox; a - daughter colony, b - parent colony

2) Chlamydomonas; a - daughter colony, b - parent colony

3) Spirogyra; a - heterocyst, b - parent colony

4) Laminaria; a -frond, b - hold fast

21. Pyrenoids consists of :

1) Proteins beside starch

2) Protein around starch

3) Starch besides oil

4) Both 1 & 3

22. Isogamous condition with non-flagellated gametes are found in :

1) Fucus

2) Ulothrix

3) Spirogyra

4) Volvox

23. Select the correctly matched pair :

1) Chlorophyceae - Volvox

2) Phaeophyceae - Porphyra

3) Rhodophyceae - Laminaria

4) All of the above

24. A type of complex carbohydrates, stored as food by brown algae are :

1) Starch and oil 2) Laminarin

3) Floridean starch 4) Starch only

25. Simple branched, filamentous, brown alga :

1) Laminaria 2) Fucus

3) Sargassum 4) Ectocarpus

26. Olive green to various shade of brown colour in phaeophyceae due to :

1) r-Phycoerythrin

2) Chl. a, chl. c

3) Chl. a, chl. b

4) Amount of xanthophyll and fucoxanthin present in them

27. The photosynthetic pigments of brown algae are :

1) Chl. a & chl. b

2) Chl. a & chl. c only

3) Chl. a, chl. c and Fucoxanthin

4) Chl. a & chl. d

28. Read the following statements and select the correct option.

A) The cell wall of brown algae contain outer algin and inner cellulose

B) The protoplast of brown algae contain plastids and centrally located vacuole only

C) Vegetative reproduction of brown algae by fragmentation

D) Asexual reproduction by biflagellated zoospores that are pear shaped, flagella unequal and laterally placed

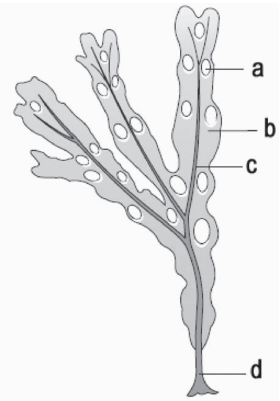
1) A, C & D are correct but B is incorrect

2) A, B, C are correct D is incorrect

3) A & B are correct C & D are incorrect

4) All statements are correct

29. Recognise the figure and find out the correct match :



1) a - Vacuole, b - Frond, c - Stipe, d - Holdfast

2) a - Air bladder, b - Frond, c - Midrib, d - Hold fast

3) a - Vacuole, b - Frond, c - Holdfast, d - Foot

4) a - Air bladder, b - Midrib, c - Frond, d - Holdfast

30. Find the brown alga which reproduce sexually by oogamy.

1) Volvox

2) Fucus

3) Both 1 & 2

4) Porphyra

31. In Phaeophycean members, union of gametes takesplace in which place :

1) In water

2) Within the oogonium

3) In the antheridium

4) Both 1 & 2

32. Which of the following is an edible brown algae :

1) Laminaria 2) Porphyra

3) Sargassum 4) Both 1 & 3

33. The plant body of brown algae is attached on the substratum by means of :

1) Frond 2) Stipe

3) Holdfast 4) Midrib

34. **Assertion** : Profusely branched forms of brown algae are represented by kelps.

Reason : Plant body of brown algae is differentiated into foot, seta and capsule.

1) If both Assertion and Reason are true, the Reason is correct explanation of Assertion

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

35. Match the following suitably and select the correct option :

Column I		Column II	
a)	Ectocarpus	i)	Oogamy
b)	Laminaria	ii)	Simple, branched
c)	Fucus	iii)	Colonial
d)	Volvox	iv)	Edible

1) a-ii ; b - iv ; c- i ; d - iii

2) a-i ; b - ii ; c- iii; d - iv

3) a-iv ; b - iii ; c- ii ; d - i

4) a-ii ; b - iii ; c- iv ; d - i

36. In phaeophyceae, the gametes are :

1) Pyriform and bear 2 unequal flagella that are apically attached.

2) Pear shaped and bear 2 unequal flagella, laterally attached

3) Pyriform and bear 2 - 8 equal and apical

4) Pear shaped bear 2 - 8 equal and apical

37. Which of the following sets belongs to same class of alga :

1) Ectocarpus, Ulothrix, Chlorella

2) Chara, Polysiphonia, Fucus

3) Sargassum, Gracilaria, Laminaria

4) Laminaria, Fucus, Dictyota

38. Read the following statements about red algae and select the incorrect one :

1) The predominant pigment in red algae is r-phycoerythrin

2) Porphyra is a multicellular filamentous red alga

3) Agar is obtained from Gracilaria and Gelidium.

4) Cell wall in red algae is made up of cellulose, pectin and poly sulphate esters.

39. The characteristic stored food in Rhodophyceae is :

1) Mannitol

2) Starch

3) Laminarin

4) Floridean starch

40. Carrageen is a hydrocolloid obtained from :

1) Chlorophyceae

2) Phaeophyceae

3) Rhodophyceae

4) Cyanophyceae

41. Major sources of Agar are :

1) Gelidium and Sargassum

2) Gelidium and Gracilaria

3) Gracilaria and Sargassum

4) Polysiphonia and Gelidium

42. Sexual reproduction in Rhodophyceae is :

1) Isogamous

2) Anisogamous

3) Oogamous

4) All the above

43. Select the correct statement with regard to red algae :

1) Motile stages are totally absent in red algae

2) Major pigments in Rhodophyceae are chlorophyll a, b and phycoerythrin

3) In red algae, the sexual reproduction is through isogamy and anisogamy.

4) Most of the Rhodophycean members found in fresh water.

44. Select the correct match :

1) Algin - Gelidium

2) Agar - Gracilaria

3) Floridean starch - Ectocarpus

4) Laminarin - Rhodophyceae

45. Consider the following statements and select the correct option :

Statement I : Commercially important carrageen is obtained from red algae.

Statement II : Red alga-Porphyra and brown alga-Laminaria are used as food

1) Both the statements are true

2) Both statements are wrong

3) Statement I is true and II is wrong

4) Statement I is wrong and statement II is true

46. Which one is wrongly matched?

1) Uniflagellate gametes - Polysiphonia

2) Biflagellate zoospores - Brown algae

3) Gemma cups - Marchantia

4) Unicellular organism - Chlorella

47. Complex post fertilisation development is found in

1) Volvox

2) Porphyra

3) Fucus

4) Spirogyra

48. Holdfast, stipe and frond constitute the plant body in case of

1) Laminaria

2) Spirogyra

3) Anabaena

4) Volvox

BRYOPHYTES

49. Marchantia is a :

1) Homothallic, thalloid liverworts

2) Heterothallic, thalloid liverworts

3) Homothallic differentiated thalloid moss

4) Heterothallic, undifferentiated, thalloid advanced bryophyte

50. Consider the following statements and select the correct option :

Statement I : In Mosses, sporophyte is partially depend on gametophyte.

Statement II : Antheridiophore and archegoniophore are developed in female and male thallus of marchantia respectively.

1) Statement I is true

2) Statement II is true

3) Both statement I and II are true

4) Both statement I and II are false

51. **Assertion :** Peat is used as packing material for trans-shipment of living material.

Reason : Peat has the capacity to hold water.

1) If both Assertion and Reason are true, the Reason is correct explanation of Assertion

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

52. In bryophytes, antherozoids are :

1) Non-motile, produced in archegonium

2) Multiflagellated, produced in archegonium

3) Biflagellated, produced with in archegonium

4) Biflagellated, produced within antheridium

53. Consider the following statements regarding primary protonema :

A) Haploid and formed directly from spores due to mitosis

B) Haploid and formed directly from spores due to meiosis.

C) Haploid leafy gametophyte formed from spores due to mitosis

D) Haploid leafy gametophyte formed from spores due to meiosis.

Of the above statements.

1) Only D is false

2) Only C is true

3) A and D are true

4) B, C and D are false

54. Gemmae are :

1) Green, multicellular, diploid, asexual bud and photosynthetic in nature.

2) Green, multicellular, haploid, asexual bud in Marchantia.

3) Green, multicellular, diploid, asexual bud found in all bryophytes.

4) Green, multicellular, haploid asexual bud produced in mosses only.

55. In Funaria, rhizoids are :

1) Unicellular, multinucleated

2) Multicellular, unbranched

3) Multicellular, branched

4) Unicellular, unbranched

56. Find the mis-matched pair :

A) Antheridiophore - Mosses

B) Sphagnum - Peat

C) Secondary protonema - Haploid

D) Polytrichum - Protonemal and leafy gametophyte

1) A only

2) All except B

3) D only

4) C only

57. Independent sporophyte is not found in :

1) Bryophytes

2) Pteridophytes

3) Gymnosperms

4) Angiosperms

58. In moss, zygote is formed in :

1) Antheridium

2) Archegonium

3) Prothallus

4) Protonema stage

59. In Funaria, the haploid structure is :

1) Capsule 2) Seta

3) Foot 4) Protonema

60. Which provides peat that have long been used as fuel?

1) Marchantia

2) Funaria

3) Sphagnum

4) Polytrichum

61. Bryophytes include :

1) Ferns and Horse tails

2) Naked seeded plants

3) Mosses and Liverworts

4) Liver worts and Horse tails

62. Select a liverwort from the following :

1) Funaria

2) Marchantia

3) Sphagnum

4) Polytrichum

63. Adult gametophyte in Funaria has :

1) Upright slender axes bearing spirally arranged leaves

2) Multicellular and branched rhizoids

3) Multicellular sex organs

4) All of the above

PTERIDOPHYTES

64. A plant having vascular supply, producing spores but lacking seed is a :

1) Bryophyte

2) Pteridophyte

3) Gymnosperm

4) Angiosperm

65. Which one of the following is heterosporous?

1) Adiantum

2) Equisetum

3) Dryopteris

4) Salvinia

66. Selaginella and Salvinia are considered to represent a significant step towards evolution of seed habit because :

1) Megaspores possess endosperm and embryo surrounded by seed coat.

2) Embryo develops in female gametophyte, which is retained on parent sporophyte

3) Female gametophyte is free and get dispersed like seeds.

4) Female gametophyte lacks archegonia.

67. In bryophytes and pteridophytes, transport of male gamete requires :

1) Wind

2) Insects

3) Birds

4) Water

68. The prothallus represents :

1) Gametophyte of Fern

2) Gametophyte of Bryophyte

3) Sporophyte of Gymnosperm

4) Sporophyte of Fern

69. Selaginella differs from Pteris (Fern) in which of the following character :

1) Absence of seed

2) Absence of leaves

3) Needs water for fertilization

4) Heterosporous condition

70. Meiosis (Reduction division) in Pteridophytes takes place at the time of :

1) Spore formation

2) Sex organ formation

3) Germination of spores

4) Gamete formation

71. Select the mismatched one :

1) Psilopsida - Psilotum

2) Lycopsida - Selaginella

3) Sphenopsida - Lycopodium

4) Pteropsida - Adiantum

72. Read the following statements and select the correct option :

Statement I : Homosporous Pteridophytes have independent gametophyte and sporophyte.

Statement II : In heterosporous pteridophytes female gametophyte dependent on sporophyte.

1) Both the statements are true

2) Both statements are wrong

3) Statement I is true and II is wrong

4) Statement I is wrong and statement II is true

73. **Assertion** : Water is required for fertilization process in ferns.

Reason : Flagellated antherozoids reach the archegonium with the help of water.

1) If both Assertion and Reason are true, the Reason is correct explanation of Assertion

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

74. The plant groups which possess xylem and phloem?

1) Bryophyte

2) Pteridophytes

3) Gymnosperms

4) Both 2 and 3

75. Which of the following is an incorrect statement?

1) Gametophytes of Pteridophytes are with protonemal and leafy stages

2) Pteridophytes include horsetails and ferns

3) Origin of seed habit can be traced in Pteridophytes

4) Selaginella belongs to the class Lycopsida

76. Heterospory is the production of

1) Sexual and asexual spores

2) Large and small spores

3) Haploid and diploid spores

4) Diploid and tetraploid spores

77. Which of the following is a rootless pteridophyte ?

1) Adiantum 2) Dryopteris

3) Selaginella 4) Salvinia

78. Which of the following group of Pteridophytes belong to class-Pteropsida?

1) Equisetum & Psilotum

2) Lycopodium & Adiantum

3) Selaginella & Pteris

4) Pteris, Dryopteris & Adiantum

79. Prothallus of fern produces :

1) Gametes

2) Spores

3) Both 1 and 2

4) Gemmae

GYMNOSPERMS AND ANGIOSPERMS

80. The highly reduced male gametophyte in Gymnosperm is called :

1) Pollen grain

2) Ovule

3) Endosperm

4) Megasporangium

81. Microsporangia are located in gymnosperms:

1) At the apex of microsporophyll

2) On the adaxial surface of microsporophyll

3) On the abaxial surface of microsporophyll

4) At the margin of microsporophyll

82. A gymnospermic leaf carries 24 chromosome. The number of chromosome in its endosperm is :

1) 72 2) 24

3) 12 4) 48

83. The plant groups which produce naked seeds :

1) Algae

2) Bryophytes

3) Gymnosperms

4) Pteridophytes

84. Functional megaspore in gymnosperm develops into :

1) Embryo sac

2) Ovule

3) Endosperm

4) Megasporangium

85. Heterospory is found in which of the following genus :

i) Pinus ii) Cycas

iii) Salvinia iv) Equisetum

v) Selaginella

1) i, ii, iii, iv

2) i and ii

3) i, ii, iii and v

4) iii and iv

86. Female gametophyte in gymnosperm is represented by :

1) Endosperm

2) Embryo sac

3) Megaspore mother cell

4) Embryo

87. Find out the mismatched one :

1) Lax - Loosely packed sporophylls

2) Pinus - Coralloid root

3) Sequoia - Giant red wood tree

4) Cycas - Unbranched

88. In gymnosperms, ovules are borne on :

1) Megasporangia

2) Megasporophyll

3) Nucellus

4) Microsporophyll

89. Consider the following statements and select the correct option :

Statement I : In Gymnosperms, seeds are not enveloped by fruit.

Statement II : In Gymnosperms, male and female gametophytes do not have an independent free living existence.

1) Both the statements are true

2) Both statements are wrong

3) Statement I is true and II is wrong

4) Statement I is wrong and statement II is true

90. Gametophytes are dependent on sporophyte in the following plant group :

1) Algae

2) Bryophyte

3) Gymnosperm

4) Homosporous Pteridophyte

91. Gymnosperms are characterised by

1) Multiciliated male gametes

2) Winged seed

3) Seeds inside fruits

4) Naked seeds

92. Which of the following plants produce seeds but not fruit ?

1) Eucalyptus and Pinus

2) Pinus and Wolffia

3) Funaria and Fern

4) Cedrus and Cycas

93. In Gymnosperms, pollination takesplace by:

1) Water [Hydrophily]

2) Wind [Anemophily]

3) Insects [Entomophily]

4) Animals [Zoophily]

94. The giant red wood tree (*Sequoia*) is a/an :

1) Algae 2) Bryophyte

3) Pteridophyte 4) Gymnosperm

95. The gametophytic generation do not have an independent free living existence in :

1) Bryophytes

2) Gymnosperms

3) Algae

4) Homosporous Pteridophytes

SAMPLE QUESTIONS

1. Motile structures are not formed during any stage in the life cycle of :

1) Red algae

2) Green algae

3) Brown algae

4) Both 2 and 3

2. The cell wall of brown algae consists of :

1) Outer cellulose and inner pectin

2) Inner pectin and outer algin

3) Outer algin and inner cellulose

4) Inner algin and outer cellulose

3. In Phaeophyceae, the stored food is :

1) Laminarin or Mannitol

2) Laminarin only

3) Mannitol only

4) Floridean starch

4. Choose the wrong pair :

1) Psilotum - Psilopsida

2) Lycopodium - Pteropsida

3) Equisetum - Sphenopsida

4) Selaginella - Lycopsida

5. The dominant phase is the diploid sporophyte in which of the following groups :

1) Pteridophytes, Gymnosperms and Angiosperms

2) Bryophytes, Gymnosperms and Angiosperms

3) Algae, Gymnosperms and Angiosperms

4) Algae, Pteridophytes and Angiosperms

6. The first stage of gametophyte in mosses which develops from a spore :

1) Prothallus

2) Promycelium

3) Leafy stage

4) Protonema stage

7. The first terrestrial plants to possess vascular tissues - xylem and phloem :

1) Bryophytes

2) Pteridophytes

3) Gymnosperms

4) Angiosperms

8. Male gametophyte in gymnosperm is represented by :

1) Embryosac

2) Pollen grain

3) Nucellus

4) Endosperm

9. Select the Pteridophytes in which the sporophylls may form distinct compact structures called strobili/cones:

1) Selaginella and Salvinia

2) Selaginella and Equisetum

3) Equisetum and Salvinia

4) Equisetum and Adiantum

10. Roots of which genera of Gymnosperms have fungal association in the form of mycorrhiza :

1) Pinus 2) Cycas

3) Cedrus 4) Pteris

11. In Pinus, sunken stomata and thick cuticle helps to :

1) Increase surface area

2) Decrease surface area

3) Reduce transpiration

4) Increase transpiration

12. Which of the following is a rootless pteridophyte:

1) Equisetum 2) Selaginella

3) Salvinia 4) Sphagnum

13. Gemmae are seen in :

1) Funaria

2) Marchantia

3) Sphagnum

4) Polytrichum

14. Protonema is the juvenile stage of :

1) Laminaria 2) Marchantia

3) Funaria 4) Ferns

15. Rhizoids of mosses are:

1) Unicellular

2) Multicellular

3) Diploid

4) Triploid

16. Artificial system of classification proposed by Linnaeus was based on :

1) Physiological characters

2) Phylogeny

3) Sexual characters

4) Both 1 and 3

17. Main plant body of algae is :

1) Haploid, gametophytic thallus

2) Diploid, sporophytic thallus

3) Haploid, sporophytic thallus

4) Diploid gametophytic thallus

18. Carageen and agar-agar are :

1) Protein

2) Phycocolloids

3) Hydrocolloids

4) Both 2 and 3

19. Cell wall of green algae is composed of :

1) Inner algin and outer cellulose

2) Polysulphate esters and algin

3) Inner cellulose and outer pectose

4) Outer cellulose and inner pectose

20. The thallus of Laminaria is differentiated into :

1) Foot, Seta, Capsule

2) Rhizoid, Stem, Leaves

3) Rhizome, Sporophyll

4) Holdfast, Stipe, Frond

21. Which of the following algae belong to the same class?

1) Chara, Fucus, Polysiphonia

2) Volvox, Spirogyra, Chlamydomonas

3) Porphyra, Ectocarpus, Ulothrix

4) Sargassum, Laminaria, Gracilaria

22. The root like structures in bryophytes, by which they attach to the substratum :

1) Unicellular rhizoids only

2) Unicellular or multicellular rhizoids

3) Rhizome

4) Multicellular rhizoids only

23. Choose the correct statement :

1) In bryophytes, photosynthetic, multicellular plant body is gametophyte

2) During sexual reproduction male and female sex organs are produced on different thalli in Marchantia

3) In mosses, sporophyte is partially dependent on gametophyte

4) All statements are correct

24. First vascular plants which possess xylem and phloem :

1) Algae

2) Bryophytes

3) Pteridophytes

4) Gymnosperms

25. In homosporous pteridophytes sex organs are present in :

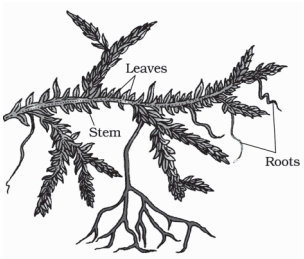
1) Sporophyte

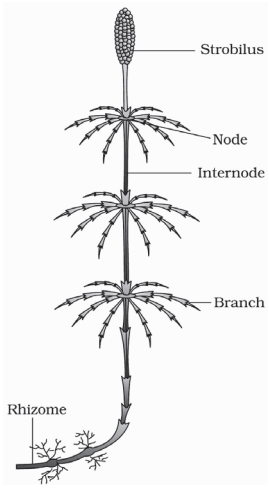
2) Gametophyte

3) Prothallus

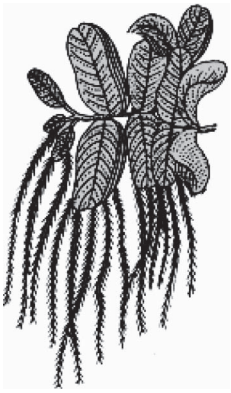
4) Both 2 and 3

26. Observe and identify the rootless pteridophyte.

1) 

2) 

3)

4) 

27. Which organism is associated with coralloid roots of Cycas?

1) Fungi

2) Green algae

3) N_2 fixing cyanobacteria

4) Brown algae

28. Double fertilization is a unique feature of :

1) Gymnosperms 2) Pteridophytes

3) Angiosperms 4) Bryophytes

29. Select the mismatch with respect to Angiosperms :

1) Egg cell - Haploid (n)

2) Zygote - Diploid (2n)

3) Endosperm - Haploid (n)

4) Microspore - Haploid

30. Which of the following is a red alga ?

1) Ectocarpus 2) Polysiphonia

3) Kelps 4) All of the above

31. Consider the following statements regarding Numerical taxonomy and select the correct option.

a) Numerical taxonomy is now easily carried out using computers

b) It is based on all observable characters

c) It considers evolutionary relationship among organisms.

d) In numerical taxonomy, number and codes are assigned to all the characters and the data are then processed.

e) Each character is given equal importance

f) Few number of characters can be considered

1) a, b, c are true and d, e, f are wrong

2) a,b, d and e are true and c, f are wrong

3) All statements are correct

4) a, b, c, d are true and e, f are wrong

32. Read the following statements and select the correct option.

I. Artificial system is mainly based on vegetative and morphological characters

II. Natural systems were based on natural affinities among organisms and considered not only the external features but also internal features.

III. Phylogenetic system is based on evolutionary relationship between various organisms.

1) I and II only

2) II and III only

3) I and III only

4) I, II and III

33. How many of the following are marine, attached algae?

[Spirogyra, Eudorina, Ulothrix, Volvox, Laminaria, Fucus, Dictyota, Porphyra, Polysiphonia]

1) 2 2) 3

3) 4 4) 5

34. Match the following :

Column I		Column II	
i.	Chlorella	a.	Mannitol and Laminarin
ii.	Fucus	b.	Glycogen
iii.	Polysiphonia	c.	Starch and oil
iv.	Nostoc	d.	Floridean starch

1) i-c, ii-b, iii-d, iv-a

2) i-c, ii-d, iii-b, iv-a

3) i-c, ii-a, iii-d, iv-b

4) i-b, ii-c, iii-a, iv-d

35. Select the mismatched one :

1) Isogamy - Spirogyra, Ulothrix, Cladophora, Chlamydomonas

2) Anisogamy - Eudorina

3) Oogamy - Fucus

4) Isogamy - Volvox

36. Which group of algae exhibit oogamous type of reproduction with non motile male gamete :

1) Rhodophyceae

2) Phaeophyceae

3) Cyanophyceae

4) Chlorophyceae

37. Multicellular plant body formed from diploid zygote by mitotic division in mosses :

1) Diploid gametophyte

2) Diploid sporophyte

3) Haploid gametophyte

4) Haploid sporophyte

38. Protonema is :

1) Diploid, filamentous, photosynthetic and formed by mitosis

2) Haploid, filamentous, photosynthetic and formed from spore due to mitosis

3) Haploid, filamentous, photosynthetic and formed from spore due to meiosis

4) A haploid structure which bears sex organs

39. Which among the following statements are correct regarding gametophyte of Pteridophytes?

I) Independent and photosynthetic

II) They require cool, damp and shady places to grow

III) The gametophyte is dorsiventrally flattened without vascular tissue

1) I and II only

2) I only

3) II only

4) All statements are correct

40. Lax, relaxed sporophyll is present in :

1) Male plant of cycas

2) Male plant of Pinus

3) Female plant of cycas

4) Female plant of Pinus

Statement Type Questions

1) Both the statements are true

2) Both statements are wrong

3) Statement I is true and II is wrong

4) Statement I is wrong and statement II is true

41. **Statement I :** The sporophytic body of pteridophyte do not produce sex organs.

Statement II : Male gametes are flagellated and motile in pteridophyte and do not require water for fertilization.

42. **Statement I :** In angiosperms and gymnosperms, megaspore mother cell undergo meiosis to form functional megaspore.

Statement II : In angiosperms and gymnosperms, fertilization occurs within megasporangium.

Assertion - Reason Type Questions

1) If both Assertion and Reason are true, the Reason is correct explanation of Assertion

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

43. **Assertion :** Rhodophycean algae are found in great depths in ocean where relatively little light penetrates.

Reason : Rhodophycean algae possess phycoerythrin.

44. **Assertion :** Algae are non-vascular non embryophyte.

Reason : Fertilisation occur in archegonium of all alga.

45. **Assertion :** In heterosporous pteridophytes, female gametophyte is retained within sporophyte.

Reason : All Gymnosperms and Angiosperms are heterosporous

ANSWER KEY

1.	2	20.	1	39.	4	58.	2	77.	4
2.	4	21.	1	40.	3	59.	4	78.	4
3.	4	22.	3	41.	2	60.	3	79.	1
4.	3	23.	1	42.	3	61.	3	80.	1
5.	2	24.	2	43.	1	62.	2	81.	3
6.	2	25.	4	44.	2	63.	4	82.	3
7.	2	26.	4	45.	1	64.	2	83.	3
8.	1	27.	3	46.	1	65.	4	84.	3
9.	4	28.	1	47.	2	66.	2	85.	3
10.	1	29.	2	48.	1	67.	4	86.	1
11.	2	30.	2	49.	2	68.	1	87.	2
12.	1	31.	4	50.	1	69.	4	88.	2
13.	3	32.	4	51.	1	70.	1	89.	1
14.	3	33.	3	52.	4	71.	3	90.	3
15.	4	34.	3	53.	4	72.	1	91.	4
16.	3	35.	1	54.	2	73.	1	92.	4
17.	1	36.	2	55.	3	74.	4	93.	2
18.	3	37.	4	56.	1	75.	1	94.	4
19.	4	38.	2	57.	1	76.	2	95.	2

SAMPLE QUESTIONS

1.	1	10.	1	19.	3	28.	3	37.	2
2.	3	11.	3	20.	4	29.	3	38.	2
3.	1	12.	3	21.	2	30.	2	39.	4
4.	2	13.	2	22.	2	31.	2	40.	3
5.	1	14.	3	23.	4	32.	4	41.	3
6.	4	15.	2	24.	3	33.	4	42.	1
7.	2	16.	3	25.	4	34.	3	43.	1
8.	2	17.	1	26.	4	35.	4	44.	3
9.	2	18.	4	27.	3	36.	1	45.	2

WORK BOOK

Chapter 03

MORPHOLOGY OF FLOWERING PLANTS

THE ROOT

1. The direct elongation of radicle leads to the formation of

1) Primary root

2) Secondary root

3) Fibrous root

4) Adventitious root

2. Which among the following description is incorrect about tap root system

1) Embryonic origin

2) Long lived primary root

3) Presence of different types of root in mature root system

4) Found in dicots and few monocots

3. Tap root system is not expecting in the plant

1) Mustard

2) China rose

3) Maize

4) Sunflower

4. Grasses have the following root system except

1) Tap root system

2) Fibrous root system

3) Adventitious root system

4) Both 1 and 3

5. Which among the following region of root possess root hairs ?

1) Meristematic region

2) Elongation region

3) Maturation region

4) Root cap region

6. Which among the following description is wrong about meristematic region

1) It is just proximal to the root cap region

2) Presence of small, thin walled cells

3) Growing region

4) H_2O absorbing area

7. Region of elongation lies ;

1) Below the maturation region

2) Above the meristematic region

3) Just above the root cap region

4) Both 1 and 2

8. In Plants like Carrot, Turnip, ,Beetroot etc, the primary root is modified

1) Below the soil for respiration

2) Above the soil for respiration

3) Below the soil for storage

4) Above the soil for storage

9. The opening present on the aerial root of rhizophora is known as

1) Pneumatothode

2) Pneumatophore

3) Hydathode

4) Lenticels

10. Prop root found in banyan tree originating from

1) Horizontal branch and grows oblique downward

2) Horizontal branch and grows vertically downward

3) Main stem and grows oblique downward

4) Main stem and grows vertically downward

11. Halophytes like Rhizophora possess

1) Prop root

2) Stilt root

3) Pneumatophore

4) Storage root

12. Which among the following plant possess swollen root ?

1) Sugar cane

2) Sweet-potato

3) Banyan tree

4) Maize

THE STEM

13. Stem is the ascending axis of shoot originating from the part of embryo

1) Radicle

2) Plumule

3) Cotyledon

4) Any part of embryonal axis

14. The region of the stem where leaves are borne are called

1) Nodes

2) Internodes

3) Thalamus

4) Both 1 and 2

15. Read the following statements and identify the correct option.

Statement I : Stem bears buds which may be terminal or axillary.

Statement II : Stem is generally dark brown when young and later often become woody and green.

1) Statement I and II are correct

2) Statement I and II are incorrect

3) Statement I is correct, II is incorrect

4) Statement I is incorrect, II is correct

16. The main function/functions of stem include :

1) Spreading out branches bearing leaves, flowers, fruits etc

2) Conduction of H_2O, minerals and photosynthate

3) Photosynthesis and storage

4) Both 1 and 2

17. Stem differ from root in the following characteristics

1) Presence of two types of buds

2) Axis is divided into nodes and internodes

3) Presence of mechanical tissues

4) All the above

18. Which among the following plant have stem below the soil modified for storage ?

1) Citrus

2) Bougainvillea

3) Ginger

4) Sweet potato

19. Swollen stem found below the soil as in the case of Potato, Zaminkand etc can act as organ of / for

1) Defence

2) Protection

3) Mechanical support

4) Perennation

20. Plants like Cucumber, Pumpkin and Grapevine possess

1) Stem thorns

2) Stem tendrils

3) Perennation organs

4) Storage organs

21. Which among the following plant posses aerial stem modified into green, fleshy and flattened structure ?

1) Turmeric

2) Opuntia

3) Euphorbia

4) Amorphophallus

22. Sub-aerial stem modifications or creepers are modified for

1) Storage

2) Vegetative propagation

3) Photosynthesis

4) Climb on support

23. Modified stems of some plants spread to new niches through just over soil surface to produce new plant is found in

1) Pistia, Eichornia

2) Grass, Strawberry

3) Mint, Jasmine

4) Banana, Pineapple

24. Which among the following plant possess a lateral branch with short internodes and each node bearing a rosette of leaf

1) Chrysanthemum

2) Oxalis

3) Pistia

4) Citrus

THE LEAF

25. Which among the following sentence is true about the morphology of leaf ?

1) It is a lateral, generally flattened structure

2) It develops at the node and bears a bud in the axil

3) They are arranged in an acropetal order

4) All the above

26. Which among the following is not a compulsory part of leaf ?

1) Leaf base

2) Petiole

3) Lamina

4) Stipule

27. Stalk of a simple leaf is named as

1) Stipule

2) Petiole

3) Pedicel

4) Peduncle

28. Which among the following description is incorrect about the vein and venation

1) A veins provide rigidity to the lamina and act as channels for transport

2) All dicotyledonous plant possess reticulate venation

3) Venation is applicable to the leaf lamina or blade

4) All lamina possess primary vein or midrib

29. Neem and silk cotton possess

1) Simple leaf

2) Pinnately compound leaf

3) Compound leaf

4) Palmately compound leaf

30. Phyllotaxy is the pattern of arrangement of leaf at the

1) Node of stem or branch

2) Internode of stem or branch

3) Node of main stem

4) Node of branch only

31. Which among the following pair of plant possess two leaves at a node

1) Alstonia, Mustard

2) China rose, Sunflower

3) Calotropis, Guava

4) Both 1 and 2

32. A bud is present in the axil of

1) Petiole of simple leaf

2) Stalk of compound leaf

3) Leaflet of compound leaf

4) Both 1 and 2

33. The leaf of China rose is characterised by the presence of

1) Reticulate venation

2) Alternate phyllotaxy

3) Simple leaf

4) All the above

34. The leaflet of compound leaf is modified into tendril for climbing is in

1) Opuntia

2) Pea

3) Onion

4) Acacia

35. Which part of leaf is modified into a new structure in Australian acacia ?

1) Leaf base

2) Petiole

3) Stipule

4) Ligule

36. In Neem plant, leaflets are arranged

1) on either side of rachis

2) on either side of petiole

3) at the tip of rachis

4) at the tip of petiole

THE INFLORESCENCE & THE FLOWER

37. The term 'Peduncle' refers to the

1) Inflorescence axis

2) Floral axis

3) Stalk of flower

4) Modified bract

38. Inflorescence are classified according to

1) Branching of peduncle

2) Sexuality of flowers

3) Order of maturation of flowers on the peduncle

4) All the above

39. **Assertion :** In racemose inflorescence, the peduncle is of indefinite growth.

Reason : In racemose inflorescence peduncle never ends in flower.

1) Both Assertion and Reason are true, Reason is correct explanation of Assertion.

2) Both Assertion and Reason are true, Reason is not correct explanation of Assertion.

3) Assertion is true, But Reason is false

4) Both Assertion and Reason is true

40. Which among the following description is wrong about cymose inflorescence ?

1) Peduncle ends in flower

2) Flowers are in acropetal order

3) Peduncle is of definite growth

4) Oldest flower is at the tip of peduncle

41. Read the following statements and identify the correct option.

Statement I : Flower is a modified shoot mean for sexual reproduction.

Statement II : Floral axis bears different types of floral leaves.

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct, II is incorrect

4) Statement I is incorrect, II is correct.

42. In some plants like Lily, calyx and corolla are not distinct and are termed as

1) Sepal

2) Petal

3) Tepal

4) Perianth

43. In dicotyledonous plants, usually the flowers are

1) Tetramerous

2) Pentamerous

3) Trimerous

4) Both 1 and 2

44. Which among the following is/are accessory organs of flower ?

1) Calyx

2) Corolla

3) Perianth

4) All the above

45. Match the name of aestivation of corolla given in column I with that of examples given in column II.

Column I		Column II	
A.	Valvate	1.	Bean
B.	Twisted	2.	China rose
C.	Imbricate	3.	Brinjal
D.	Vexillary	4.	Gulmohar

1) A-1 ; B-2 ; C-3 ; D-4

2) A-4 ; B-3 ; C-2 ; D-1

3) A-3 ; B-2 ; C-4 ; D-1

4) A-2 ; B-1 ; C-2 ; D-4

46. Which among the following plant possess half inferior ovary ?

1) Rose

2) Plum

3) Peach

4) All the above

47. Aestivation is the mode of arrangement of

1) All types of floral leaves

2) Accessory organ

3) Essential parts

4) Tepals of perianth only

48. Assymmetrical flower is found in

1) Canna 2) Mustard

3) Brinjal 4) China rose

49. In Salvia and Mustard, there is variation in the length of

1) Style of carpel

2) Filament of stamen

3) Pedicel of flower

4) Thalamus of flower

50. **Assertion :** The shape and colour of calyx, vary greatly in plants.

Reason : The calyx may be tubular, bell shaped or wheel shaped.

1) Both Assertion and Reason are true, Reason is correct explanation of Assertion.

2) Both Assertion and Reason are true, Reason is not correct explanation of Assertion.

3) Assertion is true, But Reason is false

4) Both Assertion and Reason are false

51. In epipetalous condition, the filament of stamen is attached to

1) Petal of corolla

2) Sepal of calyx

3) Leaf

4) Tepal of perianth

52. Which among the following description is wrong about an epigynous flower ?

1) The margin of thalamus grows upward enclosing the ovary completely

2) The other parts of flower arise above the ovary

3) Ovary is inferior in position

4) It is common guava, mustard and Brinjal

53. Adelphy is a type of cohesion existing in the following floral whorl

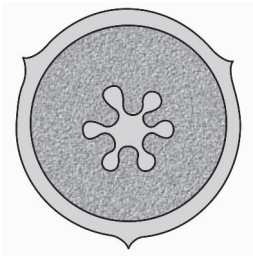
1) Calyx

2) Corolla

3) Androecium

4) Gynoecium

54. The following diagram illustrate a type of placentation which is common in the plant



1) Dianthus

2) Tomato

3) Argemone

4) Marigold

55. Placenta is a mass of special tissue which is found attached to the margin of

1) Ovary

2) Ovule

3) Anther

4) Both 1 and 2

56. Identify the type of aestivation given below.

1) Valvate

2) Twisted

3) Imbricate

4) Vexiallary

57. Which among the following placentation possess many ovules inside the ovary ?

1) Axile

2) Free central

3) Parietal

4) All the above

58. Multicarpellary apocarpous gynoecium is found in

1) Lotus

2) Mustard

3) Tomato

4) China rose

59. Identify the incorrectly matched pair

1) Monocarpellary gynoecium - Pea, Bean

2) Monadelphous androecium - Salvia, Mustard

3) Zygomorphic flower - Gulmohar, Cassia

4) Gamosepalous calyx - Tomato, Brinjal

60. The receptive surface for pollen grain is

1) Ovary

2) Style

3) Stigma

4) None of these

61. Generally, fruit is a

1) Fertilized ovule

2) Fertilized ovary

3) Fertilized flower

4) Both 1 and 2

62. The fruit wall is called as

1) Mesocarp

2) Endocarp

3) Epicarp

4) Pericarp

63. Read the following statements and identify the correct option.

Statement I : Fertilization in flower is essential for the formation of fruit.

Statement II : All fruit are with seeds.

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct, II is incorrect

4) Statement I is incorrect, II is correct.

64. Which among the following is a distinguishing characteristic feature of parthenocarpic fruit ?

1) Presence of only one seed

2) Absence of seed

3) Differentiation of pericarp

4) Dry nature of pericarp

65. Fruit developed from ovary of flowers only after fertilization is

1) True fruit

2) Parthenocarpic fruit

3) False fruit

4) None of these

66. The fruit wall of Mango and Coconut have

1) No sub layers

2) 3 sub layers

3) 2 sub layers

4) 4 sub layers

67. Which among the following is not correct about drupe ?

1) It develops from monocarpellary superior ovary

2) It is a fleshy fruit

3) Presence of hard mesocarp

4) Presence of hard endocarp

68. Which among the following part of fruit wall is edible in Coconut ?

1) Epicarp

2) Mesocarp

3) Endocarp

4) None of the part of pericarp is edible

69. Mango and Coconut possess

1) True fruit

2) Parthenocarpic fruit

3) False fruit

4) No fruit

70. Read the following statements.

Statement I : In Mango mesocarp is edible

Statement II : In Coconut mesocarp is fibrous.

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct, II is incorrect.

4) Statement I is incorrect, II is correct.

71. A seed can be better defined as

1) Fertilized ovary

2) Fertilized ovule

3) Fertilized flower

4) Unfertilized ovary

72. The outermost seed coat layer is

1) Exine

2) Intine

3) Testa

4) Tegmen

73. Aleurone layer is the part of

1) Embryo of monocot

2) Endosperm of monocot

3) Embryo of dicot

4) Endosperm of diocot

74. Which among the following description is correct about the structure and functions of part of seed

1) All dicot seeds are non-endospermic

2) Most of the dicot seeds are non-endospermic

3) Most of the monocot seeds are endospermic

4) Both 2 and 3

75. Identify a plant with non-endospermic seeds from the following.

1) Orchid

2) Castor

3) Maize

4) Wheat

76. Read the following statements and identify the correct option.

Statement I : In monocot seed, embryo is larger size and situated in a groove at one end of the endosperm.

Statement II : Embryo consists of one small and shield shaped cotyledon known as scutellum and a long axis with a plumule and radicle.

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct, II is incorrect

4) Statement I is incorrect, II is correct.

77. Coleorhiza and coleoptile are the parts of

1) Embryo of dicot

2) Embryo of monocot

3) Endosperm of dicot

4) Endosperm of monocot

78. In non-endospermous seeds, food is mainly stored in ;

1) Endosperm

2) Radicle

3) Cotyledon

4) Plumule

79. Which among the following is not a part of seed ?

1) Epicarp

2) Mesocarp

3) Endocarp

4) All the above

80. Which among the following is a non-endospermous seed ?

1) Castor 2) Paddy

3) Bean 4) Wheat

FAMILY DESCRIPTION

81. Which among the following floral character can be expressed in floral diagram ?

1) Aestivation

2) Placentation

3) Sexuality of flower

4) All the above

82. Different types of fusion of floral leaves can be shown in/through

1) Floral formula only

2) Floral diagram only

3) Both 1 and 2

4) None of these

83. In the floral formula, over bracketing the two letters indicate ;

1) Cohesion of floral leaves

2) Adhesion of floral leaves

3) Position of ovary

4) Symmetry

84. How many among the following families possess basal placentation

Malvaceae, Brassicaceae, Fabaceae, Asteraceae, Poaceae, Solanaceae

1) 2 2) 3

3) 4 4) 5

85. Match the name of plants given in column I with that of the name of family given in column II.

Column I		Column II	
A.	Mustard	1.	Solanaceae
B.	Soyabean	2.	Asteraceae
C.	Cotton	3.	Brassicaceae
D.	Brinjal	4.	Fabaceae
E.	Marigold	5.	Malvaceae

1) A-1 ; B-2 ; C-3 ; D-4 ; E-5

2) A-5 ; B-4 ; C-3 ; D-2 ; E-1

3) A-3 ; B-4 ; C-5 ; D-1 ; E-2

4) A-2 ; B-1 ; C-4 ; D-3 ; E-5

86. Which among the following plant possess 6 stamens in androecium which are in two whorls ?

1) Mustard

2) Lady's finger

3) Garden pea

4) Tomato

87. Brassicaceae and Solanaceae share the following similarity

1) Parietal placentation

2) Persistent calyx

3) Pentamerous flower

4) Bicarpellary gynoecium

88. Which among the following is not a distinguishing character of Malvaceae ?

1) Presence of epicalyx

2) Twisted aestivation in corolla

3) Axile placentation

4) Diadelphous androecium

89. Observe the floral formula of brassicaceae; identify the whorl which is wrongly described

$\oplus$ ⚥ $K_{2+2}C_4A_4\underline{G}_{(2)}$

1) Calyx

2) Corolla

3) Androecium

4) Gynoecium

90. Which among the following pair of plants belongs to the same family ?

1) Mustard, Groundnut

2) Lady's finger, Soyabean

3) Sunflower, Marigold

4) Wheat, Tomato

91. Read the following statements and identify the correct option.

Statement A : Dicotyledonous plants possess tetramerous or pentamerous flowers.

Statement B : Monocotyledonous plant possess tetramerous or trimerous flowers.

1) Statement A and B are correct.

2) Statement A and B are incorrect.

3) Statement A is correct, B is incorrect.

4) Statement A is incorrect, B is correct.

92. Head inflorescence is characteristic of the following plant

1) China rose

2) Sunflower

3) Maize

4) Garden pea

93. The economically important group, pulses belongs to the family ;

1) Malvaceae

2) Fabaceae

3) Solanaceae

4) Asteraceae

94. Identify the mis-matched pair

1) Axile placentation - Malvaceae

2) Marginal placentation - Fabaceae

3) Basal placentation - Asteraceae

4) Parietal placentation - Poaceae

95. Spikelet inflorescence is commonly found in the following family

1) Poaceae

2) Asteraceae

3) Fabaceae

4) Mimosae

96. Which among the following is not a character of Fabaceae ?

1) Zygomorphic flower

2) Diadelphous androecium

3) Bicarpellary gynoecium

4) Marginal placentation

97. Both cohesion and adhesion type of fusion, are found in androecium in the following family

1) Poaceae

2) Brassicaceae

3) Asteraceae

4) Fabaceae

98. Which among the following plant not belongs to Brassicaceae ?

1) Mustard

2) Brassica

3) Arabidopsis

4) Cotton

99. The economically important group cereals belongs to the family

1) Asteraceae

2) Poaceae

3) Solanaceae

4) Fabaceae

100. Lodicules found in Poaceae is

1) Modified sepal

2) Modified petal

3) Modified tepal

4) Modified bract

SAMPLE QUESTIONS

1. Similarity shared by the tap root system and fibrous root system is

1) Non-embryonic origin

2) Embryonic origin

3) long lived primary root

4) Short lived primary root

2. Root hairs are absent in the following region of root

1) Root cap region

2) Meristematic region

3) Elongation region

4) All the above

3. Stem is the edible part in the following plant/s

1) Ginger

2) Turmeric

3) Potato

4) All the above

4. Root is the edible part in the following plant/s

1) Sweet potato

2) Carrot

3) Amorphophallus

4) Both 1 and 2

5. As far as different regions of root is concerned; growth regulators are mainly formed in

1) Meristematic region

2) Elongation region

3) Maturation region

4) Root cap region

6. Apical bud and axillary buds are present in/on

1) Main stem

2) Branch

3) Root

4) Both 1 and 2

7. An underground stem grows horizontally below the soil and carries scale leaf at the node is found in

1) Ginger

2) Zaminkand

3) Onion

4) Potato

8. Read the following statements and identify the correct option.

Statement I : The stem may not always be typically like what they are expected to be

Statement II : Stem is generally green when young and later often become woody and dark brown.

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct, statement II is incorrect.

4) Statement I is incorrect, statement II is correct.

9. Thorns found in Citrus and Bougainvillea are;

1) Aerial stem modification

2) Sub-aerial stem modification

3) Underground stem modification

4) Leaf modification

10. Tendrils which help to climb on support are found in

1) Cucumber

2) Pumpkins

3) Watermelon

4) All the above

11. Plants like grasses, Jasmine, Pistia etc possess stem modification meant for

1) Vegetative propagation

2) Defence

3) Photosynthesis

4) Storage and perennation

12. Which among the following part of leaf is named as pulvinus in leguminous plants ?

1) Leaf base

2) Petiole or Rachis

3) Leaf lamina

4) Stipule

13. How many leaves are present at the node of a stem or branch of Calotropis

1) One

2) Two

3) Four

4) Many

14. The term 'vein and veinlets' refers to the

1) Stalk of leaf

2) Vascular tissue arrangement

3) Branching of stalk

4) Size and shape of margins of leaf

15. Venation is the mode of arrangement of vein and veinlets, through the ;

1) Entire leaf

2) Lamina only

3) Petiole only

4) Leaf base only

16. When the leaflets are present on either side of rachis as in Neem or Rose, the leaf is said to be

1) Simple leaf

2) Pinnately compound leaf

3) Palmately compound leaf

4) Both 2 and 3

17. The order of maturation of leaf/leaves on a shoot axis is :

1) Basipetal

2) Acropetal

3) Imbricate

4) Valvate

18. Which among the following description is wrong.

1) Compound leaves are advanced than simple leaf

2) Stipules and ligules are accessory parts of leaf

3) Leaf is a bifacial organ with distinct dorsal and ventral surface

4) Axillary bud originate from the base of leaflet

19. The axis of flower which carries different types of floral leaves is named as

1) Thalamus

2) Pedicel

3) Peduncle

4) Bract

20. Spores are formed in the distinct areas of the following floral leaf/leaves

1) Stamen

2) Carpel

3) Petal

4) Both 1 and 2

21. **Assertion :** An ovary with basal placentation after fertilisation transforms into one seeded fruit.

Reason : In basal placentation ovary possess only one ovule.

1) Both assertion and reason are true, bur reason is the correct explanation of assertion.

2) Both assertion and reason are true, but reason is not the correct explanation of assertion.

3) Assertion is true, but reason is false

4) Both assertion and reason are false

22. Variation in the length of filament of stamen is found in the following family

1) Brassicaceae

2) Malvaceae

3) Fabaceae

4) Solanaceae

23. Lateral wall of ovary is free from thalamus so that ovary can be detached from the thalamus in the case of following type of flowers

1) Hypogynous flower only

2) Perigynous flower only

3) Epigynous flower only

4) Both 1 and 2

24. How many megasporangium can be there in an ovary

1) Always one

2) Always four

3) Always many

4) One to many

25. Maximum how many pollen sacs can be there in an anther

1) One 2) Two

3) Four 4) Varies

26. An aestivation with regular overlapping is ;

1) Valvate

2) Twisted

3) Imbricate

4) Vexillary

27. In which among the following placentation, ovary possess false septum separating ovary partially into two chambers

1) Axile

2) Parietal

3) Basal

4) Marginal

28. Which among the following wall layer in pericarp is fleshy and edible in most of the fleshy fruit ?

1) Epicarp

2) Mesocarp

3) Endocarp

4) Perisperm

29. **Assertion :** Parthenocarpic fruits are seedless

Reason : Parthenocarpic fruits are formed without fertilization.

1) Both assertion and reason are true, bur reason is the correct explanation of assertion.

2) Both assertion and reason are true, but reason is not the correct explanation of assertion.

3) Assertion is true, but reason is false

4) Both assertion and reason are false

30. Which among the following description is correct about the fruit of Mango and Coconut ?

1) Fibrous mesocarp

2) Thin endocarp

3) One seeded fruits

4) Developed from inferior ovary

31. A fertilized ovary is morphologically equivalent to

1) True fruit

2) Parthenocarpic fruit

3) False fruit

4) Apomictic seed

32. Which among the following part of seed is not a product of fertilization ?

1) Embryo

2) Endosperm

3) Perisperm

4) All the above

33. If a cell in the embryo possess 24 chromosomes what will be the chromosome number in a cell of endosperm ?

1) 24 2) 12

3) 36 4) 48

34. Scutellum is the part of ;

1) Embryo of dicot

2) Embryo of monocot

3) Endosperm of dicot

4) Endosperm of monocot

35. Which among the following is not an endospermic seed ?

1) Castor

2) Coconut

3) Maize

4) Bean

36. Testa and tegmen are

1) Pericarp layers

2) Seed coat layers

3) Parts of embryonal axis

4) Part of endosperm

37. Which among the following floral characters can be represented both in floral formula and floral diagram ?

1) Position of ovary

2) Aestivation

3) Placentation

4) Sexuality of flower

38. Swollen leaf base, named as pulvinus is common in the following family

1) Brassicaceae

2) Fabaceae

3) Asteraceae

4) Malvaceae

39. Which among the following is not a character of Brassicaceae ?

1) Cruciform corolla

2) Tetramerous flower

3) Monadelphous androecium

4) Parietal placentation

40. Identify a plant with basal placentation

1) Mustard

2) Lady's finger

3) Sunflower

4) Brinjal

41. Presence of two types of florets are found on the peduncle of an inflorescence ; which is

1) Simple raceme

2) Head/ capitulum

3) Spikelet

4) Cymose

42. Pentamerous flowers are found in the following family(s).

1) Malvaceae

2) Fabaceae

3) Solanaceae

4) All the above

43. Which of the following family possess the following floral formula

$\% \; ⚥ K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$

1) Cotton family

2) Pea family

3) Potato family

4) Sunflower family

44. Which among the following pair of plant possess inferior ovary ?

1) Pea, Bean

2) Lady's finger, Cotton

3) Paddy, Wheat

4) Marigold, Sunflower

45. Which one of the following is modified perianth in Poaceae family ?

1) Glumes

2) Palea

3) Lodicule

4) Lemma

ANSWER KEY

1.	1	21.	2	41.	1	61.	2	81.	4
2.	4	22.	2	42.	4	62.	4	82.	3
3.	3	23.	2	43.	4	63.	2	83.	2
4.	1	24.	3	44.	4	64.	2	84.	1
5.	3	25.	4	45.	3	65.	1	85.	3
6.	4	26.	4	46.	4	66.	2	86.	1
7.	4	27.	2	47.	2	67.	3	87.	4
8.	3	28.	2	48.	1	68.	4	88.	4
9.	1	29.	3	49.	2	69.	1	89.	3
10.	2	30.	1	50.	4	70.	1	90.	3
11.	3	31.	3	51.	1	71.	2	91.	3
12.	2	32.	4	52.	4	72.	3	92.	2
13.	2	33.	4	53.	3	73.	2	93.	2
14.	1	34.	2	54.	1	74.	4	94.	4
15.	3	35.	2	55.	1	75.	1	95.	1
16.	4	36.	1	56.	2	76.	2	96.	3
17.	4	37.	1	57.	4	77.	2	97.	3
18.	3	38.	3	58.	1	78.	3	98.	4
19.	4	39.	1	59.	2	79.	4	99.	2
20.	2	40.	2	60.	3	80.	3	100.	3

SAMPLE QUESTIONS

1.	2	10.	4	19.	1	28.	2	37.	4
2.	4	11.	1	20.	4	29.	1	38.	2
3.	4	12.	1	21.	1	30.	3	39.	3
4.	4	13.	2	22.	1	31.	1	40.	3
5.	1	14.	2	23.	4	32.	3	41.	2
6.	4	15.	2	24.	4	33.	3	42.	4
7.	1	16.	2	25.	3	34.	2	43.	2
8.	1	17.	2	26.	2	35.	4	44.	4
9.	1	18.	4	27.	2	36.	2	45.	3

WORK BOOK

Chapter 04

ANATOMY OF FLOWERING PLANTS

TISSUES

1. The study of internal structure of plants is called

1) Morphology

2) Physiology

3) Anatomy

4) Embryology

2. Depending on whether the cells being formed are capable of dividing or not, plant tissues are classified into

1) Meristematic tissue and permanent tissue

2) Simple and complex tissue

3) Primary and secondary tissue

4) Apical and intercalary tissue

3. Find the example of primary meristem

1) Apical meristem

2) Intercalary meristem

3) Lateral meristem

4) Both 1 and 2

4. Apical meristem is present at

1) Root and shoot apex

2) Placed between mature tissue

3) Mature regions of roots and shoots

4) Woody area

5. Which of the following is/are an example/s of lateral meristem ?

1) Fascicular cambium

2) Interfascicular cambium

3) Cork cambium

4) All of these

6. Axillary buds are capable of forming a

1) Branch

2) Flower

3) Tendrils

4) All of these

7. Cylindrical meristem is

1) Apical meristem

2) Intercalary meristem

3) Lateral meristem

4) Protoderm

8. During the formation of primary plant body, specific regions of the apical meristem produce

1) Dermal tissue

2) Ground tissues

3) Vascular tissues

4) All of these

9. Which of the following tissue is most abundant in plant organ ?

1) Parenchyma

2) Collenchyma

3) Sclerenchyma

4) Sclereids

10. Which permanent tissue provide mechanical support to the growing parts of the plant ?

1) Parenchyma

2) Collenchyma

3) Sclerenchyma

4) Phloem

11. Intercalary meristem is related to all except,

1) Present between permanent tissue

2) Primary meristem

3) Increasing the girth of axis

4) Regenerates part of grasses removed by grazing herbivores

12. Choose odd one out with respect to origin

1) Interfascicular cambium

2) Intercalary meristem

3) Apical meristem

4) Intrafascicular cambium

13. Thickening material present in wall of collenchyma is

1) Pectin, cellulose, hemicellulose

2) Lignin, cellulose, hemicellulose

3) Hemicellulose, suberin, cellulose

4) Suberin, pectin, cellulose

14. Major xylary element in wood of a gymnospermic plant help in conduction of water and minerals is

1) Xylem vessel

2) Xylem tracheids

3) Xylem fibre

4) Both 1 and 2

15. Which of the following tissue consists of long, narrow cells with thick and lignified cell walls having a few or numerous pits. They are usually dead and without protoplasts.

1) Sclerenchyma and collenchyma

2) Sclerenchyma

3) Fibres or sclereids

4) Both 2 and 3

16. The fibres are not

1) Thick-walled

2) Spherical or oval

3) Pointed

4) Sclerenchymatous

17. With reference to features of Tracheids, which of the following statements is not correct ?

1) Elongated or tube like cells with thick and lignified walls with tapering ends

2) It contain perforations in end walls

3) These are dead and are without protoplasm

4) The inner layers of the cell walls have thickenings which vary in form.

18. Which of the following options best represents the phloem elements in angiosperms?

1) Sieve tubes, companion cells , tracheids, parenchyma

2) Sieve tubes, companion cells , vessels, parenchyma

3) Sieve tube elements, companion cells, phloem parenchyma and phloem fibres

4) Sieve tube, sieve cells, companion cells and phloem fibres

19. Which among these is the incorrect combination of phloem elements

1) Companion cells– closely associated with sieve tube elements.

2) Sieve tube– lacks nucleus at maturity

3) Phloem fibres– absent in most of the dicotyledons

4) Phloem parenchyma - elongated, tapering cylindrical cells which have dense cytoplasm and nucleus.

20. Select the false option from the following statements regarding the companion cells

1) Specialised parenchymatous cells, which are closely associated with sieve tube elements

2) Help in maintaining the pressure gradient in the sieve tubes.

3) Absent in most of the monocotyledons

4) The sieve tube elements and companion cells are connected by pit fields present between their common longitudinal walls.

21. Phloem in gymnosperms lacks:

1) Both sieve tubes and companion cells

2) Albuminous cells and sieve cells

3) Sieve tubes only

4) Companion cell only

22. Which of the following is/are the function/s of parenchyma

1) Photosynthesis

2) Storage

3) Secretion

4) All of these

23. The living element present in xylem is

1) Tracheids

2) Vessels

3) Xylem parenchyma

4) Xylem fibres

24. A mechanical tissue devoid of lignin is :

1) Parenchyma

2) Sclerenchyma

3) Chlorenchyma

4) Collenchyma

25. Consider the following statements

1) Xylem transports water and minerals

2) Gymnosperms lack sieve tubes and companion cells in phloem

3) The first formed primary xylem is called metaxylem

4) Phloem fibres (bast fibers) are made of collenchymatous cells

Of the above statements

1) 1 and 3 alone are correct

2) 1 and 4 alone are correct

3) 2 and 3 alone are correct

4) 1 and 2 alone are correct

26. The first formed primary phloem consisting of narrow sieve tube elements constitutes the

1) Metaphloem

2) Protophloem

3) Accessory cell

4) Subsidiary cell

27. The component of phloem, involved in storing of food materials and other substances like resins, latex and mucilage :

1) Sieve tube

2) Companion cells

3) Phloem parenchyma

4) Sieve cells

28. Which part of Jute, Flax and Hemp are used commercially:-

1) Phloem fibres

2) Phloem parenchyma

3) Protophloem

4) Metaphloem

29. "Endarch" condition of primary xylem in stems means :

1) Protoxylem lies towards the centre and the metaxylem lies towards the periphery

2) Protoxylem lies towards periphery and metaxylem lies towards the centre

3) Phloem towards outside and xylem towards inside

4) Xylem towards outside and phloem towards inside

30. The cells which do not have nucleus at maturity

1) Parenchyma

2) Companion cells

3) Phloem parenchyma

4) Sieve tube elements

TISSUE SYSTEM

31. How many types of tissue systems are present in plant depending on their structure and function ?

1) 2 2) 3

3) 5 4) 4

32. Epidermal tissue system is made up of

1) Epidermal cells

2) Stomatal apparatus

3) Epidermal appendages

4) All of these

33. Which of the following are epidermal outgrowth present in stem ?

1) Root hairs

2) Subsidiary cells

3) Trichomes

4) Both 1 and 3

34. Identify the incorrect statement.

1) Epidermis is usually single layered

2) In root, stem and leaf outside of the epidermis is often covered with a waxy thick layer called the cuticle.

3) Epidermal cells are parenchymatous with a small amount of cytoplasm and a large vacuole

4) Epidermis made up of elongated, compactly arranged cells, which form a continuous layer.

35. Stomatal apparatus consists of

1) Stomatal aperture

2) Guard cells

3) Subsidiary cells

4) All of these

36. Trichomes are

1) Usually unicellular

2) Branched or unbranched

3) Always stiff

4) Promote transpiration

37. Ground tissue is made up of

1) Parenchyma

2) Collenchyma

3) Sclerenchyma

4) All of these

38. Conjoint vascular bundle is present in

1) Stem

2) Leaf

3) Both 1 and 2

4) Root

39. Identify incorrect statement

1) The outer walls of guard cells are thin and inner walls are highly thickened

2) Guard cells possess chloroplast

3) A few epidermal cells, in the vicinity of the guard cells become specialized in their shape and size are known as subsidiary cells.

4) In grasses, the guard cells are bean shaped

40. In leaves, the ground tissue consists of thin walled chloroplast containing cells and is called

1) Mesophyll

2) Endodermis

3) Pericycle

4) Pith

41. Select the wrong one from the following statements :

1) Epidermal system comprises epidermal cells, stomata, trichomes and hairs

2) Cuticle is absent in roots

3) In grasses, the guard cells are dumb-bell shaped

4) The stomatal aperture and guard cells together called stomatal apparatus.

42. Match the Column I and II, and choose the correct combination with respect to vascular bundles

Column I		Column II	
a.	Open	1.	arranged in an alternate manner
b.	Radial	2.	xylem and phloem are jointly situated
c.	Closed	3.	presence of cambium
d.	Conjoint	4.	no cambium

1) a-3, b-2, c-4, d-1

2) a-4, b-2, c-3, d-1

3) a-4, b-1, c-3, d-2

4) a-3, b-1, c-4, d-2

43. Vascular bundle is closed when

1) Cambium is present

2) Cambium is absent

3) Pericycle is absent

4) Epidermis is absent

44. Radial vascular tissue arrangement can be seen in :

1) Leaf 2) Dicot root

3) Stem 4) Flower

45. The guard cells are surrounded by

1) Epidermal cells

2) Subsidiary cells

3) Trichomes

4) Palisade tissue

46. **Assertion :** Cuticle is absent in root epidermis

Reason : Root is the structure for absorption of water and minerals

1) Both Assertion and Reason are true and Reason is a correct explanation of Assertion

2) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

47. In conjoint type of vascular bundles

1) Xylem and phloem are situated at the same radius of vascular bundles

2) Xylem and phloem arranged in an alternate manner on different radii

3) Usually have the phloem located only on the outer side of xylem

4) Both 1 and 3

48. Stomata regulate the process of

1) Transpiration

2) Gaseous exchange

3) Both 1 and 2

4) Secretion

49. Which one of the following statements is not valid for vascular bundles

1) In dicotyledonous stems, vascular bundles are open

2) Conjoint vascular bundles are common in stems and leaves

3) In root, vascular bundles are radial and collateral

4) Vascular bundles are closed in mono-cotyledonous stems

50. Exarch xylem is found in

1) Root

2) Stem

3) Leaf

4) Rachis

ANATOMY OF STEM, ROOT AND LEAVES

51. Stele is made up of

1) Pericycle

2) Vascular bundle

3) Pith

4) All of these

52. From outside to inside, the layer of monocot root is

1) Endodermis → epidermis → cortex → pith → vascular bundles

2) Epidermis → cortex → endodermis → pericycle → vascular bundle → pith

3) Pericycle → vascular bundle →cortex → pith → epidermis → endodermis

4) Pith → epidermis → endodermis → pericycle → vascular bundles

53. Parenchymatous cells which lie between the xylem and phloem in root are called

1) Cortex

2) Conjunctive tissue

3) Pericycle

4) Medullary rays

54. A common character of monocot and dicot root is

1) Exarch protoxylem

2) Number of xylem bundles

3) Large and well developed pith

4) Initiation of lateral roots and vascular cambium from pericycle

55. The tangential, as well as radial walls of the endodermal cells, have a deposition of water-impermeable, waxy material suberin in the form of

1) Epiblem

2) Casparian strips

3) Stele

4) Conjuctive tissue

56. Identify incorrect statement with respect to dicot root.

1) Cortex consists of several layers of thin walled parenchyma cells without intercellular spaces

2) Endodermis comprises a single layer of barrel shaped cells without any intercellular spaces

3) Pericycle contain a few layers of thick walled parenchymatous cells

4) There are usually 2 to 4 xylem and phloem patches

57. A person observe a cross section of a plant material under the microscope and observe the following characters ;

a) Homogenous cortex

b) Protoxylem facing towards the periphery

c) Xylem and phloem are arranged on different radii

d) Tetrarch xylem

Identify the specimen :

1) Dicot stem

2) Monocot stem

3) Dicot root

4) Monocot root

58. Dicot stem is characterized by

1) Conjoint, closed, endarch vascular bundles which are arranged in the form of a ring

2) Conjoint, open, endarch vascular bundles which are arranged in the form of a ring

3) Conjoint, open, endarch and scattered vascular bundles

4) Conjoint, closed, endarch and scattered vascular bundles

59. In Barley stem, the vascular bundles are :

1) Closed and scattered

2) Open and in a ring

3) Closed and radial

4) Open and scattered

60. Vascular bundles are sacttered in :

1) Bryophytes

2) Dicot root

3) Dicot stem

4) Monocot stem

61. The vascular bundle in monocot stem is

1) Conjoint and open

2) Conjoint and radial

3) Conjoint and closed

4) Radial and open

62. In T.S. of a dicotyledonous stem, the sequence of tissues from outside to inside is

1) Epidermis → Cortex→ Pericycle → Endodermis → Phloem → Xylem

2) Cortex → Epidermis → Pericycle → Phloem → Endodermis → Xylem

3) Epidermis → Hypodermis →Cortical layers → Endodermis →Pericycle → Phloem → Cambium → Xylem

4) Epidermis → pericycle → cortex → endodermis→ phloem → xylem

63. Two to four xylem bundles are found in

1) Monocot root 2) Monocot stem

3) Dicot stem 4) Dicot root

64. Vascular bundles are arranged in a ring manner observed in

1) Dicot root

2) Monocot stem

3) Dicot stem

4) Monocot root

65. Collenchymatous and sclerenchymatous hypodermis is a characteristic feature of

1) Dicot stem and monocot stem

2) Dicot root and monocot root

3) Monocot stem and dicot stem

4) Monocot root and dicot root

66. Identify the specimen from given features.

A) Each vascular bundles are surrounded by a sclerenchymatous bundle sheath

B) Peripheral vascular bundles are generally smaller than the centrally located ones

C) Water-containing cavities are present within the vascular bundles.

1) Dicot Leaf

2) Dicot stem

3) Monocot stem

4) Monocot root

67. Starch sheath and semi-lunar patches of sclerenchymatous pericycle is present in

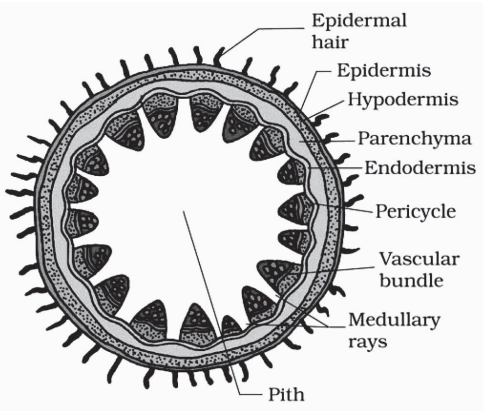
1) Dicot root

2) Dicot stem

3) Monocot stem

4) Monocot root

68. Identify the diagram.



1) Dicot root

2) Dicot stem

3) Monocot stem

4) Monocot root

69. In dicot stem, cortical layers below hypodermis consists of

1) Rounded thin walled parenchymatous cells with conspicuous intercellular spaces

2) Cells rich in starch grains

3) Few layers of radially placed parenchymatous cells

4) All of these

70. Medullary rays are present

1) between vascular tissues

2) between vascular bundles

3) above phloem

4) below epidermis

71. Vertically elongated, closely packed parenchyma cells, with abundant chloroplast and a large vacuole, found below the upper epidermis in a dicot leaf:

1) Mesophyll tissue

2) Spongy tissue

3) Palisade tissue

4) Ground tissue

72. Conjoint, collateral and closed vascular bundles are found in

1) Monocot stem

2) Dicot leaf

3) Monocot leaf

4) All of these

73. Palisade and spongy parenchyma is absent in leaves of

1) Gram

2) Soyabean

3) Maize

4) Mustard

74. In a dorsiventral leaf, the location of palisade tissue and phloem is, respectively.

1) Abaxial and abaxial

2) Adaxial and abaxial

3) Adaxial and adaxial

4) Abaxial and adaxial

75. Palisade parenchyma is

1) made up of elongated cells, which are arranged vertically and parallel to each other

2) possesses chloroplasts and carry out photosynthesis

3) made up of oval or round and loosely arranged cells

4) both 1 and 2

76. In dicot leaf vascular bundles

1) Surround by a layer of thick walled bundle sheath cells

2) Size dependent on the size of the veins

3) can be seen in veins and the midrib

4) All of these

77. With reference to bulliform cells, which of the following statements are correct ?

a. Large, empty, colourless , adaxial epidermal cells

b. They make the leaves curl during water stress

c. Prevent water loss through transpiration.

d. Primarily seen in grasses.

1) (a), (b) and (c)

2) (a) (c) and (d)

3) (b), (c) and (d)

4) (a) (b) (c) and (d)

78. The photosynthetic tissue between the upper and lower epidermis in dorsiventral leaves are called

1) Cuticle

2) Stomatal chamber

3) Mesophyll

4) Bundle sheath

79. Parallel venation in monocot leaves is reflected

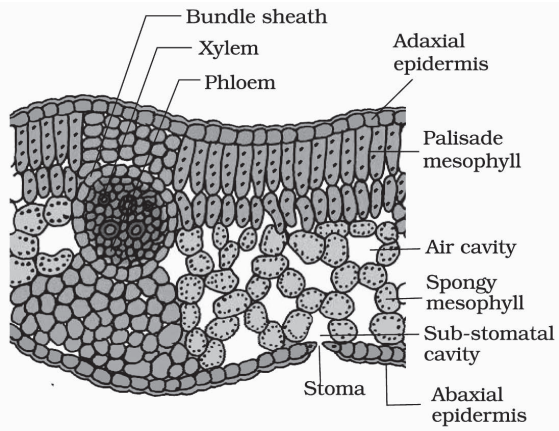
1) near similar size of vascular bundles except in main veins

2) near similar size of vascular bundles only in main veins

3) dissimilar size of vascular bundles except in main veins

4) smaller size of vascular bundles in main veins

80. Identify the diagram.



1) Dicot leaf

2) Monocot leaf

3) Isobilateral leaf

4) Both 2 and 3

SECONDARY GROWTH IN PLANTS

81. The secondary growth occurs in

1) Most of the dicotyledonous stems only

2) Most of the dicotyledonous roots and stems only

3) Most of the dicotyledonous roots , stems and in gymnosperm

4) Most of the dicotyledonous roots , stems, gymnosperm and in pteridophytes

82. The cells of secondary cortex are

1) Parenchymatous

2) Sclerenchymatous

3) Collenchymatous

4) Meristematic

83. During secondary growth at some places, the cambium forms a narrow band of parenchyma, which passes through the secondary xylem and the secondary phloem in the radial directions. These are the

1) Conjunctive tissue

2) Secondary xylem

3) Secondary medullary rays

4) Secondary cortex

84. Main function of lenticels is :

1) Transpiration

2) Guttation

3) Gaseous exchange

4) Bleeding

85. The wood is actually

1) Secondary xylem and secondary phloem

2) Secondary xylem ,secondary phloem and vascular cambium

3) Secondary xylem only

4) Secondary xylem ,secondary phloem, vascular cambium and primary xylem

86. Match the Column I and II, and choose the correct combination with respect to vascular bundles

Column I		Column II	
a.	Early wood	1)	Durable
b.	Sapwood	2)	Autumn
c.	Heartwood	3)	Conduction
d.	Late wood	4)	Spring

1) a-4, b-3, c-1, d-2

2) a-2, b-1, c-3, d-4

3) a-3, b-2, c-4, d-1

4) a-1, b-4, c-2, d-3

87. Periderm consists of

1) Phellogen, phellem and phelloderm

2) Cork , Cork cambium and primary cortex

3) All tissues exterior to the vascular cambium

4) All the above

88. Which of the statements given below is not true about the formation of annual rings in trees?

1) Annual rings are not prominent in trees of temperate regions.

2) Annual rings are a combination of spring wood and autumn wood produced in a year.

3) Differential activity of cambium causes light and dark bands of tissue - early and late wood respectively.

4) Activity of cambium depends upon variation in climate.

89. In the dicot root the vascular cambium originates from :

1) Tissue located below the phloem bundles and a portion of pericycle tissue above protoxylem.

2) Cortical region

3) Parenchyma between endodermis and pericycle

4) Intrafascicular and interfascicular tissue in a ring

90. Identify the incorrect statement.

1) Sapwood is involved in conduction of water and minerals

2) Sapwood is the innermost secondary xylem and is lighter in colour

3) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.

4) Heart wood does not conduct water but gives mechanical support.

91. Match List-I with List-II.

List - I		List - II	
a.	Lenticels	i.	Phellogen
b.	Cork cambium	ii.	Suberin deposition
c.	Secondary cortex	iii,	Exchange of gases
d.	Cork	iv.	Phelloderm

	(a)	(b)	(c)	(d)
1)	(ii)	(iii)	(iv)	(i)
2)	(iv)	(ii)	(i)	(iii)
3)	(iv)	(i)	(iii)	(ii)
4)	(iii)	(i)	(iv)	(ii)

92. The vascular cambium normally gives rise to.

1) Phelloderm

2) Primary phloem

3) Secondary xylem

4) Periderm

93. Cork cambium is an example for

1) Lateral meristem

2) Intercalary meristem

3) Primary meristem

4) Apical meristem

94. In winter, the cambium is less active and forms fewer xylary elements that have narrow vessels, this type of wood is called

1) Early wood

2) Late wood

3) Sap wood

4) Heart wood

95. Periderm is made up of :

1) Cork and secondary cortex only

2) Cork cambium, cork and secondary phloem

3) Cork cambium, cork and secondary cortex

4) Cork alone

96. Age of plant can be calculated by :

1) Measuring height

2) Counting lateral branches

3) Counting number of annual rings

4) Counting the number of leaves in the main stem

97. Most distinct annual rings are formed in :

1) Tropical plants

2) Temperate plants

3) All monocots

4) Both 1 & 2

98. **Assertion :** In dicot root vascular cambium is completely secondary in origin.

Reason : Vascular cambium in dicot roots is formed from conjuctive tissue and pericycle.

1) Both Assertion and Reason are true and Reason is a correct explanation of Assertion

2) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

Statement Type Questions

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

99. Given below are two statements

Statement I : The vascular cambium is more active on the inner side than on the outer side

Statement II : The amount of secondary xylem produced is more than secondary phloem.

100. Given below are two statements

Statement I : Sap wood does not help in water conduction

Statement II : Its tracheary elements are filled with tannins, resins, oils, gums, aromatic compounds and essential oils.

SAMPLE QUESTIONS

1. Identify the incorrect statement :

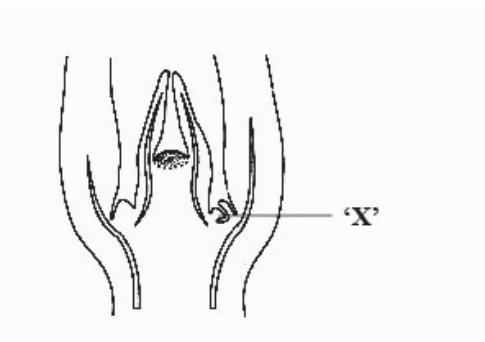
1) Different organs in a plant show differences in their internal structure

2) Monocots and dicots seen to be anatomically different

3) Highest level of organisation in plants is tissues

4) Plants have cells as the basic unit and cells are organised into tissues

2.



The region X will form

1) Leaves 2) Branches

3) Flowers 4) Both 2 and 3

3. In which of the following pairs of parts of a flowering plant, epidermis is absent?

1) Ovule and seed

2) Root and stem

3) Shoot bud and floral bud

4) Root tip and shoot tip

4. Read the following statements and choose the correct option

Statement I : Bast fibres are sclerenchymatous and are generally absent in primary phloem but are found in secondary phloem.

Statement II : The first formed primary phloem called protophloem consists of bigger sieve tubes and later formed phloem called metaphloem has narrow tube.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct and Statement II is incorrect

4) Statement I is incorrect and Statement II is correct

5. Identify the correct statement

1) Epidermal tissue systems are made up of epidermis, stomata, endodermis

2) The ground tissue system forms the main bulk of the plant and is divided into epidermis, hypodermis and cortex

3) Annual rings are reported in dicot roots and are generally less prominent than a dicot stem

4) The vascular bundles forms the conducting tissue and translocate only water and minerals

6. Identify the correct statement

1) The first formed primary xylem element is metaxylem and are arranged towards the periphery of the organ in exarch condition

2) In stems, the protoxylem lies towards the periphery and metaxylem lies towards the pith

3) In dicot stem, following secondary growth, the newly formed metaxylem from vascular cambium is arranged towards inner side

4) In roots, the protoxylem lies towards periphery and metaxylem lies towards the centre

7. Identify the correct statement

1) The modification in adaxial epidermis into bulliform cells in found in all monocots

2) In monocot leaf, the vascular bundles are almost similar sized due to the parallel venation

3) In isobilateral leaf, the mesophyll is differentiated into palisade and spongy

4) The vascular bundles are surrounded by sclerenchymatous bundle sheath in dicot leaf.

8. A 100 year old tree which shows well marked annual rings in its trunk will show :

1) The same number of rings form base to its top

2) More than 100 rings at base and nearly 100 rings at top of trunk

3) Only about a 100 ring at base and a uniformly decreasing number of rings towards top

4) No annual rings are found at base

9. **Assertion :** Older layer of sap wood lies just outside vascular cambium.

Reason : Sap wood contains actively conducting vessels and occupies central part of stem.

1) Both Assertion and Reason are true and Reason explains Assertion

2) Both Assertion and Reason are true and Reason does not explain Assertion

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

10. Read the following statements and identify the total number of correct statements

A) Vacuoles are large sized in intercalary meristem.

B) Ground tissue system consist of only simple tissues.

C) During the course of time, heart wood converts into sap wood due to deposition of certain phytochemicals.

D) Major part is dead in secondary xylem, some part is dead in secondary phloem and no part is dead in secondary medullary rays.

E) In dicot stems, primary xylem and primary phloem are separated by parenchymatous cells that are known as medullary rays.

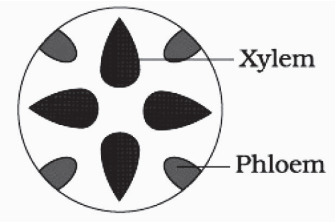
1) 3

2) 2

3) 1

4) 4

11. Identify the type of vascular bundle from the following diagram :



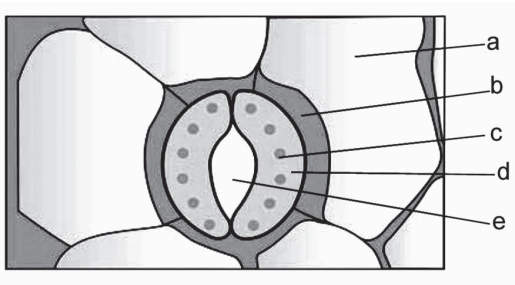
1) Radial

2) Conjoint open

3) Conjoint closed

4) Concentric

12. Choose the correct combination of labelling of stomatal apparatus of dicot leaves:-



1) a = epidermal cells, b = guard cells, c = chloroplast, d = subsidiary cells, e = stomatal aperture

2) a = epidermal cells, b = subsidiary cells, c = chloroplast, d = stomatal aperture, e = guard cells

3) a = epidermal cells, b = subsidiary cells, c = chloroplast, d = guard cells, e = stomatal aperture

4) a = subsidiary cells, b = epidermal cells, c = chloroplast, d = stomatal aperture, e = guard cells

13. Bark formed early in the season is called as ..... bark and bark formed towards the end of the season is called as ..... bark.

1) hard, soft 2) soft, hard

3) scaly, ring 4) ring, scaly

14. Y-shaped arrangement of xylem vessels is found in :

1) monocot stem

2) dicot stem

3) monocot root

4) dicot root

15. Identify the characteristics which belongs to isobilateral leaf

1) Uniform cuticle

2) Equal number of stomata on either side

3) Cuticle is thick at upper epidermis and thin at lower epidermis

4) Stomata more on lower surface

5) Mesophyll is differentiated into palisade and spongy parenchyma

6) Mesophyll is not differentiated into palisade and spongy parenchyma

1) 1, 2, 5

2) 1, 2, 6

3) 1, 2, 4

4) 1, 2, 3

16. Select the incorrect statement

1) In a dicotyledonous stem, the epidermis is single layered with multicellular trichomes, covered with cuticle

2) In a dicotyledonous leaf, the upper and lower surfaces are covered by epidermis

3) In dicotyledonous leaf lower epidermis is interrupted by a large number of stomata

4) In a dorsiventral leaf, the stomata are present almost in an equal number on both the surfaces

17. Select the false statement(s) from the following:-

a) The companion cells are specialised parenchymatous cells, which are closely associated with sieve tube elements.

b) The stomatal aperture, guard cells and the surrounding subsidiary cells are together called stomatal apparatus

c) In Dicot stems, the cells of cambium present between primary xylem and primary phloem is the interfascicular cambium.

d) Phellem, phellogen and phelloderm are collectively known as periderm.

e) Study of internal structure of plants is called Anatomy.

1) a, b, d & e only

2) b & c only

3) a, b & c only

4) c only

18. Dicot stem and monocot root exhibit similarity in having :

1) Collenchymatous hypodermis

2) Centripetal xylem

3) Centrifugal xylem

4) Central large pith

19. A component of phloem, which is generally absent in the primary phloem but found in the secondary phloem :

1) Sieve cells

2) Sieve tube elements

3) Phloem parenchyma

4) Phloem fibres or bast fibres

20. Which of the following statement is not true :

1) Based on the origin and development meristems are classified as promeristem, primary meristem and secondary meristem

2) Based on the position in the plant body meristems are classified into apical, intercalary and lateral meristem

3) Fascicular vascular cambium, interfascicular cambium and cork cambium are examples of lateral meristem

4) Both apical and intercalary meristems are responsible for producing secondary tissues

21. Match the column I with column II and choose the correct option :

Column I		Column II	
a.	Heart wood	1.	Mechanical support to stem
b.	Sap wood	2.	Conduction of water and minerals
c.	Spring wood	3.	Low density, early wood
d.	Autumn wood	4.	High density, late wood

1) a-1; b-2; c-3; d-4

2) a-2; b-1; c-4; d-3

3) a-1; b-2; c-4; d-3

4) a-2; b-1; c-3; d-4

22. In a Dicot leaf, the position of palisade parenchyma and spongy parenchyma are respectively:-

1) Adaxial and adaxial

2) Abaxial and abaxial

3) Abaxial and adaxial

4) Adaxial and abaxial

23. During the formation of the primary plant body, specific regions of which meristem produce dermal tissues, ground tissues and vascular tissues:

1) Apical meristem

2) Fundamental meristem

3) Ground meristem

4) Promeristem

24. Which of the following statement is incorrect?

1) In a dicot stem, the pericycle is usually multilayered

2) Wood is the common name used for secondary xylem

3) Peripheral cytoplasm, a large vacuole and a prominent nucleus; all are absent in a mature sieve tube element

4) Lenticels are the aerating pores present in bark of plants and are associated with gaseous exchange

25. The wood contain organic compounds like oils, aromatic substances, gums, resins, tannins, phenols and other coloured materials, especially the essential oils is called

1) Sap wood 2) Alburnum

3) Heart wood 4) Early wood

26. Eliminate, which is not applicable to Dicotyledonous stem:

a) Collenchymatous hypodermis.

b)Endodermis rich in starch grains and pericycle in the form of semilunar patches of sclerenchyma.

c) A large number of conjoint, open vascular bundles are arranged in a ring.

d) Sclerenchymatous hypodermis and bundle sheath.

e) Conjoint and closed vascular bundles with water-containing cavities.

1) a and b 2) b and c

3) c and d 4) d and e

27. In winter and autumn, the cambium is less active and forms fewer xylary elements that have narrow vessels, and this wood is called

1) Spring wood 2) Early wood

3) Autumn wood 4) Both 2 and 3

28. The living tissue present in xylem is

1) Vessels

2) Tracheids

3) Xylem fibres

4) Xylem parenchyma

29. Match the items in column I with column II and choose the correct option

Column I		Column II	
a.	Xylem vessels	1.	Store food material
b.	Xylem tracheids	2.	Obliterated lumen
c.	Xylem fibre	3.	Perforated cross walls
d.	Xylem parenchyma	4.	Tapered ends

1) a→ 4; b→ 2; c→ 3; d→ 1

2) a→ 3; b→ 2; c→ 1; d→ 4

3) a→ 2; b→1; c→ 4; d→ 3

4) a→ 3; b→ 4; c→ 2; d→1

30. Which of the following cells help in maintaining pressure gradient in sieve tube?

1) Phloem parenchyma

2) Bast fibre

3) Companion cell

4) Wood fibre

31. Match the following column

Column I		Column II	
a.	Endodermis	1.	Companion cells
b.	Stomata	2.	Lenticels
c.	Sieve tube	3.	Palisade cells
d.	Periderm	4.	Starch grains
e.	Mesophyll	5.	Accessory cells

1) a-1; b-2; c-3; d-4; e-5

2) a-5; b-4; c-3; d-2; e-1

3) a-4; b-5; c-1; d-2; e-3

4) a-4; b-5; c-1; d-3; e-2

32. How many shoot apical meristems are likely to be present in a twig of a plant possessing 4 branches and 26 leaves

1) 4 2) 26

3) 1 4) 5

33. Vessels are found in :

1) All angiosperms and few gymnosperms

2) Most of angiosperms and few gymnosperms

3) All angiosperms, all gymnosperms and some pteridophytes

4) In all pteridophytes

34. Select the correct option along with its function

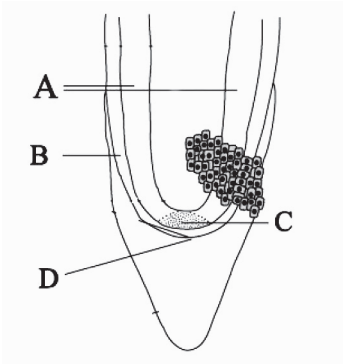
1) Sieve pore - Pores on the lateral walls of sieve tube elements

2) Sieve tube element - Have imperforated sieve plates

3) Phloem parenchyma - Have pits, exist plasmodesmata and absent in dicots

4) Companion cell - Parenchymatous cell, maintain pressure gradient in sieve tube

35. Identify the figure :



1) A - Protoderm, B - Cortex, C - Initials of cap root, D - Root apical meristem

2) A - Protoderm, B - Cortex, C - Root apical meristem, D - Initials of cap root

3) A - Cortex, B - Protoderm, C - Root apical meristem, D - Initials of cap root

4) A - Central cylinder, B - Protoderm, C - Root apical meristem, D - Initials of central cylinder and cortex

36. Consider the following statements.

A) Soft bark is formed during autumn season.

B) Polygonal xylem vessels are found in both dicot and monocot roots

C) In a dicot root, during secondary growth, phellogen arises from outer layer of pericycle.

D) Complementary cells are non-suberised.

Of the above statements:

1) Both A & B are true

2) Both C & D are true

3) Only D is false

4) Only A is false

37. Match List I with List II

	List-I		List-II
a.	Cells with active cell division capacity	i.	Complex tissues
b.	Tissue having all cells similar in structure and function	ii.	Meristematic tissue
c.	Tissue having different types of cells	iii.	Sclereids
d.	Dead cells with highly thickened walls and narrow lumen	iv.	Simple tissue

Select the correct answer from the options given below.

1) a-i ; b-ii ; c-iii ; d-iv

2) a-iii ; b-ii ; c-iv ; d-i

3) a-ii ; b-iv ; c-i ; d-iii

4) a-iv ; b-iii ; c-ii ; d-i

38. With reference to features of Tracheids, which of the following statements is not correct ?

1) Elongated or tube like cells with thick and lignified walls and tapering ends

2) In flowering plants, only tracheids is the main water transporting elements.

3) These are dead and are without protoplasm

4) The inner layers of the cell walls have thickenings which vary in form.

39. Identify the correct sequence of tissues from tip to backwards in root apex

1) Initials of root cap, Root cap , Root apical meristem , Initials of central cylinder

2) Root cap , Initials of central cylinder , Initials of root cap, Root apical meristem

3) Root cap , Initials of root cap, Root apical meristem , Initials of central cylinder

4) Initials of central cylinder , Root apical meristem, Root cap , Initials of root cap.

40. Choose the incorrect combination of phloem elements

1) Companion cells– closely associated with sieve tube elements.

2) Sieve tube– lacks a nucleus at maturity

3) Phloem fibres– absent in secondary phloem

4) Phloem parenchyma- elongated, tapering cylindrical cells which have dense cytoplasm and nucleus.

41. Which of the following is not a component of stomatal apparatus ?

1) Guard cell

2) Companion cell

3) Subsidiary cell

4) Stomatal aperture

42. Select the false option from the following statements regarding the companion cells

1) Specialised parenchymatous cells, which are closely associated with sieve tube elements

2) Help in maintaining the pressure gradient in the sieve tubes.

3) Absent in most of the monocotyledons

4) The sieve tube elements and companion cells are connected by pit fields present between their common longitudinal walls.

43. Select the correct pair.

1) Cells of medullary rays that form part of a cambial ring - Interfascicular cambium

2) Loose parenchyma cells rupturing the epidermis and forming a lens-shaped opening in the bark - Spongy parenchyma

3) Large colorless empty cells in the epidermis of grass leaves - Subsidiary cells

4) In dicot leaves, vascular bundles are surrounded by large thick-walled cells - conjunctive tissue

44. Which of the following is not generally a function of parenchyma

1) Photosynthesis

2) Storage

3) Secretion

4) Mechanical support

45. The simple tissue which provide mechanical support to organs of plant.

1) Parenchyma

2) Sclerenchyma

3) Chlorenchyma

4) Ray parenchyma

ANSWER KEY

1.	3	21.	1	41.	4	61.	3	81.	3
2.	1	22.	4	42.	4	62.	3	82.	1
3.	4	23.	3	43.	2	63.	4	83.	3
4.	1	24.	4	44.	2	64.	3	84.	3
5.	4	25.	4	45.	2	65.	1	85.	3
6.	4	26.	2	46.	2	66.	3	86.	1
7.	3	27.	3	47.	4	67.	2	87.	1
8.	4	28.	1	48.	3	68.	2	88.	1
9.	1	29.	1	49.	3	69.	1	89.	1
10.	2	30.	4	50.	1	70.	2	90.	2
11.	3	31.	2	51.	4	71.	3	91.	4
12.	1	32.	4	52.	2	72.	4	92.	3
13.	1	33.	3	53.	2	73.	3	93.	1
14.	2	34.	2	54.	1	74.	2	94.	2
15.	4	35.	4	55.	2	75.	4	95.	3
16.	2	36.	2	56.	1	76.	4	96.	3
17.	2	37.	4	57.	3	77.	4	97.	2
18.	3	38.	3	58.	2	78.	3	98.	1
19.	3	39.	4	59.	1	79.	1	99.	1
20.	3	40.	1	60.	4	80.	1	100.	2

SAMPLE QUESTIONS

1.	3	10.	2	19.	4	28.	4	37.	3
2.	4	11.	1	20.	4	29.	4	38.	2
3.	4	12.	3	21.	1	30.	3	39.	3
4.	3	13.	2	22.	4	31.	3	40.	3
5.	3	14.	1	23.	1	32.	4	41.	2
6.	4	15.	2	24.	3	33.	2	42.	3
7.	2	16.	4	25.	3	34.	4	43.	1
8.	3	17.	4	26.	4	35.	3	44.	4
9.	4	18.	4	27.	3	36.	2	45.	2

WORK BOOK

Chapter 05

CELL : THE UNIT OF LIFE

CELL AND CELL THEORY

1. Cytology is the study of

1) Structure and function of cell

2) Genetic constituent of cell

3) Morphology of cell

4) Both 2 and 3

2. The term cell was proposed by

1) Robert Brown

2) Anton Van Leeuwenhoek

3) Robert Hooke

4) Rudolf Virchow

3. Unicellular organisms are capable of

1) Independent existence

2) Performing the essential functions

3) Does not ensure independent living

4) Both 1 and 2

4. Organisms composed of many cells are called

1) Unicellular

2) Multicellular

3) Eukaryotes

4) Prokaryotes

5. Cell theory was proposed by

1) Anton van Leeuwenhoek

2) Robert Brown

3) Rudolf Virchow

4) Schleiden and Schwann

6. Cell theory was modified by

1) Robert brown

2) Robert Hooke

3) Rudolf Virchow

4) Theodor Schwann

7. The British Zoologist, who concluded that the presence of cell wall is a unique character of plant cell

1) Theodor Schwann

2) M J Schleiden

3) Rudolf Virchow

4) Hofmeister

8. Rudolf Virchow explained that - cells are formed from pre-existing cells in

1) 1855

2) 1885

3) 1858

4) 1958

9. Who reported that cell had a thin outer layer known as plasma membrane

1) Shleiden

2) Schwann

3) Virchow

4) Leeuwenhok

10. Read the following statement and find the incorrect statement.

1) All cells are originate from pre-existing cells

2) All living organisms are composed of cells

3) Cells are the basic structural and functional unit of all living organism

4) Cells can spontaneously generate from non-living matter

11. Schleiden observed that all plants are composed of cells in

1) 1839

2) 1838

3) 1855

4) 1858

12. Who observed cell first ?

1) Robert Brown

2) Robert Hooke

3) Anton van leeuwenhoek

4) Rudoff virchow

13. Cell theory is not applicable to

1) RBC 2) Rhizopus

3) Virus 4) All of these

14. Structural and functional unit of living organisms ?

1) Tissue

2) Cell

3) Molecule

4) Organ

15. Who proposed the presence of cell wall is the unique character of plant cell ?

1) Brown

2) Schleiden

3) Schwann

4) Leeuwenhoek

16. Match the items in column I with those in column II.

List-I		List-II	
a.	Robert Hooke	1.	First one to examine living cells
b.	Robert Brown	2.	Omnis cellula e cellula
c.	Leeuwenhoek	3.	Discovered cells in cork tissue
d.	Schleiden and Schwann	4.	Discovered nucleus in orchid root cells
e.	Rudolf Virchow	5.	Proposed cell theory

1) a-1, b-2, c-3, d-4, e-5

2) a-2, b-3, c-4, d-5, e-1

3) a-3, b-4, c-1, d-2, e-5

4) a-3, b-4, c-1, d-5, e-2

AN OVERVIEW OF CELL

17. The main difference between animal cell and plant cell is that

1) Plant cell posses non membraneous organelle

2) Plant cell lack rigid cell wall

3) Animal cell lack rigid cell wall

4) Animal cell posses large vacuole

18. Non-membrane bound organelle found in animal cell which helps in cell division ?

1) Centrosome 2) Nucleus

3) Ribosome 4) Nucleolus

19. The membrane bound organelle are absent in

1) Eukaryotic cell

2) Prokaryotic cell

3) Animal cell

4) Both 2 and 3

20. Typical plant cell has a distinct outer boundary called

1) Plasma membrane

2) Cell membrane

3) Cell wall

4) Both 1 and 2

21. The main arena of cellular activities in both plant cell and animal cell is

1) Nucleus

2) Cytoplasm

3) Vacuole

4) Mitochondria

22. Cell differ greatly in

1) Size 2) Shape

3) Activities 4) All of these

23. The largest isolated single cell is

1) Nerve cell

2) RBC

3) Egg of an ostrich

4) Tracheid

24. Shape of the cell depends upon its

1) Function

2) Age

3) Reproduction

4) Environmental condition

25. The longest cell is of

1) Tracheids

2) Egg of ostrich

3) Nerve cell

4) Epithelial cell

26. Non membrane bound organelle found in both prokaryotic and eukaryotic cell

1) Centrosome 2) Ribosome

3) Vacuole 4) Lysosome

27. The average size of bacterial cell is

1) 3 to 5 μm

2) 1 to 2 μm

3) 3 to 4 μm

4) 1 to 2 mm

28. Match column I and column II and select the correct options.

Column A		Column B	
a.	RBC	1.	Amoeboid
b.	WBC	2.	Biconcave
c.	Nerve cell	3.	Long and narrow
d.	Mesophyll cell	4.	Branched and long
e.	Epithelial cell	5.	Round and oval

1) a - 1 ; b - 2 ; c - 3 ; d - 4 ; e - 5

2) a - 2 ; b - 1 ; c - 4 ; d - 5 ; e - 3

3) a - 2 ; b - 1 ; c - 5 ; d - 4 ; e - 3

4) a - 2 ; b - 1 ; c - 4 ; d - 3 ; e - 5

29. Find the mismatched pair.

1) Tracheid - Elongated cells

2) Mycoplasma - Smallest cell

3) RBC - 0.7mm in diameter

4) Nerve cell - Longest cell

30. Read the following statement and select the incorrect statement.

1) Cytoplasm is semi-fluid matrix

2) The shape of the cell does not depends on the function they performs

3) Cells differ greatly in size, shape and activities

4) Prokaryotic cell lack membrane bound organelle

31. Which of the following is NOT a component of a typical animal cell ?

1) Nucleus 2) Mitochondria

3) Chloroplast 4) Cytoplasm

32. The cells lack nucleus are;

1) Erythrocytes of many mammals

2) Sieve tube cells of vascular plants

3) Lymphocytes of mammals

4) Both 1 and 2

33. An example of enucleated living plant cell is :

1) RBC

2) Mature sieve tube cell

3) companion cell

4) xylem parenchyma

34. The common feature of prokaryotic and eukaryotic cells is

1) Membrane bound nucleus

2) Cell wall made of cellulose

3) Ribosomes

4) Flagella that contain microtubules

35. Arrange the following in the increasing of their size

1) Virus < PPLO < Typical bacteria < Typical eukaryotic cell

2) PPLO < Virus < Typical bacteria < Typical eukaryotic cell

3) Virus < PPLO < Typical eukaryotic cell < Typical bacteria

4) Virus > PPLO > Typical bacteria > Typical eukaryotic cell

PROKARYOTIC CELL

36. In prokaryotic cells reserve materials are stored in the form of :

1) Inclusion bodies

2) Plasmids

3) Cell wall

4) 70S ribosomes

37. Gas vacuoles allow cyanobacteria to :

1) Store carbon dioxide for assimilation

2) Control their buoyancy

3) Provide anaerobic conditions to nitrogenase

4) Eliminate toxic ammonia

38. A feature unique to prokaryotes would be :

1) A cell wall made up of cellulose

2) Genomic chromosomal DNA called plasmid

3) A cell membrane is made of peptidoglycan

4) Presence of inclusions bodies

39. Chromatophores are:

1) present in lipopolysaccharide layer of gram negative bacteria

2) colored pigments present in fluorescent bacteria

3) vesicles that store pigments in prokaryotic cells

4) extension on membrane in cyanobacteria

40. What is the term for the process by which a cell takes in substances from outside the cell by forming vesicles ?

1) Endocytosis

2) Exocytosis

3) Mitosis

4) Meiosis

41. The motile bacteria are able to move with the help of :

1) pili

2) fimbriae

3) flagella

4) cilia

42. Pigment-containing membranous extensions in some cyanobacteria are :

1) Pneumatophores

2) Chromatophores

3) Heterocysts

4) Chloroplast

43. Mesosomes are not involved in

1) DNA replication

2) Respiration

3) Lipid synthesis

4) Cell wall synthesis

44. Which among the following is/are the functions of mesosomes?

1) DNA replication

2) Respiration

3) Cell wall formation

4) All of these

45. Match the following suitably :

Column I		Column II	
a.	Coccus	p.	Spiral
b.	Vibrio	q.	Rod like
c.	Bacillus	r.	Spherical
d.	Spirillum	s.	Comma shaped

1) a = p, b = q, c = r, d = s

2) a = q, b = s, c = r, d = p

3) a = r, b = s, c = q, d = p

4) a = r, b = q, c = r, d = p

46. Match the following

Column I		Column II	
a.	Bacterial flagellum	p.	Pilin
b.	Pili	q.	Flagellin
c.	Bacterial cell wall	r.	Murein
d.	Cell membrane	s.	Lipoprotein

1) a - r ; b - s ; c - q ; d - p

2) a - q ; b - p ; c - r ; d - s

3) a - p ; b - q ; c - r ; d - s

4) a - q ; b - r ; c - s ; d - p

47. Glycocalyx is associated with

1) nucleolus

2) plasma membrane

3) nucleus

4) nucleosome

48. The word "Prokaryotes" means a cell

1) with many nuclei

2) with one nucleus

3) primitive nucleus

4) without nucleus

49. Prokaryotic cell represented by

1) Monera 2) Protists

3) Algae 4) Fungi

50. PPLO is

1) Pleuropneumonic level organism

2) Pleuropneumonia like organisation

3) Pleuropenumonia like organism

4) Pleuralpneumonia like organism

51. No organelles, like the ones in eukaryotes, are found in prokaryotic cell except for

1) Mesosome

2) Plasmid

3) Chromatophore

4) Ribosome

52. Prokaryotic ribsomes are characterised by

1) 70s type

2) 80s type

3) Sub units are 50s and 30s

4) Both 1 and 3

53. Bacterial transformation with foreign DNA is monitored by

1) its genomic DNA

2) plasmid DNA

3) ribosome

4) both 1 and 2

54. Bacterial plasmids are

1) Circular dsDNA

2) Circular dsRNA

3) Linear DNA

4) Linear RNA

55. Pili helps in

1) Conjugation

2) Attachment

3) Motility

4) Protection

56. Size of ribosome

1) 15mm to 20mm

2) 15nm to 20nm

3) 15μm to 20μm

4) 15mm to 20μm

57. Reserve materials in prokaryotic cells are stored in the form of

1) Pyrenoids

2) Chromatophore

3) Inclusion bodies

4) Plasmid

58. Inclusion bodies found in blue green and purple and green photosynthetic bacteria is

1) Contractile vacuole

2) Gas vacuole

3) Centriole

4) Microbodies

59. Prokaryotic flagella consist of

1) Hook and filament

2) Basal body and filament

3) Hook, basal body and filament

4) Hook and basal body

60. Fimbriae are

1) Elongated tubular structure

2) Small bristle like tubules

3) Organs for mating

4) Small bristle like fibres

EUKARYOTIC CELL

61. Which organelle is responsible for breaking down and recycling cellular waste ?

1) Lysosome

2) Golgi apparatus

3) Endoplasmic reticulum

4) Mitochondria

62. The network of protein filaments that provides structural support and shape to a cell is

1) Cytoplasm

2) Cytoskeleton

3) Cell membrane

4) Nucleus

63. The process by which cells become specialized to perform specific function is

1) Differentiation

2) Maturation

3) Elongation

4) Senescence

64. The organelle which is responsible for packing material and delivering material to the intracellular targets and secreted outside the cell is

1) Nucleus

2) Mitochondria

3) Endoplasmic reticulum

4) Golgi apparatus

65. Fluid nature of membrane helps to

1) Cell growth

2) To form intercellular junction

3) To endocytosis and cell division

4) All of the above

66. Which organelle is responsible for storing genetic information in the form of DNA ?

1) Mitochondria

2) Nucleus

3) Endoplasmic reticulum

4) Golgi apparatus

67. The term chromatin was coined by

1) Flemming

2) Robert Brown

3) Robert Hooke

4) Hofmeister

68. The two types of cellular organelles that transform energy are :

1) Chromoplasts and Leucoplasts

2) Mitochondria and Chloroplasts

3) Mitochondria and Endoplasmic reticulum

4) Chloroplasts and Golgi apparatus

69. Proteins that are to be used outside the cell are synthesized :

1) in the mitochondria

2) on the rough endoplasmic reticulum

3) on the smooth endoplasmic reticulum

4) on free ribosomes

70. Fat soluble pigments like xanthophylls are present in :

1) Chromoplasts 2) Aleuroplasts

3) Elaioplasts 4) Amyloplasts

71. Unless specifically stained by a vital stain like Janus Green, which of the following will not be visible under a microscope ?

1) Rough endoplasmic reticulum

2) Smooth endoplasmic reticulum

3) Golgi apparatus

4) Mitochondria

72. In animal cells, lipid-like steroidal hormones are synthesized in the

1) Nucleus

2) Rough endoplasmic reticulum

3) Smooth endoplasmic reticulum

4) Golgi apparatus

73. The tail of phospholipid molecule :

1) is hydrophillic and composed of phosphate

2) is hydrophillic and composed of saturated hydrocarbons

3) is hydrophobic and composed of saturated hydrocarbons

4) is hydrophobic and composed of unsaturated hydrocarbons

74. All the following are the part of a eukaryotic cell endomembranous system except :

1) Vacuole

2) Lysosome

3) Golgi complex

4) Mitochondria

75. Ribosomes are produced in

1) Nucleolus 2) Mitochondria

3) Cytoplasm 4) Golgibody

76. Microbodies, which help to convert stored lipids into carbohydrates so they can be used for plant growth, are known as :

1) Peroxisomes

2) Sphaerosomes

3) Glyoxysomes

4) Lysosomes

77. Carotenoid pigments are found in :

I. Chloroplasts

II. Chromoplasts

III. Leucoplasts

1) Only I

2) Only I and II

3) Only II

4) I, II and III

78. The lipid component of the plasma membrane mainly consists of :

1) Triglycerides

2) Cholesterol

3) Phosphoglycerides

4) Proteins

79. If the centromere is situated close to the end of a chromosome, it is called as :

1) Metacentric

2) Submetacentric

3) Acrocentric

4) Telocentric

80. Lysosomes are rich in which of the following enzymes

1) Isomerases 2) Transferases

3) Lyases 4) Hydrolases

81. Tonoplast is the membrane surrounding which organelle

1) Centriole

2) Glyoxysome

3) Peroxisome

4) Vacuole

82. Which of the following is a wrong statement

1) Chloroplast is surrounded by a double membrane

2) Chloroplast contains membrane structures called thylakoids

3) Stacks of thylakoids form grana

4) Light reaction occurs in stroma

83. Colourless plastid storing oil is

1) Chromoplast

2) Aleuroplast

3) Proteinoplast

4) Elaioplast

84. Ribosomes are synthesised in

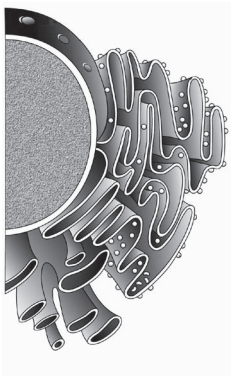
1) Cytoplasm

2) Mitochondria

3) Plastids

4) Nucleolus

85. Which one of the following organelle in the figure correctly matches with its function?



1) Golgi apparatus, formation of glycolipids

2) Rough endoplasmic reticulum, protein synthesis

3) Rough endoplasmic reticulum, formation of glycoproteins

4) Golgi apparatus, protein synthesis

86. Primary lysosomes are formed from

1) Golgi bodies 2) ER

3) Mitochondria 4) Vacuole

87. The proteins synthesized on RER are modified, converted and packaged into secretory vesicles by:

1) Golgi complex

2) Lysosomes

3) Ribosomes

4) ER

88. Smallest cell organelle in eukaryotic cell :

1) Golgi bodies

2) Centriole

3) Nucleolus

4) Ribosome

89. A large and mature plant cell has :

1) many vacuole

2) No vacuole

3) a large vacuole

4) many small vacuoles and a large vacuole

90. DNA does not occur in :

1) Mitochondria

2) Plastids

3) Mature RBC, centrioles and ribosomes

4) Nucleus, bacteria and viruses

91. Site of protein synthesis is :

1) Ribosomes

2) Mitochondria

3) Nucleus

4) DNA

92. Which among the following is not a function of cytoskeleton?

1) Mechanical support

2) Motility

3) Keeping organelles in position

4) Intracellular transport

93. Choose the false statement

1) Spindle fibers are arising from centriole

2) Centrioles are basically made up of flagellin protein

3) Centrosome is membraneless

4) Centrioles have 9+0 organisation

94. Choose the incorrect pair

1) Basal body of eukaryotic cilium - 9+2 arrangement

2) Axoneme - Core of flagellum

3) Basal body of flagella of eukaryotes - centriole like structure

4) Radial spoke - connect central sheath to peripheral doublets

95. Thickness of perinnuclear space is

1) 10-50 nm

2) 10-40 nm

3) 20-60 nm

4) 30-80 nm

96. Identify the similarities between Mitochondria and chloroplast :

I. Semiautonomous and endosymbiont

II. Enveloped by two unit membranes

III. Possess circular dsDNA and 70s ribosomes

IV. Porins are present on the outer membrane

1) I only

2) III only

3) II only

4) I, II , II & IV

97. Find the matching series :

Column I		Column II	
A.	Ribosome	George Palade	1953
B.	Golgi apparatus	Camillo golgi	1988
C.	Fluid Mosaic Model of Plasma membrane	Singer & Nicolson	1971
D.	Nucleus	Robert Brown	1831

1) A & B 2) B & C

3) C & D 4) A & D

98. The presence of chloesterol in the plasma membranes of some animals.

1) enables the membrane to stay fluid more easily when cell temperature drops

2) enables the animals to remove hydrogen atoms from saturated phospholipids

3) enables the animal to add hydrogen atoms to unsaturated phospholipids

4) makes the membrane less flexible, allowing it to sustain greater pressure from within the cell

99. Centrioles, cilia, flagella and basal bodies have remarkably similar structural elements and arrangements. This leads us to which of the following as a probable hypothesis ?

1) Disruption of one of these types of structure should necessarily disrupt each of the other as well

2) Loss of basal bodies should lead to loss of all cilia, flagella and centrioles

3) Motor proteins such as dynein must have evolved before any of these four kinds of structure.

4) Natural selection for motility must select for microtubular arrays in circular patterns.

100. Which of the following is true about nucleolous ?

1) membrane less structure

2) active site for rRNA synthesis

3) numerous in cells which are involved in protein synthesis

4) all of the above

SAMPLE QUESTIONS

1. Endocytosis is

1) Passive transport

2) Active transport

3) Facilitated diffusion

4) Both 1 and 3

2. rRNA is formed from

1) Nucleolus

2) Mitochondria

3) Cytoplasm

4) Lysosome

3. Polysome formation occur in

1) Prokaryotes

2) Eukaryotes

3) Protista only

4) Both prokaryotes and eukaryotes

4. Spherosomes contain

1) Proteins

2) Lipids

3) Cellulose

4) Both lipids and proteins

5. Match the column with correct combination.

Column A		Column B	
a.	ER	1.	Stack of cisternae
b.	Amyloplasts	2.	Store starch
c.	Aleuroplasts	3.	Storage of proteins
d.	Peroxisome	4.	Photorespiration
e.	Elaioplast	5.	Detoxification of drugs

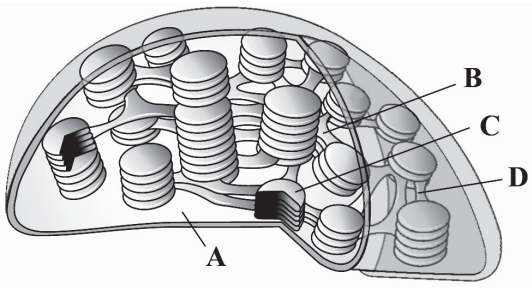
1) a - 5 ; b - 3 ; c - 2 ; d - 4 ; e - 1

2) a - 5 ; b - 2 ; c - 3 ; d - 4 ; e - 1

3) a - 5 ; b - 2 ; c - 3 ; d - 1 ; e - 4

4) a - 5 ; b - 3 ; c - 2 ; d - 1 ; e - 4

6. Identify A, B, C, D



	A	B	C	D
1)	Stroma	Grana	Thylakoid	Stroma lamella
2)	Grana	Stroma	Thylakoid	Stroma lamella
3)	Stroma	Stroma lamella	Thylakoid	Grana
4)	Stroma	Thylakoid	Grana	Stroma lamella

7. Match column I and II.

Column A		Column B	
a.	Robert Brown	1.	Presence of cell wall is unique to plants
b.	Schleiden	2.	Discovered living cell
c.	Schwann	3.	Plants are compound of cells
d.	Leeuwenhoek	4.	Discovered nucleus

1) a - 4 ; b - 3 ; c - 1 ; d - 2

2) a - 4 ; b - 1 ; c - 2 ; d - 2

3) a - 2 ; b - 3 ; c - 1 ; d - 4

4) a - 1 ; b - 2 ; c - 3 ; d - 4

8.

Column A		Column B	
I.	Middle lamella	a.	Amoeba
II.	Centriole	b.	Photosynthesis
III.	Contractile vacuole	c.	Cementing material
IV.	Grana	d.	Formation of spindle fibres

1) i - a ; ii - b ; iii - c ; iv - d

2) i - d ; ii - c ; iii - b ; iv - a

3) i - c ; ii - d ; iii - a ; iv - b

4) i - c ; ii - a ; iii - d ; iv - b

9. Choose the incorrect statement.

1) Mitochondria and chloroplast transfer energy.

2) ER are site for synthesis of steroidal hormones

3) In acrocentric chromosome, centromere lie at the terminal position.

4) Nucleolus is the site of rRNA synthesis

10. Select the correct statement from the following.

1) Nucleolus disappear during cell division after metaphase

2) Vacuole can occupy upto 90% of cellular volume in animal cell

3) All eukaryotic cells are identical

4) Infoldings of cell membrane into the cells are called mesosome

11. Fluid mosaic model explains

1) Structural aspects of cell membrane

2) Functional aspect of plasma membrane

3) Both structural and functional aspect of biomembrane

4) Only fluidity of membrane

12. F_0-F_1 particles are the part of

1) Outer membrane of mitochondria

2) Outer membrane of chloroplast

3) Inner membrane of chloroplast

4) Inner membrane of mitochondria

13. Find the incorrect statement.

1) Plasmid genome confers unique phenotypic characters to bacteria

2) Inclusion bodies are present only in prokaryotes

3) Bacteria are divided into gram +ve and gram -ve based on the difference in nuclear structure

4) Cell wall of some bacteria could be lose sheath called slime layer

14. The cell organelle which form the basal body of cilia and flagella and spindle fibres

1) Centriole

2) Golgi apparatus

3) Nucleus

4) Microbodies

15. Which of the following is not correct about middle lamella ?

1) It is formed as cell plate during cytokinesis

2) It is mainly composed of magnesium pectate

3) It holds two neighboring cells together

4) It is mainly composed of calcium pectate

16. Plasmodesmata are

1) Locomotoary organs

2) Cementing material between adjacent cell

3) Cytoplasmic connections

4) Lignified layer between two cells

17. 50s ribosomes of prokaryotes consists of

1) 23s rRNA + 21 type proteins

2) 16s rRNA + 21 type proteins

3) 28s rRNA + 5s rRNA + 40 type proteins

4) 23s rRNA + 5s rRNA + 34 type proteins

18. Which among the following is correct distribution of different types of ribosomes in a cell ?

1) 70s ribosomes present only in prokaryotes

2) In eukaryotes ribosomes are present only in cytoplasm and chloroplast

3) Prokaryotes posses 70s ribosomes

4) Eukaryotes posses only 80s ribosome

19. Which among the following is correct about chloroplast ?

1) Stroma contain small double stranded linear DNA

2) Ribosomes of chloroplast are larger than cytoplasmic ribosome

3) Thylakoids are non membraneous system found in stroma

4) Majority of chloroplast of green plants are found in the mesophyll cells of leaves

20. Cytoskeleton in cytoplasm is an elaborate network of filament made up of

1) Carbohydrate 2) Lipids

3) Nucleic acid 4) Proteins

21. Triple helical structure of collagen is discovered by

1) Rudolf Virchow

2) G.N. Ramachandran

3) Catherin Easu

4) Roobert Hooke

22. The physico-chemical approach to study and understanding living organism is called

1) Cytology

2) Rationalist Biology

3) Reductionist Biology

4) Cell Biology

23. Alpha helix and Beta sheet structure of protein was published by

1) G.N. Ramachandran

2) Linus Pauling

3) Watson and Crick

4) Sutton

ASSERTION - REASON TYPE QUESTIONS

1) Both assertion and reason are true and the R is a correct explanation of assertion.

2) Both assertion and reason are true and the reason is not a correct explanation of assertion.

3) Assertion is true and reason is false

4) Both assertion and reason are false

24. **Assertion :** Reserve material in prokaryotic cells are stored in the form of inclusion bodies.

Reason : Phosphate granules and cyanophycean granules are inclusion bodies.

25. **Assertion :** Chloroplast and Mitochondria are semiautonomous cell organelles

Reason : They have their own DNA and protein synthesising machinery

26. **Assertion :** The Quasi fluid nature of lipid enables lateral movement of proteins within the overall bilayer.

Reason : This ability to move with in the membrane is called fluidity and is important for cell growth.

27. **Assertion :** The arrangement of axonemal microtubules in cilia is called 9+2 array.

Reason : The axoneme usually has nine doublets of radially arranged peripheral microtubules and 2 pairs of centrally located microtubules.

28. **Assertion :** Mature erythrocytes in mammals lack a nucleus.

Reason : Erythrocytes does not follow cell theory.

29. **Assertion :** 'S' stands for sedimentation co-efficient.

Reason : Sedimentation co-efficient is directly a measure of density and size

30. **Assertion :** The outer membrane of nuclear envelope is continuous with ER

Reason : This continuity allows the unidirectional movement of RNA

STATEMENT TYPE QUESTIONS

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct and statement II is incorrect

4) Statement I is incorrect and statement II is correct.

31. **Statement I :** Nucleoplasma contains nucleolus and chromatin.

Statement II : Loose and distinct network of nucleoprotein fibres called chromatin

32. **Statement I :** In metacentric chromosome centromere is present at the middle.

Statement II : In sub-metacentric chromosome one arm is shorter and one longer arm.

33. **Statement I :** Enzyme contain minute vesicles in plant cell and animal cells are microbodies.

Statement II : Peroxisomes and glyoxisomes are microbodies.

34. **Statement I :** Ribosomes occur freely in the cytoplasm or associated with ER.

Statement II : RER involved in lipid synthesis.

35. **Statement I :** Chlorophyll pigments are present in the thylakoids.

Statement II : The membrane of the thylakoids enclose a space called lumen.

36. Match column I and II and select the correct option.

Column A		Column B	
a.	ER	1.	Photorespiration
b.	Peroxisome	2.	Autophagy
c.	Glyoxysome	3.	Glycosylation of proteins
d.	Lysosome	4.	Glyoxylate cycle

1) a - 2 ; b - 1 ; c - 3 ; d - 4

2) a - 3 ; b - 1 ; c - 4 ; d - 2

3) a - 4 ; b - 1 ; c - 3 ; d - 2

4) a - 1 ; b - 2 ; c - 3 ; d - 4

37. Find the incorrect statements.

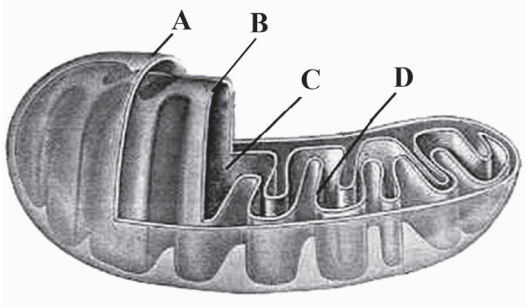
1) The prokaryotic flagella are structurally similar to that of eukaryotic flagella

2) The arrangement of axonemal microtublules in cilia is reffered to as 9 + 2 array.

3) Both cilia and flagella are emerge from centriole like structures

4) Centrosomes are surrounded by amorphous pericentriolar materials

38. Identify A, B, C and D



1) A - Outer membrane

B- Inner membrane

C - Matrix

D - Cristae

2) A - Outer membrane

B - Inner membrane

C - Cristae

D - Matrix

3) A - Innermembrane

B - Outer membrane

C - Matrix

D - Cristae

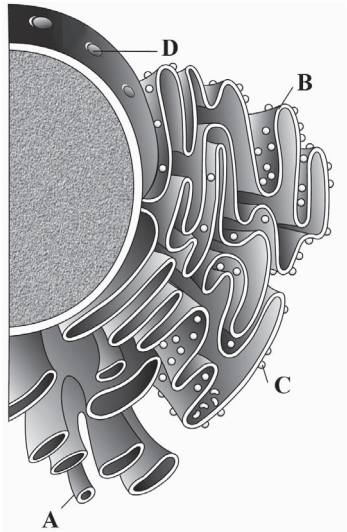
4) A - Outer membrane

B - Inner membrane

C - Cristae

D - Matrix

39. Which of the following labelled part involved in lipid synthesis ?



1) A - SER

2) B - RER

3) C - Ribosome

4) D - Nuclear pore

40. Read the following statement about the function of cell membrane and choose the correct statement.

1) It involved in the transport of molecule across it

2) Passive transport require energy

3) Na^+ and K^+ pumps use energy

4) Polar molecules cannot pass through the lipid bilayer

41. DNA occurs in

1) Mitochondria, Chloroplast and Ribosome

2) Chloroplast, Cytoplasm and Lysosome

3) Mitochondria, Cytoplasm and Lysosome

4) Mitochondria, Cytoplasm and Chloroplast

42. Flagella occurs in

1) Eukaryotic cell

2) Prokaryotic cell

3) Virus

4) Both1 and 2

43. Chromatin consist of

1) DNA

2) RNA and histones

3) DNA and non histones

4) Both 2 and 3

44. A chromosome with centromere is at the tip

1) Acrocentric

2) Telocentric

3) Submetacentric

4) Metacentric

45. The number of mitochondria per cell is variable depending on

1) Physiological activity of the cell

2) Biochemical activity of the cell

3) Morphology of the cell

4) All of the above

ANSWER KEY

1.	1	21.	2	41.	3	61.	1	81.	4
2.	3	22.	4	42.	2	62.	2	82.	4
3.	4	23.	3	43.	3	63.	1	83.	4
4.	2	24.	1	44.	4	64.	4	84.	4
5.	4	25.	3	45.	3	65.	4	85.	2
6.	3	26.	2	46.	2	66.	2	86.	1
7.	1	27.	1	47.	2	67.	1	87.	1
8.	1	28.	2	48.	3	68.	2	88.	4
9.	2	29.	3	49.	1	69.	2	89.	3
10.	4	30.	2	50.	3	70.	1	90.	3
11.	2	31.	3	51.	4	71.	4	91.	1
12.	2	32.	4	52.	4	72.	3	92.	4
13.	4	33.	2	53.	2	73.	3	93.	2
14.	2	34.	3	54.	1	74.	4	94.	1
15.	3	35.	1	55.	1	75.	1	95.	1
16.	4	36.	1	56.	2	76.	3	96.	4
17.	3	37.	2	57.	3	77.	2	97.	4
18.	1	38.	4	58.	2	78.	3	98.	1
19.	2	39.	4	59.	3	79.	3	99.	4
20.	3	40.	1	60.	4	80.	4	100.	4

SAMPLE QUESTIONS

1.	2	10.	4	19.	4	28.	1	37.	1
2.	1	11.	3	20.	4	29.	3	38.	1
3.	4	12.	4	21.	2	30.	3	39.	1
4.	2	13.	4	22.	3	31.	1	40.	2
5.	2	14.	1	23.	2	32.	1	41.	4
6.	1	15.	2	24.	2	33.	1	42.	4
7.	1	16.	3	25.	1	34.	3	43.	4
8.	3	17.	4	26.	2	35.	1	44.	2
9.	3	18.	3	27.	1	36.	2	45.	1

WORK BOOK

Chapter 06

CELL CYCLE AND CELL DIVISION

CELL CYCLE AND INTERPHASE

1. The sequence of events by which a cell duplicates its genome, synthesises the other constituents of the cell and eventually divides into two daughter cells is termed as

1) Meiosis 2) Cytokinesis

3) Cell cycle 4) Karyokinesis

2. A typical eukaryotic cell cycle is illustrated by human cells in culture. These cells divide once in approximately every

1) 24 hours 2) 12 hours

3) 6 hours 4) 4 hours

3. Yeast can progress through the cell cycle in only about

1) 90 minutes 2) 24 hours

3) 90 hours 4) 20 minutes

4. In 24 hours average duration of cell cycle of a human cell, cell division (M phase) lasts for only about an hour. The interphase lasts more than ____ percent of the duration of the cell cycle.

1) 50% 2) 95%

3) 60% 4) 80%

5. During interphase _____

1) Replication of DNA occurs

2) Replication of centriole

3) Chromosomes can be observed only as chromatin

4) All the above

6. First gap phase in cell cycle is :

1) Interval between mitotic phase and DNA replication phase

2) Interval between DNA replication phase and prophase

3) Interval between karyokinesis and cytokinesis

4) Interval between DNA replication phase and metaphase

7. Premitotic gap phase of cell cycle or post DNA synthesis phase

1) G_1- phase 2) S- phase

3) G_2- phase 4) G_0 stage

8. Post mitotic gap phase of cell cycle is

1) G_1- phase 2) S- phase

3) G_2- phase 4) G_0- phase

9. Which of the following cell can complete cell cycle in 90 minutes ?

1) Plant cell 2) Animal cell

3) Algal cell 4) Yeast cell

10. Interphase is also known as the preparatory phase because

1) It is period of preparation for cell division

2) It does not prepare cell for cell division

3) It is the phase where cell rests before entering into mitosis

4) It is the most inactive phase of the cell cycle

11. During G_2-phase, a diploid cell contains the amount of DNA equal to a :

1) Diploid cell

2) Tetraploid cell

3) Haploid cell

4) None of the above

12. Resting phase of the cell cycle is

1) M-phase 2) Prophase

3) Metaphse 4) Interphase

13. The substages of interphase consists of

1) G_1- phase

2) S- phase

3) G_2- phase

4) All the above

14. In animal cell/plant cell, during G_2 phase, _____ are synthesised in preparation for mitosis while cell growth continues.

1) Proteins

2) DNA

3) Cell organelles

4) Centrosome

15. In animal cells, during the S phase, DNA replication begins in the _____, and the centriole duplicates in the _____ .

1) Mitochondria and chloroplast

2) Mitochondria and cytoplasm

3) Cytoplasm and nucleus

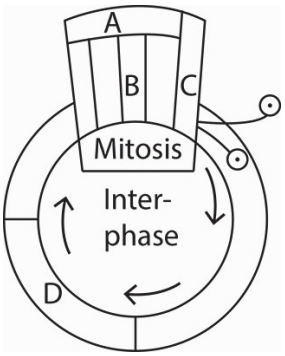
4) Nucleus and cytoplasm

16. In which phase of cell cycle, DNA synthesis takes place ?

1) S-phase 2) G_1 - phase

3) G_2 - phase 4) G_0 - phase

17. Given below is a schematic representation of cell cycle



Which one of the following is the correct indication of the stage/phase in the cell cycle ?

1) B-Metaphase

2) C-Karyokinesis

3) D-Synthesis phase

4) A-Cytokinesis

18. The centrosome duplicates during :

1) G_1 phase

2) S phase

3) G_2 phase

4) G_0 phase

19. Consider the two statements.

I) During G_1 phase, the cell is metabolically active and continuously grows but does not replicate its DNA

II) During G_2 phase, proteins are synthesized during preparation for mitosis/meiosis, while cell growth continues.

Of the two statements :

1) Only I is correct

2) Only II is correct

3) Both I and II are correct

4) Both I and II are incorrect

20. If the DNA content of an onion root tip cell is 2C at the end of the M-phase (Mitosis), what would be its DNA content at the end of the S-phase ?

1) C 2) 2C

3) 8C 4) 4C

21. Suppose an organism has 5pg of DNA in a haploid cell. How much DNA would a diploid cell has in its nucleus at G_1 ?

1) 5pg 2) 10 pg

3) 20pg 4) 2.5pg

22. The active phase also called metabolic or energetic phase with most cytogenetic activity is

1) Interphase 2) M-phase

3) Meiosis 4) Pachytene

23. Cells in G_0 phase

1) Suspend the cell cycle

2) Exit from the G_1 phase

3) Exit the cell cycle

4) Both 1 and 2

24. **Statement I :** Interphase last for more than 95% of cell cycle.

Statement II : Interphase represent the phase between two successive M- phase

1) Statement I and II are correct.

2) Statement I and II are incorrect.

3) Statement I is correct and statement II is incorrect

4) Statement I is incorrect and statement II is correct.

25. Which of the following statements are false ?

a) Cell growth is continuous throughout interphase

b) DNA synthesis occurs only during one specific stage of cell cycle

c) Cell growth and DNA replication takes place in an orderly manner

d) Cell cycle involves interphase, karyokinesis and cytokinesis

1) b only

2) c only

3) b and c only

4) All are correct

26. The phase between DNA replication and cell division

1) Gap 2 2) Gap 1

3) Interphase 4) M-phase

MITOSIS

27. Identify the correct sequence of karyokinesis

1) Prophase → Anaphase → Metaphase → Telophase

2) Prophase → Metaphase → Anaphase → Telophase

3) Prophase → Telophase → Metaphase → Anaphase

4) Prophase → Metaphase → Telophase → Anaphase

28. Astral rays arise from

1) Centrosome 2) Cytoplasm

3) Chromatid 4) Centromere

29. In the cell cycle of Yeast, the M phase starts with the nuclear division, corresponding to the separation of daughter chromosomes (Karyokinesis) and usually ends with

1) Karyokinesis

2) Interphase

3) Cytokinesis

4) Both 2 and 3

30. Which plant material is best studied for studying mitosis in classroom ?

1) Root tips (Onion) 2) Anther

3) Shoot tip 4) Flower

31. In animals, aster formation is mainly responsible for :

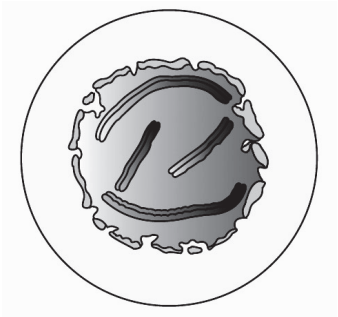
1) Spindle fibre formation

2) Pairing of homologous chromosomes

3) Cytokinesis in plant cells

4) Check point decission process on cell cycle

32. The cell shown in the given diagram is in :



1) Early prophase

2) Late prophase

3) Metaphase

4) Telophase

33. Which of the following options gives the correct sequences of events during mitosis ?

1) Condensation → nuclear membrane disassembly → crossing over → segregation → Telophase

2) Condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase

3) Condensation → crossing over → nuclear membrane disassembly → segregation →telophase

4) Condensation → arrangement at equator → centromere division → bivalent formation → telophase

34. Which of the following does not occur during mitotic prophase ?

1) Disappearance of the nuclear envelope

2) Chromosome condensation

3) Migration of centrosomes towards the cell poles

4) Synapsis of homologous chromosomes

35. The two chromatids of a metaphase chromosome represent :

1) replicated DNA to be separated at anaphase

2) non homologous chromosomes joined at the centromere

3) pair of homologous chromosomes

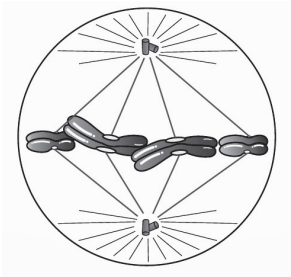
4) maternal and paternal chromosomes joined at the centromere

36. During the metaphase stage of mitosis, the number of chromatids in each chromosome :

1) Two 2) One

3) Four 4) Three

37. A stage of mitosis is shown in the diagram. Which stage is it and what are its main events ?



1) Metaphase - Spindle fibres attached to kinetochores, centromeres split and chromatids separate

2) Metaphase - Chromosomes moved to spindle equator, chromosomes made up of two sister chromatids

3) Anaphase - Centromeres split and chromatids separate and start moving away

4) Late prophase - Chromosomes move to spindle equator

38. In anaphase, a metacentric chromosome appears :

1) I - shaped 2) J - shaped

3) V - shaped 4) L - shaped

39. During cell division, the spindle fibres attach to the chromosomes at a region called

1) Chromocentre

2) Kinetochore

3) Centriole

4) Chromomere

40. Which one of the following precedes reformation of the nuclear envelope during M-phase of the cell cycle ?

1) Decondensation from chromosomes and reassembly of the nuclear lamina

2) Transcription from chromosomes and reassembly of the nuclear lamina

3) Formation of the contractile ring and formation of the phragmoplast

4) Formation of the contractile ring and transcription from chromosomes

41. How many copies of DNA molecule will be found in a cell at the beginning of each of these stages of the mitotic cell cycle ?

	G_2 of Interphase	Prophase	Cytokinesis
a.	1	1	2
b.	1	2	1
c.	2	1	2
d.	2	2	1

1) a 2) b

3) c 4) d

42. During mitosis ER and nucleolus disappear at

1) Prophase 2) Metaphase

3) Telophase 4) Anaphase

43. Mitotic anaphase differs from metaphase in possessing.

1) Same number of chromosomes and same number of chromatids

2) Half number of chromosomes and half number of chromatids

3) Half number of chromosomes and same number of chromatids

4) Double number of chromosomes and same number of chromatids

44. Number of mitotic generation required in a cell of root tip for formation of 128 cells is

1) 12 2) 3

3) 7 4) 6

45. Select the correct option with respect to mitosis.

1) Chromatids separate but remain in the centre of the cell in anaphase

2) Chromatids start moving towards opposite poles in telophase

3) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

4) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase.

46. Which one of the following never occurs during mitotic cell division ?

1) Coiling and condensation of chromatids

2) Spindle fibers attach to kinetochores of chromosomes

3) Movement of centrioles towards opposite poles

4) The pairing of homologous chromosomes

47. What is true about the mitotic spindle ?

1) It is composed of actin and myosin microfilaments

2) It is attached to kinetochore at telophase

3) It is composed of microtubules, which separate chromosomes

4) It originates only from centrioles of centrosome

48. Doubling of the number of chromosomes can be achieved by disrupting spindle formation during

1) Anaphase 2) Telophase

3) Prophase 4) Metaphase

49. What is the final stage of karyokinesis ?

1) Prophase 2) G_2-phase

3) Telophase 4) G_1-phase

50. Which of these events does not take place during telophase ?

1) Chromosomes are distinct and clear

2) Chromosomes are present at the poles

3) Chromosomes are decondensed

4) Chromsomes lose their individuality

51. Why do plants not undergo furrowing during cytokineis ?

1) Absence of centrioles

2) Presence of rigid vascular bundle

3) Presence of cell wall

4) Presence of large vacuoles

52. Furrow formation found in

1) Plant cell

2) Algae

3) Animal cell

4) Both 1 and 3

53. Which of these is an example of syncytium is coconut ?

1) Fleshy endosperm

2) Liquid endosperm

3) Endocarp

4) Mesocarp

54. The cell-plate of plant cells represents the _____ .

1) Middle lamella

2) Primary cell wall

3) Secondary cell wall

4) Plasmodesmata

55. During which stage of cell cycle do the major organelles reform ?

1) Prophase 2) Anaphase

3) Telophase 4) G_2-phase

56. Which stage is known as reverse prophase ?

1) Metaphase 2) Anaphase

3) Meiosis II 4) Telophase

57. Which type of chromosome attain J-shape ?

1) Metacentric

2) Telocentric

3) Acrocentric

4) Submetacentric

58. **Assertion :** Mitotic cell division is also called equational division.

Reason : Number of chromosome in the parent and progeny cells remains the same in mitosis.

1) If both assertion and reason are true, the reason is correct explanation of assertion.

2) If both Assertion and Reason are true, but reason is not a correct explanation of Assertion

3) If Assertion is true but the Reason is false

4) If both Assertion and Reason are false

59. Scientists who first reported mitosis are :

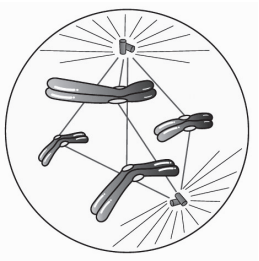
1) Farmer and Moore

2) Watson and Crick

3) Strasburger and Fleming

4) Schleiden and Schwann

60. Choose the correct option for the diagram given below:



	Chromosomes	Chromatids	Centromeres	Kinetochores
1)	4	8	8	8
2)	4	4	4	8
3)	4	16	8	4
4)	4	8	4	8

61. Match the following column -

Column I		Column II	
a.	Syncytium	i.	Divide the cytoplasm of animal cell
b.	Cell-plate	ii.	Occur in liquid endosperm of coconut
c.	Cell furrow	iii.	Method of cytokinesis in plant cell

1) a - ii, b - iii, c - i

2) a - iii, b - ii, c - i

3) a - ii, b - i, c - iii

4) a - iii, b - i, c - ii

62. Cell plate grows from

1) wall to centre

2) one wall to another

3) centre to wall

4) none of these

MEIOSIS

63. Synapsis occurs between

1) a male and a female gamete

2) mRNA and ribosomes

3) spindle fibres and centromere

4) two homologous chromosomes

64. Meiosis I :

1) is always followed by interphase

2) is not followed by any period of rest

3) is followed by a period of interkinesis

4) is sometimes followed by interphase

65. Bivalent chromosomes clearly appear as tetrads during :

1) Zygotene

2) Pachytene

3) Diplotene

4) Diakinesis

66. The beginning of diplotene is recognized by :

1) Appearance of recombination nodules

2) Crossing over

3) Dissolution of synaptonemal complex

4) Appearance of chiasmata

67. If there are 30 chromosomes in G_1 phase then what will be number of bivalents in zygotene stage ?

1) 15 2) 45

3) 60 4) 30

68. What will be the amount of DNA in metaphase II if meiocyte contains 30 Pg DNA in G_1 phase ?

1) 15 Pg

2) 120 Pg

3) 60 Pg

4) 30 Pg

69. In oocyte of some vertebrates, the stage of meiosis I that can last for months or years would be :

1) Zygotene

2) Pachytene

3) Diplotene

4) Diakinesis

70. At what phase of meiosis are homologous chromosomes separated ?

1) Prophase I 2) Prophase II

3) Anaphase I 4) Anaphase II

71. Crossing over is an enzyme - mediated process. The enzyme is :

1) DNA ligase

2) Recombinase

3) RNase

4) DNase

72. Identify the correct statements from following.

a) In meiosis I, division of chromosomes take place.

b) Usually meiosis-I is called reduction division.

c) Meiosis occur in those cells which take part in gametogenesis.

d) The gap between meiosis-I and meiosis-II is called interkinesis.

Choose the correct answer from the given options below.

1) a, b, c and d

2) b, c and d

3) Only c and d

4) Only d

73. Meiosis I is reductional division. Meiosis II is equatorial division due to

1) Pairing of homologous chromosomes

2) Crossing over

3) Separation of chromatids

4) Disjunction of homologous chromosomes

74. Crossing over takes place between which chromatids and in which stage of the cell cycle ?

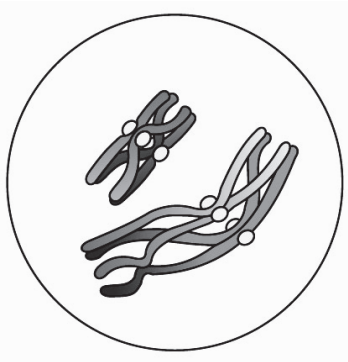
1) Non-sister chromatids of non-homologous chromosomes at Zygotene stage of prophase I.

2) Non-sister chromatids of homologous chromosomes at Pachytene stage of prophase I.

3) Non-sister chromatids of homologous chromosomes at Zygotene stage of prophase I

4) Non-sister chromatids of non-homologous chromosomes at Pachytene stage of prophase I

75. Identify the given figure.



1) Metaphase I

2) Anaphase I

3) Telophase I

4) Prophase I

76. Number of bivalent at metaphase plate of metaphase I of a plant having 2n = 60 chromosomes, will be

1) 60 2) 120

3) 180 4) 30

77. Match the column I with column II and select the correct answer :

Column I		Column II	
A.	Pachytene	i.	Bouquet stage
B.	Zygotene	ii.	Chiasma visible
C.	Diplotene	iii.	Terminalisation
D.	Leptotene	iv.	Gene exchange
E.	Diakinesis	v.	Synapsis

1) A - i; B- ii; C - iii; D - iv; E - v

2) A - iv; B- v; C - ii; D - i; E - iii

3) A - iii; B- iv; C - v; D - ii; E - i

4) A - ii; B- iii; C - iv; D - i; E - v

78. The process of appearance of recombination nodules occurs at which sub-stage of prophase I in meiosis ?

1) Diakinesis

2) Zygotene

3) Pachytene

4) Diplotene

79. The appearance of recombination nodules on homologous chromosomes during meiosis characterizes :

1) Personalization

2) Synaptonemal complex

3) Bivalent

4) Sites at which crossing over occurs

80. What results in the formation of chiasmata ?

1) Exchange of parts of paired homologous chromosome

2) Exchange of part of unpaired non-homologous chromosome

3) Duplication of parts of paired homologous chromosome

4) Loss of parts of unpaired non-homologous chromosome

81. The stage which serves as a connecting link between meiosis I and meiosis II.

1) Interphase

2) G_2-phase

3) Interkinesis

4) None of the above

82. Read the following statements and choose the correct one.

Statement I : Sister chromatids separate during anaphase II.

Statement II : Nuclear membrane dis-appears towards the end of telophase.

1) Both the statements are true

2) Both statements are wrong

3) Statement I is true and II is wrong

4) Statement I is wrong and statement II is true

83. What are the total number of chromosomes present during prophase I in a human cell undergoing meiosis ?

1) 46 2) 92

3) 23 4) 69

84. Choose the correctly matched pairs and the correct option.

a) Leptotene - Chromosomes become invisible

b) Zygotene - Pairing of homologous chromosomes

c) Pachytene - Dissolution of synaptonemal complex takes place

d) Diplotene - Bivalent chromosomes formed

e) Diakinesis - Terminalisation of chiasmata takes place

1) a and b correct

2) a and d correct

3) b and e correct

4) b and c correct

85. Which of the following is not the characteristic of prophase I ?

1) Synapsis

2) Segregation

3) Crossing over

4) Chiasmata formation

86. The formation of recombination nodules and terminalisation occur respectively during:

1) Pachytene and diakinesis

2) Leptotene and zygotene

3) Zygotene and diakinesis

4) Diplotene and diakinesis

87. Match the following correctly

Column I		Column II	
a.	Zygotene	1.	Endonuclease & ligase
b.	Pachytene	2.	Dissolution of synaptonemal complex
c.	Diplotene	3.	Bivalent
d.	Diakinesis	4.	Terminalisation

1) a - 1; b - 2 ; c - 3 ; d - 4

2) a - 2; b - 4 ; c - 1 ; d - 3

3) a - 3; b - 1 ; c - 2 ; d - 4

4) a - 4; b - 3 ; c - 2 ; d - 1

88. Bouquet stage can be noticed during

1) Zygotene 2) Leptotene

3) Pachytene 4) Diplotene

89. Find out the incorrect statement?

1) Tetrad is clearly visible at pachytene stage

2) After meiosis I, cytokinesis follows dyad of cells

3) Separation of homologous pair starts in anaphase II

4) The number of bivalent is equal to haploid number in diploid organisms like humans

90. If the diploid chromosome number is 10 how many bivalents can be observed during zygotene stage of prophase I of Meiosis I

1) 10 2) 5

3) 20 4) 40

91. During meiosis, the sister chromatids separate during :

1) Anaphase II 2) Anaphase I

3) The S-phase 4) Synapsis

92. Which of the following is not true for sister chromatids ?

1) They arise by replication during S-phase

2) They segregate from each other during each mitotic anaphase

3) They usually contain identical versions of the same genetic information

4) They segregate from each other during meiosis I

93. Which of the following is not occurs in Anaphase-I but occurs in Anaphase-II :

1) Condensation of chromosomes

2) Poleward movement of chromosome

3) Contraction of spindle fibers

4) Splitting of centromere

94. In meiosis, centromeres of chromosomes divide during :

1) Anaphase of meiosis-II

2) Metaphase of meiosis-I

3) Anaphase of meiosis-I

4) Prophase of meiosis-II

95. Regarding meiosis, which statement is incorrect ?

1) Four haploid cells form at the end of meiosis-II

2) In meiosis, there are two stages : meiosis-I and meiosis-II

3) DNA replication occurs in the S-phase of meiosis-II

4) The pairing and recombination of homologous chromosomes occurs during meiosis-I

96. Which of the following is true about diakinesis :

1) Chromosomes at pole uncoil and form chromatin reticulum

2) Exchange of chromosome segments between two non-sister chromatids of homologous pair of chromosomes

3) Chromosomes are fully condensed

4) Synaptonemal complex starts breaking down

97. Meiosis has evolutionary significance because it results in

1) Genetically similar daughters

2) Four daughter cells

3) Eggs and sperms

4) Recombinations

98. Which of the following is not a characteristic of meiosis ?

1) It involves two stages of DNA replication one before meiosis -I and another before meiosis -II

2) It involves recombination and crossing over

3) Sister chromatids separate during anaphase-II

4) Nuclear membrane disappears during prophase

99. Which of the two events restore the normal number of chromosomes in life cycle ?

1) Mitosis and meiosis

2) Meiosis and fertilisation

3) Fertilisation and mitosis

4) Only meiosis

100. Zygotic meiosis occurs in:

1) *Chlamydomonas*

2) *Marchantia*

3) *Pinus*

4) *Dryopteris*

SAMPLE QUESTIONS

1. Identify the meiotic stage in which the homologous chromosomes separate while the sister chromatids remain associated at their centromeres.

1) Metaphase I

2) Metaphase II

3) Anaphase I

4) Anaphase II

2. All the following occur during karyokinesis of mitosis except

1) Chromosome condensation

2) Spindle fibre formation

3) Disappearance of nucleolus

4) Synthesis of DNA

3. The sister chromatids of a chromosome are referred to as individual chromosomes in

1) Prophase

2) Metaphase

3) Anaphase

4) Interphase

4. Longest phase of meiosis is

1) Prophase I

2) Prophase II

3) Metaphase I

4) Telophase II

5. Find the incorrect match

1) Leptotene - Bivalent

2) Zygotene - Synapsis

3) Pachytene - Genetic recombination

4) Diplotene - Chiasmata

6. Which of the following is unique to meiosis?

1) DNA synthesis before division

2) Synapsis and crossing over

3) Karyokinesis and cytokinesis

4) Metaphasic plate formation

7. Which of the following is not a significance of mitosis?

1) Growth and development

2) Repair

3) Variation

4) Differentiation

8. Which of the following statement/s is/are correct about anaphase of mitosis?

1) Bivalent disjunction

2) Migration of daughter chromosomes towards opposite poles

3) Homologous chromosome separate and appears as daughter chromosomes

4) All the above

9. Number of daughter cells produced after mitosis and meiosis respectively are

1) 2 & 2

2) 2 & 4

3) 4 & 4

4) 4 & 2

10. Centrosomes duplicates and migrates to opposite poles during

1) Prophase

2) S phase & prophase respectively

3) S phase & Metaphase respectively

4) S phase

11. A man records the morphology, size and number of chromosomes by observing a cell under the microscope. The best stage to study these chromosome characteristics will be

1) Prophase stage when the chromosome condenses

2) Telophase stage when the daughter chromosomes reach the opposite poles

3) Pachytene stage when crossing over takes place

4) Metaphase stages of Mitosis

12. If the diploid chromosome number is 10 how many bivalents can be observed during zygotene stage of prophase I of Meiosis I

1) 10

2) 5

3) 20

4) 40

13. **Assertion :** Diplotene is characterized by the presence of chiasmata

Reason : Diplotene can last for months and years in oocytes of some vertebrates

1) If both assertion and reason are true and reason is the correct explanation of assertion.

2) If both assertion and reason are true but reason is not the correct explanation of assertion.

3) If assertion is true but reason is false

4) If both assertion and reason are false

14. Stages in proper sequence of Prophase I are

1) Zygotene, Leptotene, Pachytene, Diakinesis and Diplotene

2) Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis

3) Leptotene, Pachytene, Zygotene, Diakinesis and Diplotene

4) Diplotene, Diakinesis, Pachytene, Zygotene and Leptotene

15. Which is not characteristic of meiosis?

1) Two stages of DNA replication, first before meiosis I and second before meiosis II

2) Recombination and crossing over

3) Sister chromatids separate during anaphase II

4) Nuclear membrane disappears towards end of prophase

16. In a diploid cell, at which stage of cell cycle, the amount of DNA is doubled

1) G_1 and G_2 phase

2) G_0 phase

3) S,G_2 and G_1 phase

4) S phase

17.

Column I		Column II	
a.	Division of centromere	1.	S-phase
b.	Replication of DNA	2.	Anaphase
c.	Reappearance of nucleus	3.	Telophase
d.	Disintegration of nuclear membrane	4.	Late prophase

1) a - 2 ; b - 1 ; c - 4 ; d - 3

2) a - 2 ; b - 1 ; c - 3 ; d - 4

3) a - 1 ; b - 2 ; c - 3 ; d - 4

4) a - 1 ; b - 2 ; c - 4 ; d - 3

18. The key feature of metaphase is

1) Chromosomal material condenses to form chromosome

2) Chromatids move to opposite poles

3) Centromeres split and chromatids separate

4) Spindle fibres attach to kinetochores of chromosomes and equatorial arrangement of chromosomes

19. Which of the following statement is correct about meiosis

1) Conservation of specific chromosome number of each species is achieved

2) Results in the production of diploid daughter cells

3) Helps in cell repair

4) Results in continuous growth of plants

20. Arrange the following events of meiosis in the correct sequence

I) Terminalization

II) Crossing over

III) Synapsis

IV) Disjunction of genomes

The correct sequence is-

1) II, I, V, III

2) III, II, I, IV

3) IV, III, II, I

4) I, IV, III, II

21. How many are connected to telophase stage?

A) Decondensation of chromosome

B) Synapsis

C) Condensation

D) E.R and Golgi reformation

E) Dissolution of synaptonemal complex

F) Terminalisation

F) Formation of daughter nuclei in a cell

1) 2 2) 3

3) 4 4) 5

22. Prophase I of meiosis is divided into _____ phases based on chromosomal behaviour

1) 2 2) 3

3) 4 4) 5

23. During mitosis; metaphase differs from anaphase in having:

1) same no. of chromosomes and half no. of chromatids

2) half no. of chromosomes and half no. of chromatids

3) same no. of chromosomes and same no. of chromatids

4) half no. of chromosomes and same no. of chromatids

24. During meiosis I, the bivalent chromosomes more clearly appear as tetrads during :

1) Diakinesis

2) Diplotene

3) Leptotene

4) Pachytene

25. Chromosomes that have lose their individuality in which phase of cell cycle:-

1) Prophase

2) Telophase

3) prophase I

4) metaphase

26. Karyokinesis is not followed by cytokinesis in the case of

1) Zoospore

2) RBCs

3) Liquid endosperm of coconut

4) Muscle fibres

27. The cell which exist in 'Go' phase

1) Liver cell

2) Heart cell

3) Meristems

4) Osteocytes

28. At what stage does the number of chromosomes become half?

1) Prophase I

2) Metaphase I

3) Anaphase I

4) Telophase I

29. A chromosome carrying centromere at one end is

1) Acrocentric

2) Telocentric

3) Metacentric

4) Submetacentric

30. In meiosis, chromosome replicate during

1) Prophase I

2) Prophase II

3) Telophase I

4) Interphase

31. Which one ensures maintenance of chromosome number from generation to generation?

1) Mitosis

2) Meiosis

3) Splicing

4) Metamorphosis

32. The second division in meiosis is called

1) equational division

2) reduction division

3) multiplied division

4) none of the above

33. The cell cycle is divided into two basic phases are

1) Interphase and G1-phase

2) S phase and M phase

3) Interphase and M phase

4) Both 2 and 3

34. _____ is the best stage to count the number and study the morphology of chromosomes

1) Prophase

2) Metaphase

3) Anaphase

4) Telophase

35. Mitotic spindle is mainly composed of ___ proteins

1) Tubulin 2) Myosin

3) Actin 4) Actomyosin

36. At which of the following stages, the chromosomes appear single, thin and thread like?

1) Leptotene

2) Zygotene

3) Pachytene

4) Diplotene

37. Meiosis ensure the production of _____ phase in life cycle of sexually reproducing organisms whereas fertilization restore _____ phase.

1) Haploid and haploid respectively

2) Diploid and haploid respectively

3) Diploid and diploid respectively

4) Haploid and diploid respectively

38. Which one is the correct representation of G2 phase of a meiocyte?

1) 2n / 2c

2) n / 2c

3) n / c

4) 2n / 4c

39. Synaptonemal complex permits

1) Disjunction

2) The proper alignment of the homologous chromosome

3) Congression

4) All of the above

40. A bivalent of meiosis I consist of

1) Two chromatids and one centromere

2) Two chromatids and two centromere

3) Four chromatids and two centromere

4) Four chromatids and four centromere

41. Which is not true for anaphase

1) Golgi body and ER are reformed

2) Chromosomes moves to opposite poles

3) Spindle poles move farther apart

4) Centromeres split and chromatids separate

42. Match the column I with column II :

Column I		Column II	
A.	Condensation	1.	Zygotene
B.	Congression	2.	Prophase
C.	Synapsis	3.	Metaphase
D.	Disjunction	4.	Diplotene
		5.	Anaphase

1) A-2 ; B-3 ; C-1 ; D-5

2) A-1 ; B-3 ; C-4 ; D-5

3) A-2 ; B-4 ; C-1 ; D-3

4) A-3 ; B-5 ; C-1 ; D-4

43. How many meiotic divisions are required to produce 100 seeds?

1) 25 2) 50

3) 100 4) 125

44. If the haploid number of a species is 12, each dividing diploid cell during mitosis will have how many chromatids at early Anaphase :

1) 24 2) 12

3) 6 4) 48

45. Histone proteins are synthesised during which of the following phase of cell cycle?

1) Metaphase 2) G_2-phase

3) G_1-phase 4) S-phase

46. How many chromosome does onion somatic cell have ?

1) 12 2) 14

3) 16 4) 20

47. Syncytium is

1) A multicellular organism

2) A bacteria with many nucleae

3) A single cell with more than one nucleus

4) A tissue with many undivided cells

48. Kinetochores are

1) Precursors of microtubules

2) Sites of attachment of spindle fibres

3) Site for origination of spindle fibres

4) Small disc-shaped structure at telomere of chromosome

49. Poleward movement of dyads occurs during

1) Anaphase

2) Anaphase I

3) Anaphase II

4) Telophase

50. Diad of cells is the feature of

1) Prophase I

2) Metaphase I

3) Zygotene

4) Telophase I

ANSWER KEY

1.	3	21.	2	41.	4	61.	1	81.	3
2.	1	22.	1	42.	1	62.	3	82.	3
3.	1	23.	4	43.	4	63.	4	83.	1
4.	2	24.	1	44.	3	64.	1	84.	3
5.	4	25.	4	45.	4	65.	2	85.	2
6.	1	26.	1	46.	4	66.	3	86.	1
7.	3	27.	2	47.	3	67.	1	87.	3
8.	1	28.	1	48.	4	68.	4	88.	2
9.	4	29.	3	49.	3	69.	3	89.	3
10.	1	30.	1	50.	1	70.	3	90.	2
11.	2	31.	1	51.	3	71.	2	91.	1
12.	4	32.	2	52.	3	72.	2	92.	4
13.	4	33.	2	53.	2	73.	3	93.	4
14.	1	34.	4	54.	1	74.	2	94.	1
15.	4	35.	1	55.	3	75.	4	95.	3
16.	1	36.	1	56.	4	76.	4	96.	3
17.	3	37.	2	57.	3	77.	2	97.	4
18.	2	38.	3	58.	1	78.	3	98.	1
19.	3	39.	2	59.	3	79.	4	99.	2
20.	4	40.	1	60.	4	80.	1	100.	1

SAMPLE QUESTIONS

1.	3	11.	4	21.	2	31.	2	41.	1
2.	4	12.	2	22.	4	32.	1	42.	1
3.	3	13.	2	23.	4	33.	3	43.	4
4.	1	14.	2	24.	4	34.	2	44.	4
5.	1	15.	1	25.	2	35.	1	45.	4
6.	2	16.	4	26.	3	36.	1	46.	3
7.	3	17.	2	27.	2	37.	4	47.	3
8.	2	18.	4	28.	3	38.	4	48.	2
9.	2	19.	1	29.	2	39.	2	49.	2
10.	2	20.	2	30.	4	40.	3	50.	4

WORK BOOK

Chapter 07

PHOTOSYNTHESIS IN HIGHER PLANTS

INTRODUCTION AND EXPERIMENTS

1. The process of photosynthesis takes place in :

1) Roots only

2) Shoot only

3) All the cells of plant

4) Chlorophyll containing cells

2. Name of the scientist who pointed out the importance of different wavelengths of light using a green algae and aerobic bacteria :

1) Priestley 2) Ingenhousz

3) Melvin Calvin 4) Engelman

3. Identify the experimental material used by Engelman to describe his first action spectrum of photosynthesis :

1) Chlorella 2) Chara

3) Cladophora 4) Chlorobium

4. Paper chromatography is used to :

1) Separate leaf pigments

2) Demonstrate the importance of water in photosynthesis

3) Prove the importance of light in photosynthesis

4) Demonstrate the importance of CO_2 in photosynthesis

5. Photosynthesis in green plants and purple sulphur bacteria are respectively :

1) Oxygenic and anoxygenic

2) Anoxygenic and oxygenic

3) Both are oxygenic

4) Both are anoxygenic

6. In higher plants, rate of absorption maximum in :

1) Violet light 2) Blue light

3) Orange light 4) Yellow light

7. Who demonstrated the importance of sunlight in photosynthesis :

1) T.W Engelman

2) Julius Von Sachs

3) Cornelius Van Niel

4) Jan Ingenhousz

8. Maximum photosynthesis occurs in :

1) Blue light

2) Red light

3) White light

4) Twilight

CHLOROPLAST , PHOTOSYSTEM , PHOTOSYNTHETIC PIGMENTS

9. Which fractions of the visible spectrum of solar radiations are primarily absorbed by carotenoids of the higher plants :

1) Blue and green

2) Green and red

3) Red and violet

4) Violet and blue

10. Which of the following is true regarding photo-oxidation :

A) Destruction of chlorophyll due to high light intensity

B) Destruction of chlorophyll due to high wavelength of light

C) Destruction of chlorophyll due to high wavelength of light above 700 nm

D) Destruction chlorophyll due to high wavelength of light above 750 nm

1) A only 2) B and C

3) B only 4) B,C and D

11. Which one of the following pigment does not occur in the chloroplast?

1) Carotene

2) Xanthophyll

3) Chlorophyll b

4) Anthocyanin

12. Which of the following is/are accessory pigments :

A) Chlorophyll a B) Chlorophyll b

C) Xanthophyll D) Carotene

1) A only 2) All of these

3) All except A 4) All except B

13. Chlorophyll a is found in :

1) All O_2 releasing photosynthetic organism

2) Only higher plants

3) Plant kingdom only

4) All photosynthetic organisms

14. Match the following:

a) Chlorohyll a – 1) yellow

b) Chlorophyll b – 2) bright or blue green

c) Xanthophyll – 3) orange

d) Carotene – 4) yellow green

1) a - 2; b - 4; c - 1; d - 3

2) a - 3; b - 4; c - 2; d - 1

3) a - 4; b - 3; c - 2; d - 1

4) a - 4; b - 2; c - 1; d - 3

15. Both PS I and PS II are present in :

1) Membrane of grana thylakoid

2) Membrane of stroma lamellae

3) Fret channel

4) Stroma

16. Oxysomes present in:

1) Membrane of stroma lamellae

2) Membrane of grana thylakoid

3) Stroma

4) Both 1 & 2

17. With regarding to chloroplast, more number of protons are found in:

1) Periplastidal space

2) Lumen

3) Stroma

4) Both 1 & 3

18. Percentage of chlorophyll in a normal chloroplast:

1) 5 - 10% 2) 50%

3) 10 – 25% 4) 75%

19. In a photosystem, chlorophyll b present in:

1) Core region

2) Antenna region

3) Trap centre

4) Reaction centre

20. Which chlorophyll form the reaction centre :

1) Chlorophyll a

2) Chlorophyll b

3) Chlorophyll e

4) Chlorophyll d

21. Which of the following is an accessory pigment :

1) Chlorophyll a

2) Chlorophyll b

3) Xanthophyll

4) Both 2 & 3

22. Oxidation of chlorophyll due to high light intensity is called:

1) Photo-oxidation

2) Photorespiration

3) Photophosphorylation

4) Both 1 & 2

23. Consider the following statements and select the correct option

Statement I : Chlorophyll a present only in photosynthetic eukaryotes

Statement II : Carotenoids are more stable pigments and provide protection to chlorophyll from photo-oxidation

1) Both the statements are true

2) Both the statements are false

3) Statement I is false

4) Statement II is false

24. When chloroplast align parallel to cell wall :

1) For maximum light absorption

2) For minimum light absorption

3) Photo oxidation

4) Both 1 & 3

PHOTOCHEMICAL REACTIONS / LIGHT PHASE REACTIONS

25. Type of photophosphorylation in which PSI alone participate :

1) Cyclic photophosphorylation

2) Non-cyclic photophosphorylation

3) Z - scheme of electron transport

4) Oxidative phosphorylation

26. Consider the following statements:

A) NADP found in stroma

B) Both cytochrome B_6 and cytochrome f are found in the membrane of both stroma lamellae and grana thylakoid

C) Flow of proton from lumen towards the stroma through F_0 channel is facilitated diffusion.

D) Plastocyanin is a non-protein found in the outer surface of thylakoid membrane

1) C and D are false

2) A, B & C are true

3) All except B are true

4) All statements are false

27. Identify the most possible location of cyclic electron transport :

1) Stroma lamellae

2) Stroma

3) Periplastidial space

4) Both 1 & 2

28. During non-cyclic electron transport, NADP accept protons from :

1) Lumen of grana thylakoid

2) Stroma of chloroplast

3) In between outer and inner membrane of chloroplast

4) Cytoplasm of mesophyll cell

29. FNR is associated with :

1) Cyclic electron transport

2) Calvin cycle

3) C_4 cycle

4) Z-scheme

30. NADP is :

1) Electron acceptor only

2) Proton acceptor only

3) Both proton and electron acceptor

4) Proton pumping channel

31. Photolysis takesplace in :

1) Luminal surface of grana thylakoid

2) Lumen of stroma lamellae

3) Lumen of frets

4) Both 1 & 2

32. The electron deficiency of PS II is compensated by :

1) Splitting of H_2O in the stroma and provided electrons to PS II

2) Splitting of H_2O in periplastidal space and provided electrons to PS II

3) Photolysis of water in the luminal surface of thylakoid and provided electrons to PS II

4) Photolysis of water in frets and provided electrons to PS II

33. The primary electron acceptor of photosystem I is located in :

1) Inner surface of the thylakoid membrane

2) Outer surface of the thylakoid membrane

3) Middle portion of the thylakoid membrane

4) Luminal surface of the granum

34. Which of the following statement is true regarding non-cyclic electron transport :

1) Electrons excited from PS II goes to PS I and then to ferredoxin and there is negligible chance to go to NADP but most probably electrons return back to PS I

2) Electrons from PS II goes to PS I and from PS I to ferredoxin and there is a chance to go to PS I but most probably electron goes to NADP

3) Electrons from PS II goes to PS I and from PS I to ferredoxin and strictly go to NADP and there is no chance to return back to PS I

4) Electrons from PS II goes to PS I and from PS I to ferredoxin and there is equal chance to go to NADP and PS I

35. The most outstanding objective of light phase reactions during photosynthesis :

I. Evolution of O_2 and purification of atmosphere

II. Synthesis of assimilatory powers

III. Creating proton gradient

IV. Absorption of light up to 700nm

V. Absorption of light up to 680 nm

1) Both I & II 2) I only

3) II only 4) All except III

36. Which of the following are true regarding proton pump in thylakoid membrane :

A) Only one type of pump

B) More than one type of pump

C) Cytochrome b_6 is a pump

D) PlastoQuinone B is a pump

1) A & D 2) A & C

3) B & C 4) C & D

37. Connecting link between light phase and dark phase of photosynthesis :

1) ATP only

2) $NADH_2$ only

3) $NADPH_2$ only

4) ATP & $NADPH_2$

38. Expansion of NADP:

1) Nicotinamide Adenine dinucleotide phosphate

2) Nicotinamide Adenosine dinucleotide phosphate

3) Nicotine Adenosine dinucleoside phosphate

4) Nicotine Adenine dinucleoside phosphate

39. Which of the following electron carriers possess maximum redox potential value:

1) Primary electron acceptors

2) Plastoquinone - B

3) Cytochrome B_6

4) Plastocyanin

40. Which of the following mobile electron carriers are present in thylakoid membrane:

1) Plastoquinone - B

2) Plastocyanin

3) Cytochrome B_6 and Cytochrome F

4) Both 1 & 2

41. Identify the electron transport reaction occur in stroma lamellae:

1) Cyclic

2) Non-cyclic

3) Both 1 & 2

4) Electron transport do not occur in stroma lamellae

42. During cyclic electron transport, ATP synthesis occur during?

1) Uphill transport of electrons

2) Downhill transport of electrons

3) Night

4) Both 1 & 2

43. During photosynthesis, splitting of water requires :

1) Ca^{2+}

2) Mg^{2+}

3) Ca^{2+} and Mg^{2+}

4) Mn and Cl

44. Identify the proton pump in thylakoid :

1) Cytochrome b_6

2) Cytochrome E

3) Pheophytin

4) PlastoQuinone - B

45. First step in photosynthesis is :

1) Photoexcitation of chlorophyll

2) Synthesis of ATP

3) Synthesis of $NADPH_2$

4) Absorption of CO_2

46. Type of photophosphorylation in which PS I alone participate:

1) Cyclic photophosphorylation

2) Non-cyclic photophosphorylation

3) Oxidative phosphorylation

4) Substrate level phosphorylation

47. Non-cyclic photophosphorylation does not takes place in stroma lamellae because:

1) Absence of PS II

2) Absence of NADP -reductase enzyme

3) Absence of PS I

4) Both 1 & 2

48. Number of $NADPH_2$ molecules that are produced during a single non cyclic photophosphorylation

1) 1 2) 2

3) 3 4) Zero

49. Identify the site of Z-scheme of electron transport:

1) Membrane of stroma lamellae

2) Membrane of grana thylakoid

3) Membrane of fret channel

4) Both 1 & 2

50. Identify the connecting link between light phase and dark phase

1) Cyclic photophosphorylation

2) Non-cyclic photophosphorylation

3) Stroma

4) ATP and $NADPH_2$

51. During electron transport, proton pumping occur:

1) From lumen to stroma

2) From stroma to lumen

3) Through CF_0 region of coupling factor

4) Through both CF_0 & CF_1 part of coupling factor

52. Light reaction produces assimilatory power in form of :

1) ATP, $NADH_2$

2) ATP, $NADPH_2$

3) NAD

4) NADP

DARK PHASE REACTIONS / BIOSYNTHETIC REACTIONS

53. The first stable compound of calvin cycle is PGA, as it is formed during which stage of Calvin cycle:

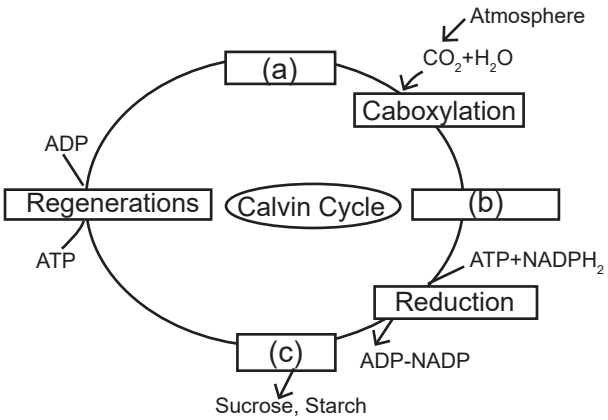
1) Carboxylation

2) Reduction

3) Regeneration

4) Product synthesis phase

54. Choose the correct combinations of labelling the carbohydrate molecule involved in the Calvin cycle:



1) a - RuBP ; b - Triose phosphate ; c - PGA

2) a - PGA ; b - RuBP ; c - Triose phosphate

3) a - PGA ; b - Triose phosphate ; c - RuBP

4) a - RuBP ; b - PGA ; c - Triose phosphate

55. Consider the following statements.

Statement I : In C_3 plants, the reactions catalysing the assimilation of CO_2 to carbohydrates take place in the stroma.

Statement II : C_3 pathway is also called Calvin cycle after its discoverer, Melvin Calvin, who received Nobel Prize for discovering this pathway.

1) Only statement I is false

2) Only statement II is false

3) Both the statements are false

4) Both the statements are true

56. How many ATP molecules are used in the regeneration of RuBP when six CO_2 molecules are entering into Calvin cycle :

1) 1 2) 2

3) 3 4) 6

57. Function of RuBisCO in Calvin Cycle :

1) Carboxylation of RuBP

2) Oxygenation of RuBP

3) Both Carboxylation and oxygenation of RuBP

4) Accept CO_2 from atmosphere

58. Through which of the following technique, the reactions of calvin cycle was discovered:

1) Paper chromatography

2) Bell jar experiment

3) Blotting technique

4) Radioactive isotope technique

59. How many major type of cells are involved in the CO_2 fixation process in C_3 plants :

1) 1 2) 2

3) 3 4) 4

60. What are the essential requirements for the synthesis of one molecule of glucose:

A) 6 molecule of RuBP

B) 6 molecule of CO_2

C) 6 Calvin cycle

D) 18 ATP

E) 12 $NADPH_2$

1) All except C 2) D & E only

3) A, D, E only 4) All

61. In C_3 plants, RuBisCO present in :

1) Mesophyll cell only

2) Bundlesheath only

3) Spongy parenchyma and bundle sheath

4) Palisade parenchyma and bundlesheath

62. In C_3 cycle, primary CO_2 acceptor is :

1) RuBisCO 2) PGA

3) PEP 4) RuBP

63. First stable product of Calvin cycle :

1) 2 - carbon compound

2) 3 - carbon compound

3) 4 - carbon compound

4) 5 - carbon compound

64. The isotope of carbon used extensively for studies on photosynthesis is :

1) C^{14} 2) C^{16}

3) C^{13} 4) C^{15}

65. Which of the following plant exhibit dimorphic chloroplast :

1) Sorghum 2) Tomato

3) Bell pepper 4) Opuntia

66. How many carboxylations and decarboxylations are required for the synthesis one molecule of glucose in C_4 plants :

1) One carboxylation in Mesophyll
One carboxylation in bundle sheath
One decarboxylation in bundle sheath

2) One carboxylation in Mesophyll
One carboxylation in bundle sheath
Twelve decarboxylation in bundle sheath

3) Six carboxylation in mesophyll
Six carboxylation in bundle sheath
Six decarboxylation in bundle sheath

4) One carboxylation in mesophyll
Six carboxylation in bundle sheath
One decarboxylation in bundle sheath

67. Which of the following plants responds to higher temperature :

I. C_3 plants

II. Bell pepper and Tomato

III. Sorghum

IV. C_4 plants

1) I & II only 2) All

3) II & IV only 4) III & IV only

68. Consider the following statements :

A) Cyclic photophosphorylation is the only source of energy for Calvin cycle for the synthesis of glucose

B) Both cyclic and non - cyclic photophosphorylation are sources of Calvin cycle for the synthesis of carbohydrate

C) With regards to C_4 plants, primary carboxylation enzyme found only in mesophyll cell

D) Calvin cycle involves only three major stages

E) In C_4 plants, mesophyll cells are arranged with or without intercellular spaces

Of the above statements

1) A and D are false but B, C, E are true

2) All except A are true

3) A,C,E are false

4) Only B and D are false

69. Identify the first stable product and substrate of photorespiration respectively :

1) 3 - PGA and 2-phosphoglycolic acid

2) 3 - PGA and glycolic acid

3) 2 - phosphoglycolic acid and glycolic acid

4) Glycolic acid and 3-PGA

70. Regeneration of one molecule of RuBP in Calvin cycle requires :

1) 1 ATP

2) 3 ATP

3) 4 ATP

4) 6 ATP

71. Which of the following statements are false:

I. In C_3 plants, C_3 cycle occur in mesophyll cells

II. Primary carboxylation is catalised by Rubisco in C_4 plants

III. C_3 plants, CAM plants and C_4 plants perform Calvin cycle

IV. In C_4 photosynthesis, RuBisCO functionally active only in Calvin cycle

1) Only II

2) I, II and IV

3) Both III and IV

4) All except I

72. In C_4 photosynthesis, number of C_4 and C_3 cycles are required for the synthesis of one glucose molecule:

1) One C_4 cycle and six C_3 cycles

2) One C_4 cycle and one C_3 cycle

3) Six C_4 cycles and six C_3 cycles

4) Twelve C_4 cycles and six C_3 cycles

73. Which of the following is false regarding PEPcase :

a) Found in both mesophyll and bundle sheath of C_4 plants

b) Primary CO_2 acceptor in C_4

c) Primary carboxylation enzyme present only in C_4 plants

d) Found in both C_3 and C_4 plants

1) All except b

2) All statements are false

3) a, b and c are false

4) b, c and d

74. Consider the following statements :

I. PEPcase is absent in bundlesheath.

II. PEPcase is a primary carboxylation enzyme present in maize and sorghum

III. Starch is the first visible product of photosynthesis

Of the above statements :

1) All statements are false

2) All statements are true

3) I & II are false but III is true

4) I & III are true but II is false

75. Consider the following statements ;

A) With regards to C_4 plants, RuBisCO is present in both mesophyll and bundle sheath cells

B) In C_4 plants both PEPcase and RuBisCO are found at the same mesophyll cells

C) Bundlesheath cells are large sized than mesophyll cells

D) Number of chloroplast found maximum in bundlesheath cells than mesophyll.

Of the above statements :

1) A & C are false

2) B & D are false

3) A & B are true

4) C & D are true

76. Identify the function of RuBisCO in photorespiration :

1) Carboxylation

2) Oxygenation

3) Reduction

4) Both 1 and 2

77. With regard to C_4 photosynthesis, the transport of both C_4 and C_3 acids from mesophyll to bundlesheath and from bundlesheath to mesophyll occur through :

1) Cell wall

2) Plasmodesmata

3) Cell membrane

4) Vacuole

78. RUBISCO is functionally active at:

1) Acidic pH

2) Alkaline pH

3) Functions only in night

4) Both 2 & 3

79. How many calvin cycles are essential for the synthesis of one molecule of glucose:

1) One 2) Two

3) Six 4) Twelve

80. Photorespiration occurs in :

1) All plants

2) C_3 plants

3) C_4 plants

4) All autotrophs

81. In C_3 cycle, the first stable product and key compounds are ---------- and ---------- respectively:

1) PGA and glucose

2) PGA and starch

3) Glucose and starch

4) PGA and PGAL

82. Total number of CO_2 required for the synthesis of one glucose molecule :

1) 1 2) 2

3) 3 4) 6

83. Sorghum and Bell pepper are coming under ---------- and ---------- categories respectively :

1) C_4 and C_4 2) C_3 and C_3

3) C_4 and C_3 4) C_2 and C_3

84. In C_4 plants, carbohydrate synthesis takes-place in :

1) Mesophyll

2) Bundlesheath

3) Agranal chloroplast

4) Both 2 & 3

85. CO_2 acceptor and carboxylating enzyme in C_3 plants are respectively :

1) PEP and PEPcase

2) RuBP and Rubisco

3) OAA and Rubisco

4) PEP and Rubisco

86. Photorespiration occurs :

1) During day time

2) In C_3 plants

3) When concentration of CO_2 decreases

4) All

87. In C_4 plants, bundle sheath cells are :

1) Smaller than mesophyll with rich in PEPcase

2) Larger than mesophyll with rich in PEPcase

3) Larger than mesophyll with rich in both PEP case and Rubisco

4) Larger than mesophyll with rich in Rubisco

88. Substrate of photorespiration is :

1) Phosphoglycolic acid

2) CO_2

3) Phosphoglyceric acid

4) Glycolic acid

89. PEPcase is a :

1) Carboxylation enzyme present in C_4 plants

2) Carboxylation enzyme present in sorghum.

3) Oxygenation enzyme present in C_3 plants

4) Both 1 & 2

90. With regards to C_4 photosynthesis, primary carboxylation occur in:

1) Cytoplasm of mesophyll

2) Granal chloroplast of mesophyll

3) Agranal chloroplast of bundle sheath

4) Cytoplasm of bundle sheath

FACTORS AFFECTING PHOTOSYNTHESIS

91. Photosynthetically active radiation (PAR), light most effective for photosynthesis :

1) 400 - 500 nm

2) 400 - 700 nm

3) 450 - 550 nm

4) 500 - 600 nm

92. With regards to the following conditions :

A) Continuous strong light intensity

B) High CO_2 concentration

C) Temperature 30°C - 40°C

D) Low oxygen level

What will be the possibility on photosynthesis in C_3 plants :

1) Denaturation of enzyme

2) Enhances rate of photosynthesis

3) Decreases rate of photosynthesis

4) Both 1 and 3

93. Who postulated the Law of Limiting Factors:

1) F.F. Blackman 2) Van Niel

3) Engelman 4) Priestley

94. Law of limiting factor was proposed in :

1) 1805 2) 1850

3) 1905 4) 1950

95. In continuous strong light, the rate of photosynthesis will :

1) Increase

2) Decrease

3) Slowly increase

4) Rapidly increase

96. Tomato and Bell pepper are:

1) CAM plants

2) C_4 plants

3) C_3 plants

4) C_3 and C_4 respectively

97. Which of the following is a major limiting factor for photosynthesis ?

1) Light 2) CO_2

3) H_2O 4) Temperature

98. **Statement I :** Dark reactions are less affected by temperature than light reaction.

Statement II : C_3 plants responds to higher temperature and show higher rate of photosynthesis.

1) Both statements are incorrect

2) Both statements are correct

3) Only statement I is correct

4) Only statement II is correct

99. Light saturation occurs at :

1) 25 percent of the full sunlight

2) 10 percent of the full sunlight

3) 5 percent of the full sunlight

4) 50 percent of the full sunlight

100. Which of the following plants responds to high CO_2 concentration by showing increased rates of photosynthesis ?

1) Tomato 2) Bell pepper

3) Sorghum 4) Both 1 and 2

SAMPLE QUESTIONS

1. During electron transport, Photophosphorylation occur in :

1) CF_0 part of oxysome

2) Only membrane of stroma thylakoid

3) Stroma

4) CF_1 part of oxysome

2. For the synthesis of one molecule of sucrose, how many ATP molecules are required in reduction step of calvin cycle

1) 36 ATP 2) 18 ATP

3) 12 ATP 4) 24 ATP

3. With regards to C_4 plants, synthesis of $NADPH_2$ occur in :

1) Chloroplast of mesophyll

2) Chloroplast of bundle sheath

3) Both-granal chloroplast and agranal chloroplast

4) Both chloroplast of mesophyll and chloroplast of bundle sheath

4. Ferredoxin and FNR are present in :

1) Stroma

2) Ferredoxin present in membrane and FNR present in stroma

3) Ferredoxin present in inner surface of the membrane and FNR present in outer surface of the membrane

4) Both ferredoxin and FNR present in outer surface of the membrane

5. Consider the following statements :

A) RuBisCO has much greater affinity for CO_2 when the CO_2 and O_2 is nearly equal in the atmosphere

B) Photo-oxidation of water occur in lumen

C) CF_0 channel of oxysome is a proton pump

D) Proton pumping occur from lumen towards stroma

Of the above statements :

1) All statements are true

2) All except A are true

3) B, C and D are false

4) All statements are false

6. In which groups of plants, light is always a limiting factor :

1) Shade plants

2) Sun plants

3) Both shade plants and Sun plants

4) Shade plants and plants growing in dense forest

7. Photosystem consists of :

A) Reaction centre

B) LHS

C) Primary electron acceptor

D) Proteins

1) A & B only

2) A, B & C only

3) A & C only

4) A, B, C & D

8. If atmosphere has low light intensity, then it

1) decreases photosynthesis in C_3 plants only

2) decreases photosynthesis in C_4 plants only

3) decreases photosynthesis in C_3 plants and C_4 plants

4) Increases photosynthesis in C_3 plants and C_4 plants

9. Which of the following are energy consuming processes :

A) Calvin cycle B) C_2 cycle

C) C_4 cycle D) Proton pumping

1) D only

2) All except A

3) Only B & C

4) A, B, C and D

10. Which of the following is the most abundant plant pigment in the world?

1) Carotenoids

2) Chlorophyll

3) Phycoerythrin

4) Both 1 & 2

11. In a photosystem, chlorophyll a present in :

1) Reaction centre only

2) Antenna region only

3) LHS only

4) Reaction centre and antenna region

12. Consider the following statements and select the correct option :

Statement I : PEPcase present in C_3 plants and C_4 plants.

Statement II : PEPcase enzyme is photosynthetically involved in C_4 plants

1) Statement I is false

2) Statement II is false

3) Statement I & II are true

4) Statement I & II are false

13. Cyclic photophosphorylation produces :

1) NADPH

2) ATP and NADPH

3) ATP, NADPH and O_2

4) ATP only

14. How many $NADPH_2$ molecules are essential for synthesis of one glucose molecule in C_3 cycle :

1) 6 2) 12

3) 18 4) 30

15. First action spectrum of photosynthesis was described by

1) Von Sachs 2) Van Neil

3) T.W. Engelmann 4) Jan Ingenhousz

16. Consider the following statements and select the correct option:

Statement I : Chlorophyll a is present in both photochemical reaction centre and antenna region

Statement II : All chlorophyll a present in a photosystem (both antenna region and reaction centre) are primary pigments.

1) Statement I is false

2) Statement II is false

3) Both statement I and II are false

4) Bot statement I and II are true

17. When optimum CO_2 concentration and high light intensity is available in atmosphere then :

1) Increases photosynthesis in C_3 plants only

2) High photosynthesis occur in C_3 and C_4 plants

3) Decreases photosynthesis in C_4 plants

4) Decreases photosynthesis in C_3 and C_4 plants

18. Consider the following statements and select the correct option.

Statement I : Two leaf/ variegated leaf experiments prove that photosynthesis occur in chlorophyll containing green parts of the plant body in the presence of light.

Statement II : Half-leaf experiment proposed the importance of CO_2 in photosynthesis.

1) Statement I is false

2) Statement II is false

3) Statement I is true but statement II is false

4) Both statement I and II are true

19. Identify the number of photosystem I and photosystem II in the membrane of grana thylakoid respectively :

1) One and one 2) Two and two

3) One and two 4) Indefinite

20. Light harvesting system (LHS) consists of

1) Chlorophyll a and carotenoids only

2) Chlorophyll b and carotenoids only

3) Carotenoids, chlorophyll b and reaction centre

4) All the pigments except chlorophyll a in the reaction centre

21. How many number of reaction centre present in a single photosystem:

1) One 2) Three

3) Two 4) Four

22. During Calvin cycle, the consumption of ATP occur in :

1) Carboxylation

2) Reduction

3) Regeneration

4) Both 2 and 3

23. Which of the following statement is true regarding C_4 plants :

A) Found only in dry tropical region

B) Involve certain dicots and monocots

C) Respond to higher temperature

D) Exhibit chloroplast dimorphism /Kranz anatomy

1) A, B, C and D

2) A, C and D

3) B, C and D

4) C and D only

24. Who proposed that H_2S is the Hydrogen donor of green and purple sulphur bacteria

1) a Cytologist

2) a Physiologist

3) a Taxonomist

4) a Microbiologist

25. Which of the following statement is false

A) Action spectrum of photosynthesis is superimposed on absorption spectrum of chlorophyll a

B) Chlorophyll a shows maximum absorption in the region of 400- 500 nm wavelength of light

C) In the chromatogram, chlorophyll a appear bright blue-green in colour

1) A only

2) B only

3) C only

4) Nil

26. Consider the following statements and select the correct statement

Statement I : Pigments in the LHS region absorb light energy and their excited electrons are transfered to the reaction centre.

Statement II : All the pigments present in the photosystem donate electrons to electron transport system

1) Only statement I is true

2) Only statement II is true

3) Both statement I & II are true

4) Both statement I & II are false

27. How many of the following statements are true regarding Calvin cycle:

1) Dependend on product of light reaction

2) Occur in day time only

3) The chemical reactions were discovered by radio active isotope technique

4) Consumption of ATP occur in two stages and oxidation of $NADPH_2$ occur only in a single phase

1) One

2) Two

3) Three

4) Four

28. How many 3-carbon compounds are involved in C_4 cycle:

1) One

2) Two

3) Three

4) Four

29. Even though a very few cells in a C_4 plant carry out the biosynthetic calvin pathway; yet they are highly productive. Why:

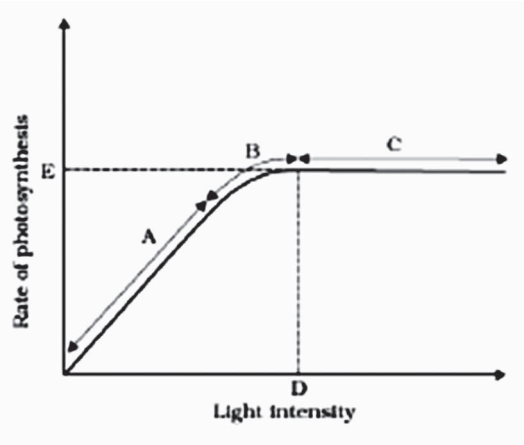
1) More amount of ATP are synthesised

2) Calvin cycle occur in bundlesheath only

3) RUBISCO play an important role in atmospheric CO_2 fixation

4) More number of chloroplast present in bundle sheath cells and primary carboxylation occur in the presence of PEP case

30. Observe and identify A, B, C, D, E in the given graph :



Column I		Column II	
I	A represents	A	Some factor other than light intensity is becoming the limiting factor
II	B represents	B	Light is no longer limiting factor
III	C represents	C	Light intensity
IV	D represents	D	Maximum rate of photosynthesis
V	E represents	E	Saturation point for light intensity

1) I - A, II - B, III - C, IV - D, V - E

2) I - C, II - A, III - B, IV - E, V - D

3) I - D, II - B, III - E, IV - C, V - A

4) I - E, II - D, III - C, IV - B, V - A

31. Which of the following statement is true regarding photo-oxidation :

1) Occur at continuous strong light intensity above optimum Quantity

2) Occur when light intensity available below optimum Quantity

3) Occur when light intensity increases from low light intensity to high light intensity below optimum Quantity

4) Occur in sorghum when light intensity become high

ASSERTION - REASON TYPE QUESTIONS

1) If both assertion and reason are true and reason is the correct explanation of assertion.

2) If both assertion and reason are true but reason is not the correct explanation of assertion.

3) If assertion is true but reason is false

4) If both assertion and reason are false

32. **Assertion :** Dark reaction is a misnomer.

Reason : The chemical reactions of Calvin cycle is light independent but it occur only in day time and dependent on product of light reaction.

33. According to chemiosmotic hypothesis, chemical osmosis occur:

1) Through proton pump

2) Through cytochrome b_6 of complex

3) Through both CF_0 and CF_1 part of ATP synthase complex

4) Through CF_0 part of ATP synthase complex

34. Which of the following factors are dependent on genetic predisposition:

A) Number of leaves

B) Internal CO_2 concentration

C) Temperature in the environment

D) Amount of chlorophyll

E) Age of leaves

1) A, B, C & E

2) B, D & E only

3) All except C

4) A, B, C, D & E

35. During non-cyclic electron transport occur in the membrane of grana lamellae, proton pumping occur through :

1) ATP synthase complex and requires energy

2) Plastoquinone - and requires energy

3) Cytochrome b/f complex passively

4) Both 1 and 2

36. Downhill movement of electrons means:

1) Downward movement of electrons from inner surface to the outer surface of the membrane.

2) Downward movement of electrons from outer surface to the inner surface of the membrane

3) Downward movement of electrons to lumen

4) Loss of excitation energy of electrons during electron transport

37. C_3 cycle occur in :

A) Sorghum

B) Bell Pepper

C) Mint

D) Maize

1) A, B, C, D

2) B only

3) B & C only

4) C only

38. Consider the following statements and select the correct option:

Statement I : In C_3 plants photo-respiration occur at high CO_2 concentration

Statement II : C_3 plants respond to higher temperature and show higher rate of photosynthesis

1) Statement I is true

2) Statement II is true

3) Both the statements are false

4) Both the statements are true

39. Identify the correct statement

1) Lumen become acidic

2) Stroma become acidic

3) Requirements of photolysis of water present in lumen of grana thylakoid

4) Ferredoxin present only in the membrane of grana lamellae

40. During photolysis, O_2 formed likely to be released in to :

1) Outer side of the membrane to atmosphere

2) Inner side of the membrane to periplastidial space

3) Inner side of the membrane to the reaction centre

4) Outer side of the membrane to the reaction centre

41. Radioactive isotope technique was used to prove some factors about :

1) Light reaction of photosynthesis

2) Biosynthetic phase of photosynthesis

3) Role of PEP case in C_4 pathway

4) Both 1 & 2

42. The plants with Hatch and Slack pathway are adapted to :

1) Humid temperate regions

2) Dry temperate regions

3) Humid tropical regions

4) Dry tropical regions

43. Consider the following statement

Statement I : In terrestrial conditions, CO_2 usually acts as main determining factor of photosynthesis

Statement II : Usually CO_2 is available at sub optimal level in terrestrial conditions

1) Only statement I is false

2) Only statement II is false

3) Both the statements are false

4) Both the statements are true

44. Identify the function of accessory pigments in a photosystem :

1) Convert light energy into chemical energy

2) Absorption of light energy

3) Provide protection to chlorophyll

4) Absorption of light energy and provide protection to chlorophyll

45. **Assertion :** Despite the presence of a green leaf and optimal light and CO_2 conditions, the plants may not photosynthesise if the temperature is very low

Reason : Temperature is the major limiting factor of photosynthesis

1) Both assertion and reason are true but reason is the correct explanation of assertion

2) Both assertion and reason are true but reason is not correct explanation of assertion

3) Assertion is true but reason is false

4) Both assertion and reason are false

46. When CO_2 is limiting in the atmosphere:

a) C_3 plants are more beneficial than C_4 plants

b) C_4 pathway is more efficient for synthesise of glucose than C_3

c) Rate of photorespiration increases

d) Decreases the rate of photosynthesis in C_3 plants

1) Only a is true

2) both a & d are true

3) only d is true

4) b, c, d are true

47. In C_4 plants, bundle sheath cells are :

1) Smaller than mesophyll with rich in PEPcase

2) Larger than mesophyll with rich in PEPcase

3) Larger than mesophyll with rich in both PEP case and Rubisco

4) Larger than mesophyll with rich in Rubisco

48. Photorespiration is different from respiration in which aspect :

1) Photorespiration takesplace in green plants but respiration occur only in animals

2) Photorespiration takesplace in green plants but respiration occur in animals and some plants

3) Photorespiration is restricted only in C_3 plants but respiration occur in all organisms

4) Photorespiration is restricted in most of the C_3 plants but rarely in some C_4 plants where as respiration takesplace in all organisms

49. In C_3 plants, Rubisco is present in :

1) only mesophyll cell

2) only bundle sheath cell

3) Spongy parenchyma and bundle sheath

4) Mesophyll and bundle sheath

50. Find the mis-matching pair :

a) C_2 cycle - C_3 plants - Tomato

b) C_4 cycle - Tropical conditions - Optimum temperature 20 - 30°C

c) Photolysis of water - Lumen surface of grana thylakoid - Evolution of oxygen

d) Z - scheme - stroma lamellae - involved only in presence of P_{680}

1) a, b, c only

2) b, c, d only

3) a, b, d only

4) b and d only

ANSWER KEY

1.	4	21.	4	41.	1	61.	1	81.	4
2.	4	22.	1	42.	2	62.	4	82.	4
3.	3	23.	3	43.	4	63.	2	83.	3
4.	1	24.	1	44.	4	64.	1	84.	4
5.	1	25.	1	45.	1	65.	1	85.	2
6.	2	26.	2	46.	1	66.	3	86.	4
7.	4	27.	1	47.	4	67.	4	87.	4
8.	3	28.	2	48.	1	68.	2	88.	4
9.	4	29.	4	49.	2	69.	3	89.	4
10.	1	30.	3	50.	4	70.	1	90.	1
11.	4	31.	1	51.	2	71.	1	91.	2
12.	3	32.	3	52.	2	72.	3	92.	4
13.	1	33.	2	53.	1	73.	3	93.	1
14.	1	34.	3	54.	4	74.	2	94.	3
15.	1	35.	3	55.	4	75.	4	95.	2
16.	4	36.	1	56.	4	76.	2	96.	3
17.	2	37.	4	57.	1	77.	2	97.	2
18.	1	38.	1	58.	4	78.	2	98.	1
19.	2	39.	4	59.	1	79.	3	99.	2
20.	1	40.	4	60.	4	80.	2	100.	4

SAMPLE QUESTIONS

1.	4	11.	4	21.	1	31.	1	41.	4
2.	4	12.	3	22.	4	32.	1	42.	4
3.	1	13.	4	23.	3	33.	4	43.	4
4.	4	14.	2	24.	4	34.	3	44.	4
5.	3	15.	3	25.	4	35.	2	45.	3
6.	4	16.	4	26.	4	36.	4	46.	4
7.	4	17.	2	27.	4	37.	1	47.	4
8.	3	18.	4	28.	2	38.	3	48.	3
9.	4	19.	4	29.	4	39.	1	49.	1
10.	2	20.	4	30.	2	40.	1	50.	4

WORK BOOK

Chapter 08

RESPIRATION IN PLANTS

INTRODUCTION AND GLYCOLYSIS

1. Cellular respiration is :

A) Biological oxidation

B) Catabolism

C) Exergonic

D) Amphibolic pathway

1) A only

2) B only

3) A & B only

4) A, B, C, D

2. Identify the most favoured respiratory substrate in plants :

1) Glucose 2) Fats

3) Glycerol 4) Protein

3. Immediate source of energy for cellular activities is

1) NADH 2) $FADH_2$

3) ATP 4) GTP

4. Breaking down process within the living organism is ---------- and synthesis is -------

1) A - anabolism, B - catabolism

2) A - catabolism, B - anabolism

3) A - aerobic respiration, B - fermentation

4) A - fermentation, B - aerobic respiration

5. In prokaryotic organisms like Bacteria, the part concerned with respiration :

1) Peroxisome

2) Mitochondria

3) Mesosome

4) Chloroplast

6. In an injured part of a plant body , rate of respiration will

1) Slowly decrease

2) Decreases

3) Increase

4) Remains constant

7. Identify the energy yielding phase of glycolysis :

1) Glucose → Glucose-6-phosphate

2) Fructose-6-phosphate → Fructose 1, 6-bisphosphate

3) Glucose-6-phosphate → Fructose-6-phosphate

4) PGAL → Pyruvic acid

8. How many decarboxylations are present in a Glycolysis :

1) One

2) Two

3) Three

4) Nil

9. In which of the following reaction of glycolysis, a molecule of water is removed from the substrate :

1) Fructose - 6 - phosphate → Fructose 1,6 - bisphosphate

2) PEP → Pyruvic acid

3) 2 - Phosphoglycerate → PEP

4) Glucose → Glucose-6-phosphate

10. Which statement is false about glycolysis?

1) It occurs in the cytosol

2) It is independent of O_2

3) It is also known as TCA cycle

4) 2 molecules of pyruvic acid are formed

11. Net gain of how many ATP and $NADH_2$ during glycolysis :

1) 4ATP and 2 $NADH_2$

2) 2 ATP and 2 $NADH_2$

3) 4 ATP and 4 $NADH_2$

4) 2 ATP and 1 $NADH_2$

12. Triose phosphates formed by the splitting of fructose-1, 6-bisphosphate during glycolysis :

a) 3-phophoglyceraldehyde [PGAL]

b) 1, 3-bisphosphoglycerate

c) Dihydroxy acetone phosphate [DHAP]

d) 3-phosphoglyceric acid

1) a and d 2) b and d

3) a and c 4) b and c

13. How many ATP molecules are directly synthesised in glycolysis from one glucose molecule :

1) 12 ATP 2) 2 ATP

3) 4 ATP 4) 8 ATP

14. Enzymes involved in glycolysis is present in

1) Cytoplasm

2) Mitochondrial matrix

3) Inner mitochondrial membrane

4) Inter membrane space

15. Which of the following is formed by phosphorylation in Glycolysis?

1) Pyruvic Acid

2) PEP

3) Phosphoglyceraldehyde

4) Fructose 1, 6-bisphosphate

16. Which of the following is a false statement regarding glycolysis :

1) Glycolysis is otherwise called mitochondrial respiration

2) Glycolysis occur in cytoplasm

3) In this process glucose undergoes partial oxidation to form two molecules of pyruvic acid

4) Pyruvic acid is the key product of glycolysis

17. The scheme of glycolysis was given by

1) Gustav Embden

2) Otto Meyerhof

3) J. Parnas

4) All the above

18. Identify the process

A) Partial break down of glucose

B) It is taken place under aerobic and anaerobic respiration

C) Net gain of ATP molecules in this process is two.

1) Glycolysis

2) Krebs cycle

3) Photosynthesis

4) Anabolism

19. How many substrate level phosphorylation/s is/are occur in glycolysis when 1 molecule of pyruvic acid is formed

1) one

2) Two

3) Three

4) Four

20. **Assertion :** Glycolysis occurs in cytoplasm and yields two molecules of pyruvate.

Reason : During glycolysis, four ATP molecules are produced and net yield is only two ATP molecules.

Mark the correct choice from given options :

1) Assertion and reason both are true but reason is not correct explanation of assertion.

2) Assertion and reason both are wrong

3) Assertion is true but reason is wrong

4) Assertion and reason both are true and the reason is correct explanation of assertion.

21. In which of the following steps of glycolysis ATP is utilised ?

i) 1, 3-BPGA → 3-PGA

ii) Glucose → Glucose-6-phosphate

iii) Phosphoenol pyruvate → Pyruvic acid

iv) Fructose-6-phosphate → Fructose 1, 6-bisphosphate

1) i and iii only

2) ii and iv only

3) ii, iii and iv

4) All of these

22. The direct formation of ATP during glycolysis is by :

1) Electron transport chain

2) Chemiosmosis

3) Oxidation of NADH + H^+ to NAD^+

4) Substrate level phosphorylation

LINK REACTION

23. Formation of acetyl CoA from pyruvic acid requires:

1) Mg^{2+}

2) Coenzyme A

3) NAD^+

4) All the above

24. Identify the activator of pyruvic dehydrogenase enzyme :

1) Mg^{2+} 2) Mn^{2+}

3) Zn^{2+} 4) Ca^{2+}

25. The enzyme involved in the formation of Acetyl Co. A from pyruvic acid :

1) Citrate synthetase

2) Aconitase

3) Isocitric acid dehydrogenase

4) Pyruvate dehydrogenase

26. In aerobic respiration, the first release of CO_2 is from :

1) Pyruvic acid

2) Oxaloacetic acid

3) Oxalosuccinic acid

4) Alpha-ketoglutaric acid

27. Which is the connecting link between glycolysis and Krebs cycle?

1) PEP

2) Acetyl CoA

3) Pyruvic acid

4) Citric acid

28. Identify the first oxidative decarboxylation reaction in respiration :

1) Isocitric acid → Oxalosuccinic acid

2) Oxalosuccinic acid → α-Ketoglutaric acid

3) α-Ketoglutaric acid → Succinyl Co. A

4) Pyruvic acid → Acetyl CoA

29. Select the step which is not a part of Krebs cycle :

1) Citric acid → Cisaconitic acid

2) Pyruvic acid → Acetyl CoA

3) Fumaric acid → Malic acid

4) Succinyl Co. A → Succinic acid

KREBS CYCLE

30. Alternate name of Krebs cycle is :

1) Tricarboxylic acid cycle

2) TCA cycle

3) Citric acid cycle

4) All the above

31. First organic acid formed during Krebs cycle is :

1) Citric acid

2) Oxaloacetic acid

3) Isocitric acid

4) Cisaconitic acid

32. In the first reaction of Citric acid cycle, 6-carbon citric acid is formed by the reaction between acetyl CoA and ----------

1) Malic acid

2) Succinic acid

3) Oxalosuccinic acid

4) Oxaloacetic acid

33. In respiration, the site of Krebs cycle is :

1) Cytosol

2) Inner mitochondrial membrane

3) Chloroplast

4) Mitochondrial matrix

34. Removal of hydrogen and CO_2 from a substrate is called

1) Decarboxylation

2) Oxidation

3) Reduction

4) Oxidative decarboxylation

35. Identify the respiratory entrant in Krebs cycle:

1) Acetyl CoA

2) Oxaloacetic acid

3) Pyruvic acid

4) Citric acid

36. Site of Krebs cycle in prokaryotic organisms :

1) Cytoplasm

2) Plasma membrane

3) Mitochondrial matrix

4) Outer membrane of mitochondria

37. Identify the compound which undergo second decarboxylation in cellular respiration :

1) Oxalosuccinic acid

2) Alpha-ketoglutaric acid

3) Isocitric acid

4) Pyruvic acid

38. Within Krebs cycle, the last release of CO_2 is from :

1) Pyruvic acid

2) Oxaloacetic acid

3) Oxalosuccinic acid

4) Alphaketoglutaric acid

39. Total number of CO_2 evolved during a single turn of Krebs cycle :

1) Two 2) Three

3) Four 4) Six

40. How many substrate level phosphorylation/s occur in a Krebs cycle :

1) One 2) Two

3) Three 4) Four

41. Final 4 carbon compound produced in Krebs cycle:

1) Oxaloacetic acid

2) Citric acid

3) Succinyl Co. A

4) Malic acid

42. Conversion of Succinic acid to Fumaric acid in Krebs cycle takesplace by

1) Addition of O_2 to succinic acid

2) Removal of hydrogen from succinic acid

3) Addition of phosphate to succinic acid

4) Removal of phosphate from succinic acid

43. $FADH_2$ is formed between :

1) Isocitric acid and Oxalosuccinic acid

2) Pyruvic acid and Acetyl CoA

3) Malic acid and Oxaloacetic acid

4) Succinic acid and Fumaric acid

44. How many co-enzymes are reduced during a single Krebs cycle :

1) Three 2) Four

3) Ten 4) Twelve

45. Identify the 2 carbon compound from the following :

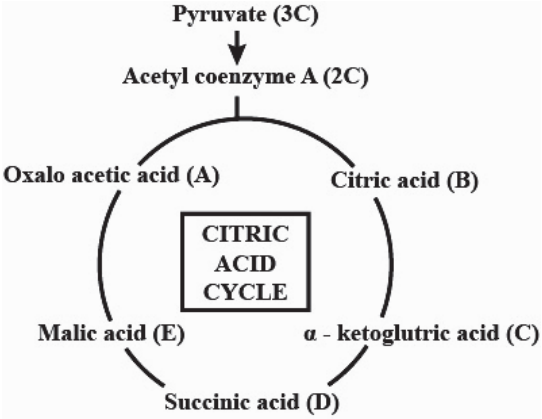
1) Acetyl CoA

2) Oxaloacetic acid

3) Pyruvic acid

4) Citric acid

46. Choose the correct combination of labelling the number of carbon compounds in the substrate molecules, involved in the citric acid cycle



1) (A) 4C, (B) 6C, (C) 5C, (D) 4C, (E) 4C

2) (A) 6C, (B) 5C, (C) 4C, (D) 3C, (E) 2C

3) (A) 2C, (B) 3C, (C) 4C, (D) 5C, (E) 6C

4) (A) 4C, (B) 5C, (C) 6C, (D) 4C, (E) 4C

47. Within Krebs cycle, the first release of CO_2 is from :

1) Pyruvic acid

2) Oxaloacetic acid

3) Oxalosuccinic acid

4) Alphaketoglutaric acid

48. Which among the following is synthesised during substrate level phosphorylation in Krebs cycle?

1) AMP 2) $NADH_2$

3) $FADH_2$ 4) GTP

49. First 4 carbon compound produced in Krebs cycle:

1) Oxaloacetic acid

2) Citric acid

3) Succinyl Co. A

4) Malic acid

50. Oxalosuccinic acid, an intermediate compound of Krebs cycle is a

1) 3 carbon compound

2) 4 carbon compound

3) 5 carbon compound

4) 6 carbon compound

51. Upon complete oxidation of 1 molecule of pyruvic acid in aerobic respiration the molecules of ATP generated are

1) 38 2) 30

3) 8 4) 15

52. In Krebs cycle, malic acid donates hydrogen to

1) NAD^+ 2) FMN

3) FAD^+ 4) GDP

53. Select a tricarboxylic acid from the following :

1) Malic acid 2) Fumaric acid

3) Succinyl Co. A 4) Citric acid

54. Select the mismatched pair

1) Succinyl Co. A - 4 carbon

2) Oxaloacetic acid - 6 carbon

3) Alpha-ketoglutaric acid - 5 carbon

4) Acetyl CoA - 2 carbon

55. Identify the correct sequence of events in Krebs cycle :

1) Citric acid → Isocitric acid → Cisaconitic acid → Oxalosuccinic acid → Alpha ketoglutaric acid → Succinyl Co.A → Succinic acid → Fumaric acid → Malic acid → Oxaloacetic acid

2) Citric acid → Cisaconitic acid → Isocitric acid → Oxaloacetic acid → Alpha ketoglutaric acid → Succinyl Co.A Succinic acid → Fumaric acid → Malic acid → Oxalosuccinic acid

3) Citric acid → Cisaconitic acid → Isocitric acid → Oxalosuccinic acid → Alpha ketoglutaric acid → Succinyl Co.A → Fumaric acid → Succinic acid → Malic acid → Oxaloacetic acid

4) Citric acid → Cisaconitic acid → Isocitric acid → Oxalosuccinic acid → Alpha ketoglutaric acid → Succinyl Co.A → Succinic acid → Fumaric acid → Malic acid → Oxaloacetic acid

56. Only 5 carbon compound in Krebs cycle

1) Citric acid

2) Pyruvic acid

3) Succinic acid

4) α-Ketoglutaric acid

57. How many substrate level phosphorylation are occur in aerobic respiration when one molecule of Glucose participates in it?

1) One 2) Two

3) Three 4) Six

58. How many decarboxylations are present in aerobic respiration when one glucose participate in the reaction :

1) One 2) Six

3) Three 4) Four

59. How many co-enzymes are reduced during the complete oxidation of one molecule of glucose :

1) Two 2) Four

3) Ten 4) Twelve

60. $NADH_2$ is not formed between :

1) Isocitric acid and Oxalosuccinic acid

2) Pyruvic acid and Acetyl Co. A

3) Malic acid and oxaloacetic acid

4) Succinic acid and Fumaric acid

61. Identify the expansion of FAD:

1) Flavine Adenosine Dinucleotide

2) Flavine Adenine Dinucleotide

3) Flavine Adenine Dinucleoside

4) Flavine Adenosine Dinucleoside

62. Pyruvic acid + $4NAD^+ + FAD^+ + 2H_2O$ +ADP + iP $\rightarrow 3CO_2 + 4NADH + 4H^+ + FADH_2 + ATP$

What is the location/site of occurrence of the above reaction ?

1) Cytoplasm

2) Inner mitochondrial membrane

3) Mitochondrial matrix

4) Outer mitochondrial membrane

63. Krebs cycle occur when :

A) Only carbohydrates are oxidising in cell

B) Only fat are oxidising in cell

C) Only proteins are oxidising in cell

D) Only in the presence of oxygen

E) In the presence or absence of oxygen

F) Carbohydrates, fat and proteins are oxidising in cell

1) A and D 2) All except E

3) A and E 4) D and F

ETS AND FERMENTATION

64. ETS present in :

1) outer mitochondrial membrane

2) Mitochondrial matrix

3) Inner mitochondrial membrane

4) Cytoplasm

65. The channel protein through which protons cross the inner membrane

1) F_0 of ATP synthase complex

2) F_1 of ATP synthase complex

3) Inner membrane

4) Matrix

66. Final electron donor in ETS :

1) Oxygen

2) UbiQuinone

3) FMN

4) Cytochrome a_3

67. How many ATP molecules are formed by oxidative phosphorylation of 1 $NADH_2$ molecule?

1) 1 2) 2

3) 3 4) 4

68. Which of the following is the final electron/ hydrogen acceptor in ETS?

1) Cytochrome C_1

2) Cytochrome C

3) Ubiquinone

4) Oxygen

69. Which of the following is a mobile electron carrier :

1) Cytochrome c

2) Cytochrome a_3

3) Cytochrome b

4) All

70. Identify complex II from the following :

1) NADH dehydrogenase

2) Cytochrome c oxidase

3) ATPsynthase

4) Succinate dehydrogenase

71. The common enzyme of TCA cycle and electron transport chain is :

1) Succinate dehydrogenase

2) ATP synthase

3) Acetyl CoA

4) Succinyl Co.A

72. Which complex/es contain Fe-S as a part of it :

1) Complex I only

2) Complex II and V only

3) Complex I, II and III only

4) Complex IV only

73. $NADH_2$ is utilized during :

i) Glycolysis

ii) Krebs cycle

iii) Electron transport chain

iv) Fermentation

1) i and ii 2) ii and iii

3) iii and iv 4) i and iv

74. Which of the following is common to respiration mediated break down of fats, carbohydrates and proteins?

1) Glucose-6-phosphate

2) Fructose 1, 6-bisphosphate

3) Pyruvic acid

4) Acetyl CoA

75. Which of the following is the common end product of both aerobic and alcoholic fermentation :

1) H_2O 2) CO_2

3) O_2 4) Acetyl CoA

76. The common phase in aerobic and anaerobic respiration is

1) TCA cycle

2) EMP pathway

3) Oxidative phosphorylation

4) Production of Acetyl CoA

77. Net ATP yield during the complete oxidation of one molecule of glucose in aerobic respiration :

1) 30 2) 32

3) 40 4) 38

78. Make suitable pairing :

A)	Glycolysis	i)	Mitochondria
B)	Krebs cycle	ii)	Cytoplasm
C)	Electron transport chain		

1) A - i ; B - i ; C - ii

2) A - ii ; B - i ; C - i

3) A - i ; B - ii ; C - ii

4) A - ii ; B - ii ; C - i

79. If 5 glucose molecules undergo aerobic and anaerobic respiration separately, then how many ATP will be released overall ?

1) 40 2) 200

3) 190 4) 76

80. Yeasts poison themselves to death when the concentration of alcohol reaches about ------ percent :

1) 13 2) 30

3) 31 4) 3

81. In fermentation, pyruvic acid is converted into _____

1) CO_2 and ethanol

2) Methanol and ethanol

3) CO_2 and H_2O

4) CO_2 only

82. Two $NADH_2$ formed during anaerobic glycolysis yields :

1) 4 ATP 2) 6 ATP

3) 2 ATP 4) No ATP

83. End product of lactic acid fermentation :

1) CO_2 only

2) CO_2, ethanol and 2ATP

3) Lactic acid and 2ATP

4) CO_2, lactic acid and 2ATP

84. Identify the type of respiration occuring in a germinating seed before rupturing of seed coat

1) Aerobic respiration

2) Anaerobic respiration

3) Fermentation

4) Both 2 and 3

85. The enzyme involved in the formation of Ethanol from Acetaldehyde :

1) Citrate synthetase

2) Pyruvic acid decarboxylase

3) Isocitric acid dehydrogenase

4) Alcohol dehydrogenase

86. Net ATP yield during the complete oxidation of one molecule of glucose in anaerobic respiration :

1) 30 2) 32

3) 2 4) 38

87. When two molecule of pyruvic acid participate in lactic acid fermentation, there is :

1) Use of 3 $NADH_2$

2) Use of 2 $NADH_2$

3) Use of 1 $NADH_2$

4) Use of 2 $FADH_2$

88. Which of the following does not release during lactic acid fermentation :

I) CO_2 II) NADP

III) NAD^+ IV) FAD^+

1) II, III, IV

2) I, II, IV

3) Only I

4) Only II

89. Which among the following process, possesses decarboxylation?

1) Glycolysis

2) Citric acid cycle

3) Electron transport chain

4) Lactic acid fermentation

90. Out of 38 ATP molecules, in aerobic respiration how many are produced by substrate phosphorylation ?

1) 38 2) 34

3) 8 4) 4

91. When the RQ values are 1, 0.7 and 0.9, then the substrates are respectively :

1) Tripalmitin, Fat and Carbohydrate

2) Carbohydrate, Tripalmitin and Protein

3) Fat, Carbohydrate and Tripalmitin

4) Carbohydrate, Protein and Tripalmitin

92. The R.Q. value of fats is always

1) 1 2) 0

3) >1 4) <1

93. Identify the respiratory substrate used in the given reaction,

$2(C_{51}H_{98}O_6) + 145\ O_2 \rightarrow 102\ CO_2 + 98\ H_2O$ + energy

$$RQ = \frac{102\,CO_2}{145\,O_2} = 0.7$$

1) Tripalmitin

2) Protein

3) Carbohydrate

4) Organic acid

94. RQ of lactic acid fermentation:

1) Infinite

2) Zero

3) Less than one

4) Unpredictable

95. Respiratory quotient is expressed as :

1) $\frac{CO_2 \text{ consumed}}{O_2 \text{ evolved}}$

2) $\frac{CO_2 \text{ evolved}}{O_2 \text{ consumed}}$

3) $\frac{O_2 \text{ evolved}}{CO_2 \text{ consumed}}$

4) $\frac{O_2 \text{ consumed}}{CO_2 \text{ evolved}}$

96. RQ of anaerobic respiration :

1) Infinity

2) Zero

3) Less than one

4) Greater than one

97. If carbohydrates are used as respiratory substrate, respiratory quotient is

1) 1 2) Infinity

3) 0.9 4) 0.7

98. The correct relationship of values of Respiratory quotient is :

1) Glucose > Fats > Organic acid

2) Glucose < Fats < Organic acid

3) Fats > Glucose > Organic acid

4) Fats < Glucose < Organic acid

99. Which of the following is a major activator of respiratory enzymes :

1) Magnesium 2) Manganese

3) Calcium 4) Both 2 & 3

100. Which of the following biomolecules are never used and do not directly enter in to respiratory pathway :

A) Pure proteins

B) Pure fat

C) Complex carbohydrates

D) Glucose and fructose

1) A, B, C and D

2) All except D

3) A and B only

4) C only

SAMPLE QUESTIONS

1. Evolution of CO_2 is more than intake of oxygen when:

1) Proteins are respired

2) Organic acids are respired

3) Glucose is respired

4) Fats are respired

2. Upon the oxidation of one mole of pyruvate by mitochondrial respiration, the mole of ATP generated are:

1) 38 2) 30

3) 8 4) 15

3. The incomplete breakdown of sugar in anaerobic respiration results in the formation of:

1) Lactic acid and CO_2

2) Glucose and CO_2

3) Ethanol and CO_2

4) Water and CO_2

4. How many ATP are used in glycolysis:-

1) 4 2) 2

3) 6 4) 8

5. Oxidation of glyceraldehyde -3-phosphate is accompanied by:-

1) Oxidation of NAD^+

2) Reduction of NAD^+

3) Substrate level phosphorylation

4) Decarboxylation

6. Glycolysis occurs in __(a)__, the TCA cycle occurs in __(b)__ and ETC occurs in __(c)__ . Identify (a), (b) & (c) and select the correct option.

1) (a) - Mitochondrial matrix, (b) - Cytosol, (c) - Mitochondrial inner membrane

2) (a) - Cytosol; (b) - Mitochondrial matrix; (c) - Mitochondrial inner membrane

3) (a) - Mitochondrial outer membrane ; (b) - Cytosol; (c) - Mitochondrial inner membrane

4) (a) - Cytosol, (b) - Mitochondrial matrix; (c) - Cytoplasm

7. Identify the wrong statement from the following?

1) O_2 is essential for aerobic respiration but it enters the respiratory process at the end

2) Fermentation and aerobic respiration accounts for partial and complete break down of glucose respectively

3) In lactic acid fermentation pyruvate is reduced to lactic acid

4) Incomplete breakdown of glucose in muscle cells during exercise results in the formation of ethanol and CO_2

8. What is the fate of pyruvic acid during aerobic respiration?

1) It enters in cytosol and undergoes oxidative decarboxylation

2) It remains in cytosol and undergoes oxidative decarboxylation

3) It enters into mitochondria and undergoes oxidative decarboxylation

4) It remains in cytoplasm and reduced to ethanol

9. Out of 38 ATP molecules how many are from glycolysis

1) 2 2) 8

3) 6 4) 4

10. Sucrose is converted into glucose and fructose by the enzyme:

1) Invertase

2) Hexokinase

3) Citrate synthase

4) ATP synthase

11. How many molecules of pyruvic acid formed from one molecule of glucose at the end of glycolysis ?

1) One 2) Two

3) Six 4) Eight

12. The step in which reduction of NAD^+ occurs :

1) Glucose → Glucose -6-phosphate

2) PGAL → BPGA

3) 3PGA → 2PGA

4) PEP → Pyrivic acid

13. Identify the steps in which synthesis of ATP occurs:

a) Glucose → Glucose -6-phosphate

b)1,3-Bisphosphoglyceric acid → 3-phosphoglyceric acid

c) Fructose -6-phosphate → Fructose 1,6-Bisphosphate

d) Phosphoenol pyruvate → Pyruvic acid

1) a and c

2) b and c

3) c and d

4) b and d

14. How many redox-equivalents are removed from a PGAL in the form of hydrogen atoms

1) One 2) Two

3) Three 4) Four

15. The activator of the enzyme pyruvate dehydrogenase is :-

1) Zn^{2+} 2) Mg^{2+}

3) Cu 4) FMN

16. The enzymes involved in the incomplete oxidation of glucose under anaerobic conditions by sets of reactions where pyruvic acid is converted to CO_2 and ethanol:

1) Pyruvic acid decarboxylase and alcohol dehydrogenase

2) Pyruvic acid dehydrogenase and citrate synthase

3) Hexokinase and invertase

4) Pyruvic acid decarboxylase and Lactate dehydrogenase

17. **Assertion (A) :** The maximum concentration of alcohol in beverages that are naturally fermented using Yeast is about 13%

Reason (R) : Yeast poison themselves to death when the concentration of alcohol reaches about 13%

1) (A) and (R) are true and the (R) is the correct explanation of (A)

2) (A) and (R) are true but (R) is not the correct explanation of (A)

3) Both (A) and (B) are false

4) (A) is true but (R) is false

18. Glycerol would enter the glycolytic pathway after being converted to:-

1) Pyruvic acid 2) Acetyl co.A

3) PGAL 4) 3-PGA

19. The complete oxidation of pyruvate by the stepwise removal of all the hydrogen atoms, leaving three molecules of CO_2. This crucial event in aerobic respiration takes place in :-

1) Cytosol

2) Mitochondrial matrix

3) Intermembrane space

4) Mitochondrial inner membrane

20. During aerobic respiration, how many glucose molecules are required for the gain of 38 ATP molecules?

1) One 2) Two

3) Nineteen 4) Four

21. By the complete oxidation of a molecule of Acetyl CoA, how many molecules of CO_2 are released

1) Three

2) Eight

3) Two

4) No release of CO_2

22. The first stable product of the Tricarboxylic acid cycle is :-

1) Oxaloacetic acid 2) Citric acid

3) Pyruvic acid 4) Acetyl CoA

23. The process of formation of citric acid in Krebs cycle is catalysed by the enzyme :-

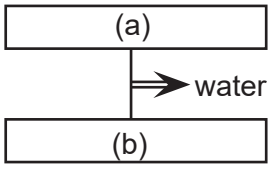
1) Hexokinase

2) Citrate synthase

3) Lactate dehydrogenase

4) Pyruvic dehydrogenase

24.



The figure represents a step in glycolysis. In this reaction, the alphabets - (a) and (b) represents :-

1) (a) 2-phosphoglyceraldehyde and (b) pyruvic acid

2) (a) 2-phosphoglyceric acid and (b) 2-phosphoenol pyruvic acid

3) (a) 1,3-diphosphoglyceric acid and (b) 3-phosphoglyceric acid

4) (a) 3-phosphoglyceric acid and (b) 2-phosphoglyceric acid

25. The process that is common for the following three steps :

(1) Pyruvate → Acetyl CoA

(2) Oxalosuccinic acid → α-ketoglutaric acid

(3) α-ketoglutaric acid → Succinyl Co.A

1) Dehydrogenation

2) Decarboxylation

3) Dehydration

4) Oxidative decarboxylation

26. Substrate level phosphorylation occurs in which of the following step of Krebs cycle:-

1) Citric acid → Cisaconitic acid

2) Fumaric acid→ Malic acid

3) Pyruvic acid → Acetyl CoA

4) Succinyl Co. A → Succinic acid

27. The integral membrane protein complex that forms the channel through which protons cross the inner membrane:-

1) F_0 subunit 2) F_1 subunit

3) Cristae 4) Oxysomes

28. During aerobic respiration, oxygen receives electrons from:-

1) Cytochrome b

2) Cytochrome a_3

3) Cytochrome c

4) Cytochrome a

29. The Coenzyme that acts as hydrogen acceptor during the oxidation of pyruvic acid to acetyl Co. A is:-

1) NAD^+ 2) NADP

3) FAD^+ 4) FMN

30. How many ATP molecules are formed by oxidative phosphorylation of one $NADH_2$ molecule:-

1) 1 2) 2

3) 3 4) 4

31. In the first reaction of TCA Cycle, which is formed by the reaction between acetyl CoA and OAA ?

1) Malic acid

2) Succinic acid

3) Oxalosuccinic acid

4) Citric acid

32. The only step in Krebs cycle where FAD is involved:-

1) Pyruvate → Acetyl CoA

2) Citric acid→ Cis-aconitic acid

3) Alpha Ketoglutaric acid→ Succinyl Co.A

4) Succinic acid→Fumaric acid

33. Cytochrome c oxidase complex containing cytochromes:-

1) b and c

2) a, a_3 and 2 copper centers

3) a and b

4) c, a_3 and 2 copper centers

34. How many oxidations are there in glycolysis, when two molecules of pyruvic acid are formed

1) One

2) Two

3) Three

4) Four

35. Pyruvate, which is formed by the glycolytic catabolism of carbohydrates in the cytosol, after it enters mitochondrial matrix undergoes oxidative decarboxylation by a complex set of reactions catalysed by :

1) Citrate synthase

2) Invertase

3) Pyruvic dehydrogenase

4) Pyruvic acid decarboxylase

36. Which of the following is the end products of anaerobic respiration in muscle cells of animals :

1) Ethanol, CO_2 and 2ATP

2) Lactic acid, CO_2 and 2ATP

3) Ethanol and 2ATP

4) Lactic acid and 2ATP

37. Which of the following indicate aerobic respiration in which tripalmitin is used as respiratory substrate :

1) $C_6H_{12}O_6+6O_2 \rightarrow 6CO_2+6H_2O+\text{Energy}$

2) $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + \text{Energy}$

3) $2(C_{51}H_{98}O_6)+145O_2 \rightarrow 102CO_2+98H_2O+\text{Energy}$

4) $2(COOH)_2+O_2 \rightarrow 4CO_2+2H_2O + \text{Energy}$

38. The end products of glycolysis are :

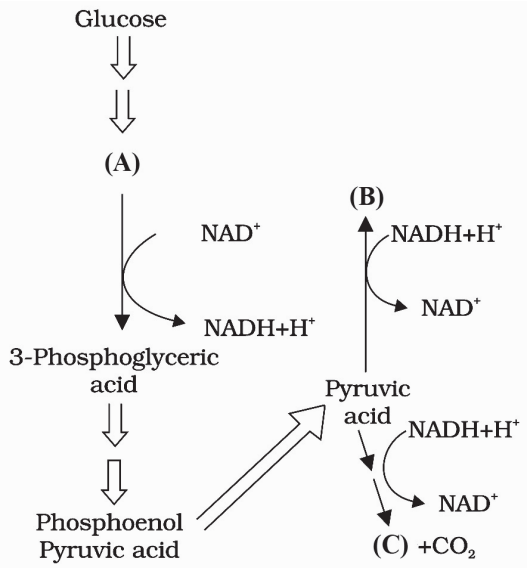
1) 2 ATP, 2 $NADH_2$, 2 molecules of Pyruvic acid

2) 2 ATP, 2 $FADH_2$, 2 molecules of Pyruvic acid

3) 36 ATP, 2 $NADH_2$, 2 molecules of Pyruvic acid

4) 2 ATP, 2 $NADPH_2$, 2 molecules of Pyruvic acid

39. Identify (A), (B) and (C) in the major pathway of anaerobic respiration given below and select the correct option.



	(A)	(B)	(C)
1)	PGAL	Lactic acid	Ethanol
2)	Lactic acid	PGAL	Ethanol
3)	Ethanol	PGAL	Lactic acid
4)	PGAL	Ethanol	Lactic acid

40. Select the false statement regarding respiration :

1) OAA is the first member of Citric acid cycle.

2) Lactic acid fermentation, alcoholic fermentation and aerobic respiration are the three major ways in which different cells handle pyruvic acid produced by glycolysis.

3) When proteins are used as respiratory substrates, the R.Q. will be about 1.6

4) Pure proteins or fats are never used as respiratory substrates.

41. Fill in the blanks and select the correct answer:-

pyruvic acid + 4 NAD^+ + FAD^+ + __(a)__ + ADP + Pi $\xrightarrow{(b)}$ __(c)__ + 4NADH + $4H^+$ + $FADH_2$ + ATP

1) (a) - $2H_2O$; (b) - Cytosol; (c) - $3CO_2$

2) (a) -$2H_2O$; (b) -Mitochondrial matrix;(c) - $3CO_2$

3) (a) - $6H_2O$; (b) - Mitochondria ; (c) - $6CO_2$

4) (a) - $6H_2O$; (b) - Cytosol; (c) - $6CO_2$

42. The passing on of the electrons removed as part of the hydrogen atoms to molecular O_2 with simultaneous synthesis of ATP. This crucial event in aerobic respiration is located:-

1) In mitochondrial matrix

2) In mitochondrial inner membrane

3) In mitochondrial outer membrane

4) In intermembrane space

43. The reduced ubiquinone is oxidised with the transfer of electrons to cytochrome C via:-

1) Complex III

2) Cytochrome bc_1 complex

3) Complex IV

4) Both 1 and 2

44. Select the enzyme/s present in cytoplasm:

1) Hexokinase

2) Citrate synthase

3) Pyruvic dehydrogenase

4) Both 2 and 3

45. How many ATP can be produced through single glycolysis with the help of ETS?

1) 2 2) 4

3) 6 4) 12

ANSWER KEY

1.	4	21.	2	41.	1	61.	2	81.	1
2.	1	22.	4	42.	2	62.	3	82.	4
3.	3	23.	4	43.	4	63.	4	83.	3
4.	2	24.	1	44.	2	64.	3	84.	4
5.	3	25.	4	45.	1	65.	1	85.	4
6.	3	26.	1	46.	1	66.	4	86.	3
7.	4	27.	2	47.	3	67.	3	87.	2
8.	4	28.	4	48.	4	68.	4	88.	2
9.	3	29.	2	49.	3	69.	1	89.	2
10.	3	30.	4	50.	4	70.	4	90.	4
11.	2	31.	1	51.	4	71.	1	91.	2
12.	3	32.	4	52.	1	72.	3	92.	4
13.	3	33.	4	53.	4	73.	3	93.	1
14.	1	34.	4	54.	2	74.	4	94.	4
15.	4	35.	1	55.	4	75.	2	95.	2
16.	1	36.	2	56.	4	76.	2	96.	1
17.	4	37.	1	57.	4	77.	4	97.	1
18.	1	38.	4	58.	2	78.	2	98.	4
19.	2	39.	1	59.	4	79.	2	99.	1
20.	1	40.	1	60.	4	80.	1	100.	2

SAMPLE QUESTIONS

1.	2	10.	1	19.	2	28.	2	37.	3
2.	4	11.	2	20.	1	29.	1	38.	1
3.	3	12.	2	21.	3	30.	3	39.	1
4.	2	13.	1	22.	2	31.	4	40.	3
5.	2	14.	2	23.	2	32.	4	41.	2
6.	2	15.	2	24.	2	33.	2	42.	2
7.	4	16.	1	25.	2	34.	2	43.	4
8.	3	17.	1	26.	4	35.	3	44.	1
9.	2	18.	3	27.	1	36.	4	45.	3

WORK BOOK

Chapter 09

PLANT GROWTH AND DEVELOPMENT

GROWTH

1. Which phase precedes reproductive phase of plants ?

1) Vegetative phase

2) Fertilisation

3) Formation of embryo

4) Formation of seed

2. Swelling of a piece of wood when placed in water is :

1) Development

2) Differentiation

3) Growth by imbibition

4) Both 1 and 2

3. Which one of the following has the capacity to self perpetuate ?

1) Meristematic cells

2) Tracheary elements

3) Leaves

4) Roots

4. Growth of pollen tube is measured in terms of

1) Volume

2) Diameter

3) Length

4) Surface area

5. Growth of a dorsiventral leaf is measured by increase in :

1) Cell number

2) Surface area

3) Length

4) Diameter

6. Growth of a fruit is measured in terms of :

1) Dry weight

2) Volume

3) Fresh weight

4) All of the above

7. Development includes :

1) Growth

2) Differentiation

3) Cell division

4) Both 1 and 2

8. Every single cell of a plant are descendants of :

1) Seeds 2) Gametes

3) Zygote 4) Flower

9. Metabolism occurs on the expense of :

1) Water 2) Energy

3) Nutrition 4) Hormone

10. Meristems are found in :

1) Root apex

2) Shoot apex

3) Seeds

4) Both 1 and 2

11. Meristems are responsible for :

1) Secondary growth

2) Primary growth

3) Lateral growth

4) All of these

12. At cellular level, growth is an :

1) Increase in mitochondrial size

2) Increase in plastidal size

3) Increase in nuclear size

4) Increase in protoplasm

13. One single maize root apical meristem can give rise to how many new cells per hour ?

1) Less than 17500

2) More than 17500

3) 15,000

4) 12,000

14. By how many times, cells in watermelon increases in size approximately,

1) 3,15,000

2) 3,50,000

3) 3,25,000

4) 3,17,000

15. The growth in plant is

1) Limited

2) Unlocalised

3) Unlimited

4) None of these

16. Developmental process are influenced by :

1) Intrinsic factors

2) Extrinsic factors

3) External factors

4) All of these

17. Growth is an :

1) Irreversible permanent increase in size

2) Irreversible temporary increase in size

3) Reversible permanent increase in size

4) Reversible temporary increase in size

18. Which of the following are phases of growth period ?

1) Meristematic phase

2) Elongation phase

3) Maturation phase

4) All of these

19. Which of the following features are seen in meristematic cells ?

1) Rich in protoplasm

2) Presence of conspicuous nuclei

3) Thin, cellulosic walls

4) All of these

20. Which of the following feature correctly explains the cells of elongation phase ?

A) Increased vacuolation

B) Seen proximal to meristematic zone

C) Cell enlargement

D) Abundant plasmodesmata

1) A and B only

2) B, C and D only

3) All except D

4) A, B, C and D

21. Cells seen further away from the apex, i.e more proximal to phase of elongation is seen in :

1) Elongation phase

2) Maturation phase

3) Meristematic phase

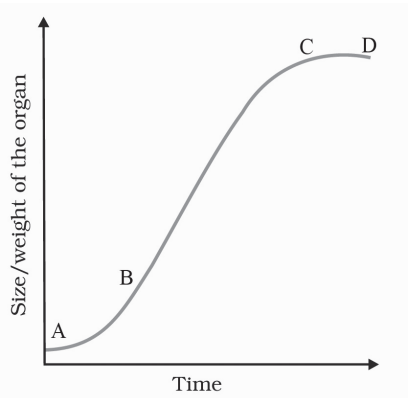
4) Shoot apex and root apex

22. The organisms growing in a natural environment shows which type of growth curve ?

1) Sigmoid 2) Linear

3) J-shaped 4) L-shaped

23. The portion 'CD' of curve represents _____ phase of growth,



1) Log phase

2) Lag phase

3) Decreasing phase

4) Stationary phase

24. Arithmetic growth is expressed mathematically as :

1) $W_1 = W_0e^{rt}$ 2) $W_0 = W_t e^{rt}$

3) $L_0 = L_t + rt$ 4) $L_t = L_0 + rt$

25. In a sigmoid curve, lag phase indicate

1) Exponential growth

2) Initial slow growth

3) Steady growth

4) Constant increase

26. In the equation, $W_1 = W_0e^{rt}$, what does 'r' represent ?

1) Arithmetic growth rate

2) Relative growth rate

3) Measure of efficiency index

4) Both 2 and 3

27. Which of the following statements is false ?

1) Plant cells grow in size by cell enlargement which need water

2) Oxygen helps in releasing metabolic energy needed for plant growth

3) Light provide medium for enzymatic activities needed for growth of plant

4) Plants need nutrients for synthesis of protoplasm and act as a source of energy

28. A leaf 'A' of 20 cm^2 grows 5cm^2 in an hour,another leaf 'B' of 25 cm^2 grows 5 cm^2 in the same time. The relative growth rates of leaf A and B, respectively are :

1) 20% and 25%

2) 25% and 20%

3) 50% and 100%

4) 25% and 50%

DIFFERENTIATION, DEDIFFERENTIATION, REDIFFERENTIATION AND DEVELOPMENT

29. The cells derived from root apical and shoot apical meristem and cambium later become mature and perform specific function. This act leading to maturation is termed as :

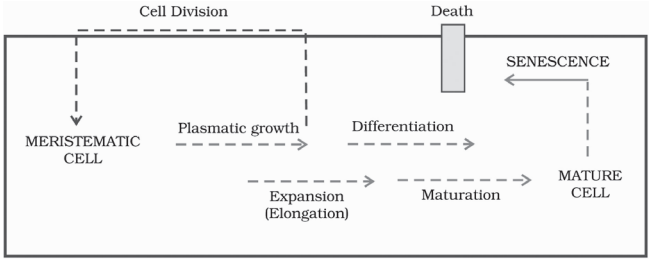
1) Differentiation

2) Dedifferentiation

3) Redifferentiation

4) Plasticity

30. The following figure belongs to



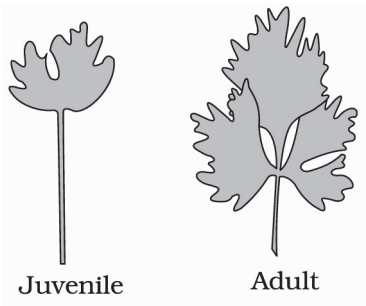
1) Sequence in maturation process

2) Sequence in growth process

3) Sequence in elongation process

4) Sequence in developmental process

31. Identify the incorrect statements from the following options.



1) It is due to response to environment

2) It is due to the phases of life to form different structures

3) It is due to plasmolysis

4) Both 1 and 2

32. An example of developmental heterophylly is :

1) Cotton

2) Coriander

3) Larkspur

4) All of these

33. Environmental heterophylly is shown by :

1) Vallisneria

2) Hydrilla

3) Buttercup

4) Cotton

34. Intrinsic factors controlling growth and differentiation are :

1) Intracellular

2) Intercellular

3) Genetic

4) All of these

35. Which of the following extrinsic factors have role in plant development ?

a) Light b) Nutrition

c) Oxygen d) Genetic factors

1) a only

2) a, b and c only

3) All except c and d

4) a, b, c and d

36. Which among the following are products of dedifferentiation ?

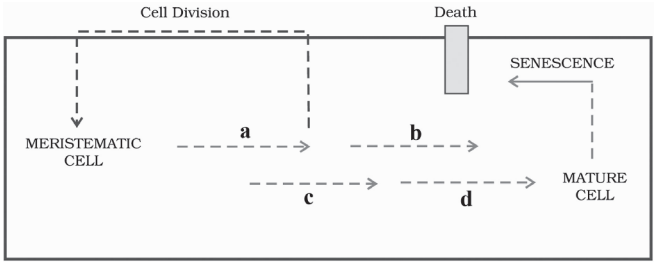
1) Interfascicular cambium

2) Permanent cells

3) Cork cambium

4) Both 1 and 3

37. Label the marked parts correctly :



1) a - Plasmatic growth, b - Differentiation
c - Elongation, d - Maturation

2) a - Plasmatic growth, b - Elongation
c - Expansion, d - Maturation

3) a - Maturation, b - Plasmatic growth
c - Elongation, d - Differentiation

4) a - Differentiation, b - Plasmatic growth
c - Expansion, d - Maturation

38. Formation of secondary phloem and secondary xylem, is due to the result of :

1) Differentiation

2) Dedifferentiation

3) Cell enlargement

4) Redifferentiation

39. Which of the following is a product of differentiation ?

1) Cork cambium

2) Tracheary element

3) Phelloderm

4) Secondary xylem

40. The cells positioned away from root apical meristem differentiates as :

1) Epiblema 2) Coleorhiza

3) Root cap 4) Root tip

41. Select the mismatched pair from the following.

1) Pericycle, endodermis - Differentiation

2) Secondary cortex, cork - Dedifferentiation

3) Secondary xylem, phellom - Redifferentiation

4) Interfascicular cambium, Cork cambium - Dedifferentiation

PLANT GROWTH REGULATORS : CHARACTERISTICS, DISCOVERY AND PHYSIOLOGICAL EFFECTS

42. Which of the plant growth regulator is in gaseous form and also mainly possess an inhibitory action

1) Cytokinin

2) Auxin

3) Abscisic acid

4) Ethylene

43. Match the following correctly :

Column I		Column II	
a.	IAA	p.	Adenine derivative
b.	Kinetin	q.	Terpenes
c.	ABA	r.	Indole compound
d.	GA_3	s.	Carotenoid derivative

1) a - p ; b - r ; c - q ; d - s

2) a - r ; b - p ; c - q ; d - s

3) a - p ; b - r ; c - s ; d - q

4) a - r ; b - p ; c - s ; d - q

44. Plant growth promoters are not involved in :

1) Seed dormancy

2) Flowering

3) Tropic growth

4) Cell enlargement

45. Charles Darwin and Francis Darwin discovered light induced growth curvature in :

1) Canary grass coleoptile

2) Oat coleoptile

3) Maize coleoptile

4) Stem of Pea plant

46. Who isolated light induced transmissible substance from tip of Oat coleoptile ?

1) Skoog 2) Miller

3) Cousin 4) Went

47. Kurosawa induced bakanae disease in rice seedlings by treating them with

1) Sterile filtrates of fungus *Penicillium notatum*

2) Sterile filtrate of fungus *Gibberella fujikuroi*

3) Infecting plants with Aspergillus

4) Sterile filtrate of fungus *Phytophthora infestans*

48. H.H Cousins confirmed the release of a volatile substance from ripened ___a___ that hastened ripening of stored unripened ___b___ in the year ___c___.

1) a - Banana, b - Orange, c - 1910

2) a - Orange, b - Banana, c - 1910

3) a - Orange, b - Banana, c - 1960

4) a - Orange, b - Banana, c - 1955

49. In addition to auxin, what else was found to be needed for continued growth of callus by Skoog and Coworkers :

1) Yeast extract

2) Coconut milk or DNA

3) Extract of vascular tissues

4) All of the above

50. Which of the following are natural auxins ?

1) IAA and IBA

2) IBA and 2,4-D

3) NAA and IAA

4) NAA and 2,4-D

51. _____ widely used to kill dicot weeds.

1) IBA 2) IAA

3) NAA 4) 2,4-D

52. Which of the following is/are not a function of auxin ?

a) Promote flowering in Tea plants

b) Induce parthenocarpy in Tomato

c) Xylem differentiation

d) Widely used to kill monocotyledonous plants

1) All except d

2) a, b and c

3) a and d only

4) a, b and d

53. Find out the mismatched pair

1) IBA - natural auxin

2) 2,4 D - synthetic auxin

3) Auxin - F W Went

4) IAA - Carotenoid derivatives

54. Select the true statement from the following ones.

1) GA_3 is one of the 1st gibberellin to be discovered

2) All GAs are basic

3) More than 100 gibberellins were reported

4) GA is a promotory PGR

55. The following functions are related to :

A) Speed up malting in brewing industry

B) Promotes bolting in Cabbages

C) Improve shape of Apple

1) Auxin 2) Gibberellin

3) ABA 4) Cytokinin

56. Which of the following is not a function of Gibberellin ?

1) Delay senescence

2) Increase length of stem in Sugarcane

3) Extent market period of fruits

4) Helps to overcome apical dominance

57. Cytokinins were discovered as _____ from autoclaved herring sperm DNA.

1) Zeatin

2) Kinetin

3) C_2H_4

4) Both 2 and 3

58. Which of the following is the site of cytokinin synthesis ?

1) Root apex

2) Developing shoot buds

3) Young fruits

4) All of the above

59. Cytokinins delay senescence of plant organs by :

1) Autogonising ABA

2) Promoting IAA activity

3) Nutrient mobilisation

4) Supporting GA activity

60. Which PGR is associated with the following functions ?

a) Produce new leaves, chloroplast etc

b) Formation of lateral shoot, adventitious shoot

c) Overcome apical dominance

1) Auxin

2) Cytokinin

3) Gibberellin

4) Ethylene

61. Which of the following is a gaseous PGR ?

1) Auxin

2) Gibberellin

3) Ethylene

4) All of these

62. Which of the following statement is/are not related to PGR ethylene ?

a) Apical hook formation in monocot seedlings

b) Delay senescence of plant organs

c) Promote seed and bud dormancy

d) Promote shoot growth

1) All except b

2) a, b and c only

3) c and d only

4) a, b, c and d

63. Thinning of Cotton, Cherry and Walnut is a function of

1) Ethylene

2) GA_3

3) ABA

4) Both 1 and 3

64. ABA promotes :

1) Seed development

2) Seed dormancy

3) Seed maturation

4) All of the above

65. Select the correctly matched pair from the following.

1) IAA - regulate abscission and dormancy

2) ABA - stimulate closure of stomata

3) Ethylene - increase tolerance of plants to stress

4) GA_3- generally a plant growth inhibitor

SAMPLE QUESTIONS

1. Study the following structures in the box and find out how many of them are the products of differentiation (A), dedifferentiation (B) and redifferentiation (C).

Cortex, Phelloderm, Secondary cortex, Secondary phloem, Primary medullary rays, Interfascicular cambium, Phellem, Endodermis

1) A = 3, B = 1, C = 4

2) A = 2, B = 1, C = 5

3) A = 3, B = 3, C = 2

4) A = 4, B = 3, C = 1

2. The term synergistic action of hormone refers to :

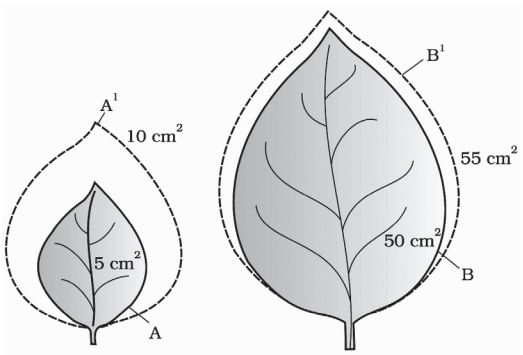
1) When two hormones act together and contribute to opposite effects

2) When two hormones act together and contribute to the same functions

3) When one hormone affects more than one function

4) When one hormone bring about two different function

3. See the figure and choose the correct option from the table.



	A Leaf		B Leaf	
	AGR	RGR	AGR	RGR
1)	0.5	100%	1.5	100%
2)	5	100%	5	10%
3)	100%	5	10%	5
4)	1%	1	2%	2

4. The tip of a green plant bends towards the source of light on unilateral illumination. Which of the following is the best explanation of this phenomenon :

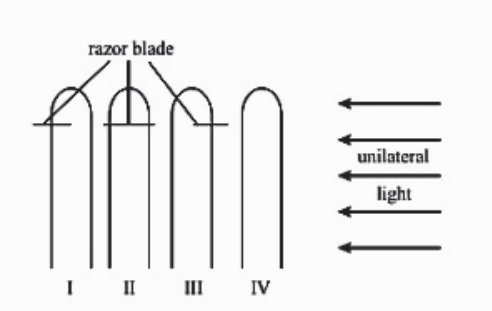
1) The apices of their stems are attracted by light

2) They need light for photosynthesis

3) Some auxins accumulate on the shaded side to induce greater cell elongation on that side

4) Light stimulates the cell on the illuminated side to increase in length

5. The given figure shows 4 Coleoptiles set up at the start of an experiment



Which two coleoptiles will bend towards the light source ?

1) III and IV

2) II and III

3) I and IV

4) I and II

6. Match the following column I and column II in relation with experimental material they use.

Column I		Column II	
A.	Darwin	i.	Rice seedlings
B.	F W Went	ii.	Tobacco stem
C.	Kurosawa	iii.	Coleoptiles of Oat seedling
D.	Skoog	iv.	Canary grass coleoptile

1) a - iii , b - iv , c - ii , d - i

2) a - iv , b - iii , c - i , d - ii

3) a - ii , b - i , c - iii , d - iv

4) a - i , b - ii , c - iv , d - iii

7. Match the following.

Column I		Column II	
1.	Auxin	a.	Bolting
2.	Gibberellin	b.	Initiate flowering
3.	Cytokinin	c.	Induce parthenocarpy
4.	Ethylene	d.	Delay leaf senescence

1) 1 - a , 2 - c , 3 - d , 4 - b

2) 1 - a , 2 - c , 3 - b , 4 - d

3) 1 - c , 2 - a , 3 - b , 4 - d

4) 1 - c , 2 - a , 3 - d , 4 - b

8. Activities of growth promoter include :

A. Induce cell division

B. Induce cell elongation

C. Delay senescence

D. Development of new leaves

E. Fruit ripening

F. Abscission of leaves

G. Flowering

H. Break seed dormancy

1) A, B, C and D only

2) A, B, D, E and G only

3) A, B, C, D, G and H only

4) All

9. Count the number of true statements :

i) Application of gibberellin helps early seed production in conifers.

ii) All synthetic auxins are widely used as herbicides

iii) Kinetin promotes cytokinesis

iv) IAA act as an antagonist to GAs

v) Gibberellins delay senescence of fruits

1) 1 2) 2

3) 3 4) 4

10. How many of the following are correctly matched

1) Auxin - Cell division - apical dominance - selective weed killer

2) GA_3 - Cell elongation - increase length of grape stalk - terpene derivative

3) Cytokinine - Cell division - bud formation - delay leaf senescence

4) Ethylene - gaseous in nature - break seed dormancy - Respiratory climatic

5) Abscisic acid - stress hormone - induce dormancy - leaf abscission

1) 1 2) 2

3) 3 4) 5

11. Functions of GA_3 and ABA are given here in a jumbled manner. Select option that correctly segregates these functions

i) Cell elongation GA_3

ii) Response to biotic and abiotic stress ABA

iii) Bolting GA_3

iv) Internode growth GA_3

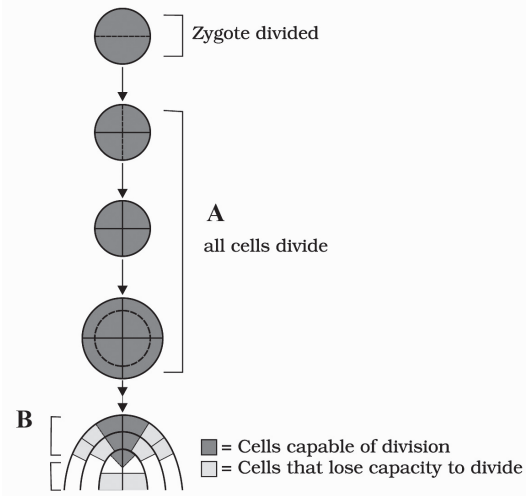
v) Response to wounding ABA

vi) Seed germination GA_3

vii) Promote seed dormancy ABA

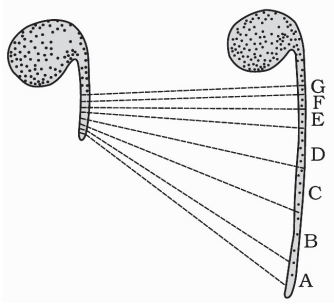
	Functions of gibberellin	Functions of ABA
1)	i, ii, vii	iii, iv, v, vi
2)	v, vi, vii	i, ii, iii, iv
3)	i, iii, iv, vi	ii, v, vii
4)	i, iii, v, vii	ii, iv, vi

12. The given figure shows development of an embryo that undergoes two phases of growth A and B. Select the correct option regarding it.



	A	B
1)	Geometric phase	Arithmetic phase
2)	Arithmetic phase	Geometric phase
3)	Arithmetic phase	Exponential phase
4)	Exponential phase	Geometric phase

13. What does the following figure show ?



1) Growth of pollen tube in terms of surface area

2) Detection of zone of maturation by parallel line technique

3) Detection of zone of elongation by the parallel line technique

4) Detection of zone of meristematic activity by parallel line technique

14. A sigmoid or S-curve is a characteristic of

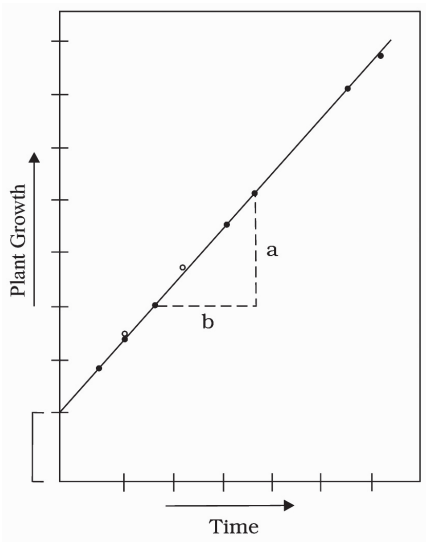
1) Living organism growing in a natural environment

2) Typically all cells, tissues and organs of a plant

3) Root elongation at a constant rate

4) Both 1 and 2

15. Which equation correctly satisfy the following growing curve ?



1) $W_1 = W_0e^{rt}$

2) $L_1 = L_0e^{rt}$

3) $L_t = L_0 + rt$

4) $W_1 = W_0et$

16. Identify the correct statement with respect to growth

1) It is a reversible permanent increase in size of an organ or its parts

2) It is accompanied by metabolic processes that occur without the expense of energy

3) Plant growth is generally indeterminate

4) Expansion of a leaf cannot be called as growth

17. Read the statements and select the correct ones :

I. The cells just after meristematic phase are called elongation phase cells

II. Geometric growth includes lag, log and exponential phase

III. Arithmetic growth represents linear curve

IV. The growth of the leaf is measured in terms of volume

1) I and II are correct

2) III and IV are correct

3) I and III are correct

4) I, II and III are correct

18. Spraying sugarcane with gibberellins increase the yield by as much as 20 tonnes per acre. GA performs it ;

1) by improving the quality of fruit

2) by making plants with rosette habit

3) by internodal elongation

4) by delaying senescence

19. Go through the columns.

Column I		Column II	
I.	IAA	a	Terpene
II.	GA	b.	Indole compounds
III.	ABA	c.	Adenine derivatives
IV.	C_2H_4	d.	Gases
V.	Kinetin	e.	Carotenoid derivatives

The correct match is :

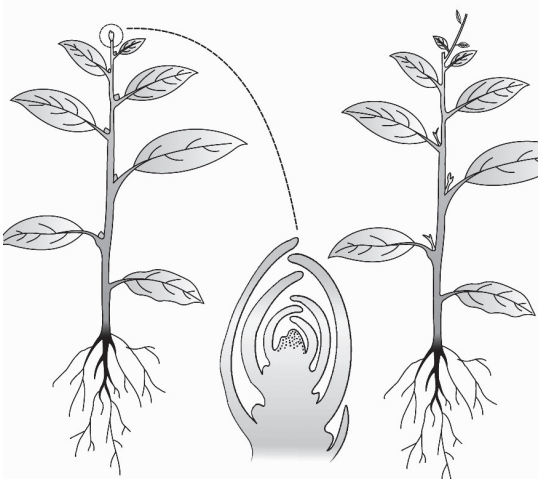
1) I - b ; II - a ; III - e ; IV - d ; V - c

2) I - a ; II - b ; III - c ; IV - d ; V - e

3) I - e ; II - d ; III - a ; IV - b ; V - c

4) None of these are correct

20. Given figure show the response due to hormone



1) Auxin

2) Gibberellin

3) Cytokinin

4) ABA

21. Match the following correctly.

A		B	
a.	Auxin	p.	Herring sperm DNA
b.	Cytokinin	q.	C_2H_4
c.	Ethylene	r.	Carotenoid derivative
d.	ABA	s.	Human urine

1) a - s ; b - p ; c - r ; d - q

2) a - p ; b - s ; c - r ; d - q

3) a - s ; b - p ; c - q ; d - r

4) a - p ; b - s ; c - q ; d - r

22. The term antagonistic action of hormone refers to

1) when 2 hormones act together but bring about opposite effects

2) when 2 hormones act together and contribute to the same function

3) when 1 hormone affects more than one function

4) when many hormones bring about any one function

23. Auxin in plant is not meant for

1) cell elongation

2) fruit ripening

3) cell division

4) adventitious root formation from stem cuttings

24. One of the preventive methods of fruit drop at early stages is by spraying

1) Auxin

2) Ethylene gas

3) Gibberellins

4) Cytokinin

25. Specify a property attributed to gibberellins

1) Shortening of genetically tall plants

2) Elongation of genetically dwarf plant

3) Promotion of rooting

4) Yellowing of young leaves

26. Cytokinins are formed in

1) Root apex

2) Leaves

3) Growing shoot

4) Both 1 and 3

27. PGRs used if someone is asked to

a) Induce rooting in a twig

b) Quickly ripens a fruit

c) Delay leaf senescence

1) a - cytokinin, b - ethylene, c - auxin

2) a - auxin, b - ethylene, c - GA

3) a - auxin, b - ethylene, c - cytokinin

4) a - cytokinin, b - ethylene, c - GA

28. Removal of shoot tips is a very useful technique to boost the production of tea-leaves. This is because

1) Gibberellins delay senescence of leaves

2) Gibberellins prevent bolting and are inactivated

3) Auxins prevent leaf drop at early stages

4) Effect of auxin is removed and growth of lateral buds is enhanced

29. The Arena curvature is used for bioassay of

1) ABA

2) GA_3

3) IAA

4) Ethylene

30. The gaseous plant growth regulator is used in plants to :

1) helps to overcome apical dominance

2) kill dicot weeds in fields

3) speed up malting

4) promote root growth and root hair formation to increase the absorption surface

31. The ability of plants to follow different pathways in response to environment leading to formation of different kinds of structures is called

1) Redifferention

2) Development

3) Plasticity

4) Differentiation

32. Two important intrinsic controls which are important to plant growth and development are :

1) PGR

2) Genomic control

3) Both 1 and 2

4) O_2 concentration

33. Ethylene is highly effective in fruit ripening. It enhance respiration rate during ripening of fruits. This process is called

1) Respiratory climatic

2) Respiratory quotient

3) Respiratory effect

4) Respiratory quiescence

34. Which of the following hormones can promote malting in brewing industry ?

1) Auxin

2) Ethylene

3) Gibberellin

4) Cytokinin

STATEMENT TYPE QUESTIONS

1) Both statements I and II are incorrect.

2) Statement I is correct but statement II is incorrect.

3) Statement I is incorrect but statement II is correct.

4) Both statement I and II are correct.

35. **Statement I :** Sugarcane stores carbohydrate as sugar in their stems.

Statement II : Spraying sugar cane with gibberellin increase length of the stem.

36. **Statement I :** During mid 1960's 3 independent researchers reported purification and characterisation of 3 kinds of inhibitors - Inhibitor -B, Abscission II and Dormin.

Statement II : These inhibitors were later proved to be 2 chemically identical to Auxin.

37. **Statement I :** Difference in shape of leaves in air and water in Buttercup represented heterophylly due to environment.

Statement II : Heterophylly due to environment is an example of plasticity.

38. **Statement I :** Measurement and comparison of total growth per unit time is called relative growth rate.

Statement II : Measure of ability of plant to produce new plant material is referred to an absolute growth rate.

39. **Statement I :** Many of the extrinsic factors such as temperature and light, control plant growth and development via PGR.

Statement II : Development in plants is under the control of intrinsic factors like PGR, light, oxygen etc.

40. **Statement I :** Gibberellins delay senescence.

Statement II : The fruits can be left on the tree longer so as to extend the market period.

41. **Statement I :** In plants differentiation is open.

Statement II : Cells or tissues arising out of the same meristem have different structure at maturity.

ASSERTION-REASON TYPE QUESTIONS

Read the assertion and reason carefully to mark the correct option out of the options given below.

1) Assertion and reason both are true and the reason is correct explanation of assertion

2) Assertion and reason both are true but reason is not correct explanation of assertion.

3) Assertion is true but reason is wrong

4) Assertion is wrong but reason is true

42. **Assertion :** Sigmoid growth curve shows three phases.

Reason : In log phase, growth rate is slow.

43. **Assertion :** ABA stimulates the closure of stomata and increase the tolerance of plants to different kind of stresses.

Reason : ABA act as general plant growth inhibitor

44. **Assertion :** Role of PGR could be complimentary or antagonistic.

Reason : There are five major groups of PGRs.

45. **Assertion :** GAs lead to early seed production in conifers.

Reason : Spraying juvenile conifers with GAs hastens the maturity period.

ANSWER KEY

1.	1	14.	2	27.	3	40.	3	53.	4
2.	3	15.	3	28.	2	41.	2	54.	2
3.	1	16.	4	29.	1	42.	4	55.	2
4.	3	17.	1	30.	4	43.	4	56.	4
5.	2	18.	4	31.	2	44.	1	57.	2
6.	4	19.	4	32.	4	45.	1	58.	4
7.	4	20.	3	33.	3	46.	4	59.	3
8.	3	21.	2	34.	4	47.	2	60.	2
9.	2	22.	1	35.	2	48.	2	61.	3
10.	4	23.	4	36.	4	49.	4	62.	4
11.	4	24.	4	37.	1	50.	1	63.	1
12.	4	25.	2	38.	4	51.	4	64.	4
13.	2	26.	4	39.	2	52.	3	65.	2

SAMPLE QUESTIONS

1.	1	10.	4	19.	1	28.	4	37.	4
2.	2	11.	3	20.	3	29.	3	38.	1
3.	2	12.	1	21.	3	30.	4	39.	2
4.	3	13.	3	22.	1	31.	3	40.	4
5.	1	14.	4	23.	2	32.	3	41.	4
6.	2	15.	3	24.	1	33.	1	42.	3
7.	4	16.	3	25.	2	34.	3	43.	2
8.	3	17.	4	26.	4	35.	4	44.	2
9.	3	18.	3	27.	3	36.	2	45.	1

WORK BOOK

Chapter 10

SEXUAL REPRODUCTION IN FLOWERING PLANTS

STAMEN, MICROSPORANGIUM AND POLLEN GRAINS

1. The study of growing and marketing flowers and foliage plants is called :

1) Agriculture

2) Floriculture

3) Sericulture

4) All the above

2. In Angiosperms, the site of sexual reproduction is :

1) Seed 2) Fruit

3) Flower 4) Embryo

3. The two parts of a typical stamen, the long and slender stalk called the ___(a)___, and the terminal generally bilobed structure called the ____(b)____ . Identify (a) and (b) :

1) (a) - Filament ; (b) - Anther

2) (a) - Funicle ; (b) - Anther

3) (a) - Pedicel ; (b) - Lamina

4) (a) - Petiole ; (b) - Leaf blade

4. A typical angiosperm anther is bilobed with each lobe having :

1) One theca

2) Two theca

3) Four theca

4) Many theca

5. The proximal end of the filament of stamen is attached to :

1) Thalamus

2) Petal

3) Thalamus or petal

4) Anther

6. The microsporangia develop further and become :

1) Ovules 2) Carpels

3) Locules 4) Pollen sacs

7. Which of the following is a correct arrangement of layers in microsporangium from out side to inside :

1) Epidermis, endothecium, middle layers and tapetum

2) Epidermis, middle layers, endothecium and tapetum

3) Tapetum, endothecium, middle layers, epidermis

4) Tapetum, middle layers, endothecium, epidermis

8. The outer three layers of anther wall broadly perform the function of :

1) Protection only

2) Dehiscence and nutrition

3) Nutrition and protection

4) Protection and dehiscence of anther

9. All the following features are related to tapetal cells, except :

1) Dense cytoplasm

2) Nourishes the developing pollen grains

3) Generally have more than one nucleus

4) No role in pollen wall formation

10. A group of compactly arranged homogenous cells in the centre of each microsporangium is :

1) Megaspore mother cells

2) Nucellus

3) Sporogenous tissue

4) Perisperm

11. What is the ploidy of the cells of the microspore/megaspore tetrad?

1) Haploid

2) Diploid

3) Triploid

4) Polyploid

12. Total number of microspore tetrad formed in a dithecous anther, if each microsporangia has 25 microspore mother cells :

1) 25 2) 100

3) 400 4) 800

13. A potential pollen is :

1) Microspore

2) Male gamete

3) Microspore mother cell

4) Male gametophyte

14. Select the correct sequence of pollen development from the following :

1) Microspore tetrad → sporogenous tissue → PMC → Pollen grains

2) Sporogenous tissue → Microspore tetrad → PMC → Pollen grains

3) PMC → Sporogenous tissue → Microspore tetrad → Pollen grains

4) Sporogenous tissue → PMC → Microspore tetrad → Pollen grains

15. Read the following statements and select the correct option :

Statement I : The pollen grains represent the male gametophytes.

Statement II : Pollen grains are formed from pollen mother cell through meiosis.

1) Statement I is wrong but II is correct

2) Both statements are wrong

3) Both statements are correct

4) Statement I is correct but II is wrong

16. Pollen grains are generally spherical measuring about :

1) 2-5μm

2) 25-50μm

3) 10-20μm

4) 50-100μm

17. Outer and inner wall layers of pollen grains are respectively :

1) Exine and intine

2) Testa and tegmen

3) Intine and exine

4) Tegmen and testa

18. Read the following statements and identify who am I !

a) One of the most resistant organic material known.

b) Can withstand high temperatures and strong acids and alkali.

c) No enzyme that degrades me is so far known.

1) Sporopollenin in exine

2) Cellulose and pectin

3) Sporopollenin in intine

4) Cellulose and pectin in exine

19. Exine of pollen grain has prominent apertures called ___(a)___ where sporopollenin is absent. Identify (a) :

1) Micropyle 2) Germpores

3) Vacuoles 4) Intine

20. In majority of Angiosperms, the pollen grains are shed at the :

1) 2-celled stage 2) 3-celled stage

3) 4-celled stage 4) 7-celled stage

21. In a fully developed male gametophyte, the number of nuclei is :

1) One 2) Two

3) Three 4) Four

22. In a mature pollen grain which cell is bigger, has abundant food reserve and a large irregularly shaped nucleus?

1) Vegetative cell/Tube cell

2) Generative cell

3) Both 1 and 2

4) Central cell

23. Male gametes are derived from which cell of the pollen grain?

1) Vegetative cell

2) Generative cell

3) Central cell

4) Egg cell

24. Pollen grains are shed at the 2-celled stage in :

1) 40% of Angiosperms

2) 60% of Angiosperms

3) All Dicots

4) All Monocots

25. Which of the following divisions help in formation of fully matured male gametophyte from a PMC :

1) One meiotic and 2 mitotic divisions

2) One mitotic and 2 meiotic divisions

3) One meiotic and 3 mitotic divisions

4) One mitotic and 3 meiotic divisions

26. The pollen grains in Angiosperms are :

1) Derived from microspore mother cells

2) Generally shed at the 2-celled stage

3) Represent male gametophyte

4) All the above

27. In an Angiosperm, the number of microspore mother cells are involved in production of 160 pollen grains :

1) 40 2) 20

3) 60 4) 80

28. Select the plant which causes chronic respiratory disorders and came into India as a contaminant with imported Wheat and has become ubiquitous in occurrence :

1) Parthenium

2) Carrot grass

3) Both 1 and 2

4) Hibiscus

29. It is possible to store pollen grains of a large number of species for years in :

1) Liquid helium at $^{-}196°C$

2) Liquid hydrogen at 96°C

3) Liquid nitrogen at $^{-}196°C$

4) Vapour nitrogen at 196°C

30. The pollen grains maintain viability for months in some members of :

1) Rosaceae

2) Leguminosae

3) Solanaceae

4) All the above

31. The pollen grains lose viability within 30 minutes in :

1) Rice and Wheat

2) Rice and Potato

3) Pea and Bean

4) Rose and Apple

32. Germ pores present in pollen grain represents :

1) Area where exine is absent

2) Area where sporopollenin is absent

3) Area where intine is absent

4) Both 1 and 2

PISTIL, MEGASPORANGIUM AND EMBRYO SAC

33. Which of the following represents the female reproductive part of the flower?

1) Gynoecium

2) Androecium

3) Ovule

4) Stamen

34. Each pistil consists of :

1) Anther and filament

2) Stigma, style and ovary

3) Anther , style and ovary

4) Stigma and filament

35. In Papaver, the pistil is :

1) Multicarpellary, apocarpous

2) Multicarpellary, syncarpous

3) Monocarpellary, unilocular

4) Multicarpellary, unilocular

36. The _____serves as the landing platform for pollen grains :

1) Ovary 2) Style

3) Stigma 4) Anther

37. The placenta is located inside the :

1) Ovarian cavity 2) Ovule

3) Anther 4) Nucellus

38. The basal bulged part of the pistil which later forms the fruit :

1) Placenta 2) Locule

3) Ovary 4) Endosperm

39. In a flowering plant, microsporangium to pollen sac; then megasporangium to _____

1) Anther 2) Ovule

3) Pollen grain 4) Embryo sac

40. Based on the number of ovules in an ovary; select the odd one out :

1) Wheat 2) Paddy

3) Mango 4) Papaya

41. Number of ovules in an ovary may be many in :

1) Papaya 2) Water melon

3) Orchids 4) All the above

42. Multicarpellary, apocarpous gynoecium is present in :

1) Hibiscus 2) Papaver

3) Michelia 4) Both 1 and 2

43. A common character shared by the gyneocium of Hibiscus, Papaver and Michelia :

1) Monocarpellary

2) Apocarpous

3) Syncarpous

4) Multicarpellary

44. The ovule is attached to the placenta by means of a stalk called :

1) Pedicel 2) Funicle

3) Petiole 4) Filament

45. The part of ovule which later transforms into seed coat :

1) Micropyle 2) Nucellus

3) Integuments 4) Hilum

46. Opening of ovule, through which pollen tube enters into the ovule?

1) Germ pore 2) Micropyle

3) Hilum 4) Stomata

47. The body of the ovule fuses with funicle in the region called :

1) Hilum 2) Chalaza

3) Nucellus 4) Micropyle

48. Main tissue in ovule which provide nourishment to developing embryo sac is :

1) Endosperm

2) Nucellus

3) Tapetum

4) Cotyledon

49. In Angiosperms; male gametophyte : pollen grain, as to female gametophyte : _____

1) Embryo sac

2) Nucellus

3) Endosperm

4) Perisperm

50. Generally the number of embryo sac in an ovule is :

1) One 2) Two

3) Three 4) Many

51. The process of formation of megaspores from the megaspore mother cell through meiosis is called :

1) Microsporogenesis

2) Microgametogenesis

3) Megasporogenesis

4) Megagametogenesis

52. Read the following statements and select the correct option :

Statement I : Ovules generally differentiate a single megaspore mother cell in the micropylar region of the nucellus.

Statement II : The megaspore mother cell (MMC) undergoes meiotic division results in the production of four megaspores.

1) Statement I is wrong but II is correct

2) Both statements are wrong

3) Both statements are correct

4) Statement I is correct but II is wrong

53. A typical Angiospermic embryo sac consists of :

1) Egg, synergids and secondary nucleus only

2) Synergids, egg and polar nuclei only

3) Egg, synergids, polar nuclei and antipodals

4) Egg, antipodals and polar nuclei only

54. Egg apparatus is at __(A)__ end and is composed of __(B)__ cells.

	A	B
1)	Micropylar	2
2)	Micropylar	3
3)	Chalazal	2
4)	Chalazal	3

55. Which of the following is the mother cell of endosperm and after triple fusion becomes primary endosperm cell :

1) Synergid cell 2) Antipodal cell

3) Egg cell 4) Central cell

56. Select the odd one with respect to ploidy level?

1) Synergid

2) Polar nuclei

3) Antipodal

4) Secondary nucleus

57. Select the correct option about filiform apparatus :

1) Guide the pollen tube into synergid

2) Absorb and transport materials from the nucellus into the embryo sac

3) Are special cellular thickenings at the micropylar end

4) All the above are correct

58. A typical Angiosperm embryo sac at maturity is :

1) 6-nucleate and 7-celled

2) 8-nucleate and 7-celled

3) 7-nucleate and 8-celled

4) 5-nucleate and 8-celled

59. What happened to the seven cells of the embryo sac :

1) All the cells disintegrate

2) Two of them participate in double fertilization and others disintegrate.

3) Three of them fertilised and others fuse to form endosperm

4) All the seven cells of embryo sac are involved in double fertilization

60. Embryo sac is monosporic when it develops from :

1) One of the four megaspores of a megaspore tetrad

2) Three megaspores of a megaspore tetrad

3) Two megaspores of a megaspore tetrad

4) All the 4 megaspores of a megaspore tetrad

61. Generally how many megaspore mother cells are required to produce100 embryo sac or 100 egg :

1) 25 2) 50

3) 100 4) 75

62. How many meiotic and mitotic divisions are required to form 7-celled and 8-nucleated embryo sac from megaspore mother cell?

1) One meiotic and 3 mitotic divisions

2) One meiotic and 2 mitotic divisions

3) Three mitotic divisions only

4) Only one meiotic division

63. Normally an embryo sac contain how many egg/s?

1) One 2) Three

3) Seven 4) Eight

64. What will be the ploidy level of the cells of the nucellus, antipodal cells, megaspore mother cell and megaspore respectively in a typical Angiospermic plant?

1) 2n, n, 2n, n 2) 2n, n, n, 2n

3) n, n, 2n, n 4) 2n, n, n, n

65. How many mitosis are required to form an egg from functional megaspore ?

1) Two

2) Seven

3) Three

4) Six

66. Select the correct statement/s regarding the structure of a typical Angiospermic embryo sac :

i) Egg apparatus consists of one egg and 2 synergids.

ii) Antipodal cells are situated towards the micropylar end

iii) It is 8 nucleate and 7-celled at maturity

iv) Polar nuclei are situated in the large central cell

1) (i) and (iii) only

2) (i), (iii) and (iv) only

3) (ii) only

4) (ii) and (iv) only

67. Fill in the blanks and select which is not correct ?

A) Synergids are characterized by the presence of __(i)__.

B) The method of embryo sac formation from a single megaspore is termed __(ii)__.

C) Most common type of ovule in Angiosperm is ___(iii)___.

D) Enclosed within the integuments there is a mass of cells called __(iv)__.

1) (i) - Filiform apparatus

2) (ii) - Monosporic development

3) (iii) - Anatropous

4) (iv) - Central cell

POLLINATION AND FERTILIZATION

68. Geitonogamy is :

1) Functionally cross-pollination

2) Genetically similar to autogamy

3) Is carried out by a pollinating agent by the pollen from the same plant

4) All the above

69. The flowers of Castor and Maize prevents :

1) Autogamy but not geitonogamy

2) Both autogamy and geitonogamy

3) Both autogamy and xenogamy

4) Geitonogamy but not xenogamy

70. The genetically different types of pollens can be brought in a plant by :

1) Autogamy

2) Xenogamy

3) Geitonogamy

4) Self pollination

71. Select the statement which is not true about autogamy :

1) Transfer of pollen grains from the anther to the stigma of same flower is called autogamy.

2) Autogamy requires synchrony in pollen release and stigma receptivity

3) For autogamy, the anthers and the stigma should lie close to each other

4) In chasmogamous flowers complete autogamy occurs

72. Assured seed set occur even in the absence of pollinators, in :

1) Commelina

2) Viola (Common Pansy)

3) Oxalis

4) All the above

73. In wind pollinated plants; the flowers :

1) Possess well exposed stamens and feathery stigma

2) Have a single ovule in each ovary

3) Possess light and non-sticky pollen grains

4) All the above

74. Pollination by ___(A)___ is quite rare in flowering plants and is limited to about 30 genera, mostly ___(B)___. Identify (A) and (B).

1) (A) - Water ; (B) - Monocots

2) (A) - Wind; (B) - Dicots

3) (A) - Water ; (B) - Dicots

4) (A) - Wind; (B) - Monocots

75. Which type of plants are having one ovule in each ovary ?

1) Water pollinated plants

2) Wind pollinated plants

3) Insect pollinated plants

4) Plants without pollinating agents

76. Which of the following sequence of contribution in pollination by the given pollinating agents is correct ?

1) Water > Wind > Animals

2) Animals > Water > Wind

3) Animals > Wind > Water

4) Wind > Animals > Water

77. In which set of plants, pollens are released on the surface of water and carried by passive water currents upto stigma ?

1) Vallisneria and Zostera

2) Hydrilla and Vallisneria

3) Zostera and Water lily

4) Water hyacinth and Water lily

78. Which of the following statement is incorrect ?

1) Vallisneria and Hydrilla grow in fresh water

2) In Vallisneria, pollination occur above the level of water

3) In Sea grasses, female flowers remain submerged in water

4) All aquatic plants use water for pollination

79. The usual floral rewards for insects from flowers are _____ and _____ during pollination.

1) Smell and colour

2) Pollen grains and nectar

3) Smell and nectar

4) Colour and pollen grains

80. Which of the following is not a water pollinated plant?

1) Zostera

2) Vallisneria

3) Water lily

4) Hydrilla

81. Which of the following is a condition that makes flowers invariably autogamous?

1) Dioecy

2) Self incompatibility

3) Cleistogamy

4) Xenogamy

82. The central cell of embryo sac; as a result of triple fusion becomes :

1) Primary endosperm nucleus (PEN)

2) Endosperm

3) Embryo

4) Primary endosperm cell (PEC)

83. Total number of gametes involved in double fertilization are :

1) 2 2) 3

3) 4 4) 5

84. Angiosperm differ from other plants of plant kingdom, in having :

1) Syngamy

2) Triple fusion

3) Double fertilization

4) Both 2 and 3

85. The number of polar nuclei and male gamete involved in triple fusion are respectively :

1) 2 + 1 2) 1 + 2

3) 3 + 1 4) 1 + 3

86. Pollen - pistil interaction includes all the events from pollen deposition on stigma until :

1) Pollen tubes are formed

2) Pollen tube enters the ovary

3) Pollen tube enters the embryosac / ovule

4) Male gametes are formed

87. **Assertion :** Emasculated flowers have to be covered with a bag of suitable size.

Reason : Bagging prevent contamination of its stigma with unwanted pollen.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Both Assertion and Reason are false

4) Assertion is true but Reason is false

POST FERTILIZATION : STRUCTURE AND EVENTS

88. The primary endosperm cell becomes _____ and zygote becomes _____.

1) Embryo, Endosperm

2) Embryo, integument

3) Nucellus, Embryo

4) Endosperm, Embryo

89. The coconut water is __(a)__ and its surrounding white kernel is __(b)__. Identify (a) and (b) and select the correct option.

	(a)	(b)
1)	Cellular endosperm	Liquid endosperm
2)	Liquid endosperm	Cellular endosperm
3)	Cellular endosperm	Cellular endosperm
4)	Liquid endosperm	Liquid endosperm

90. Seeds of many monocots have residual endosperm as :

1) It does not show triple fusion

2) It is completely consumed during embryo development

3) It is not completely consumed during embryo development

4) It produces ex-albuminous / non-albuminous seeds

91. Which of the following is incorrect?

1) Epicotyl terminates with plumule or stem tip

2) Hypocotyl terminates with radicle or root tip

3) Coleoptile and Coleorrhiza are present in Monocot embryo

4) Scutellum and epiblast are absent in Monocot embryo

92. The advantage/s of seeds in Angiosperms is/are :

1) Can get dispersed to new areas

2) Seed coat provides protection to growing embryos

3) Generate new genetic recombination leading to variation

4) All of the above

93. Perisperm is found in :

1) Barley and Castor

2) Black pepper and Beet

3) Apple and Strawberry

4) Castor and Maize

94. Strawberry is a type of false fruit as it is :

1) Formed from ovary

2) Formed from thalamus

3) Formed from ovule

4) Formed from anther

95. Which of the following is the oldest viable seed (10000 years of dormancy) excavated from Arctic Tundra?

1) *Lupinus arcticus*

2) *Phoenix dactilifera*

3) *Cocos nucifera*

4) *Mangifera indica*

96. The phenomenon wherein, the ovary develops into a fruit without fertilization is called :

1) Polyembryony

2) Parthenocarpy

3) Apomixis

4) Sexual reproduction

97. An example of naturally occurring parthenocarpic fruit is :

1) Grapes

2) Pomegranate

3) Banana

4) Apple

98. The cells of endosperm of Angiosperm have 30 chromosomes, then what will be the number of chromosomes in its gametes?

1) 10

2) 20

3) 30

4) 5

99. Generally in apomixis, embryos develop from :

1) Nucellus

2) Embryo

3) Antipodals

4) Synergids

100. **Assertion :** Apomixis is a type of asexual reproduction.

Reason : Seeds are formed without fertilization.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Both Assertion and Reason are false

4) Assertion is true but Reason is false

SAMPLE QUESTIONS

1. Essential whorls of a flower are

1) Calyx and Corolla

2) Corolla and Gynoecium

3) Androecium and Gynoecium

4) Calyx and Androecium

2. Choose the set which contain diploid structure/s only :

(a) Pollen grains (b) Nucellus

(c) Perisperm (d) Endosperm

(e) Embryo (f) Megaspore

1) d and e 2) b, c and e

3) a, d and e 4) a only

3. Multicarpellary, syncarpous gynoecium is found in

1) Hibiscus

2) Michelia

3) Papaver

4) Both 1 and 3

4. Persistent endosperm in mature seed is found in

1) Pea 2) Gram

3) Groundnut 4) Wheat

5. Tapetum is

1) Inner most layer of anther wall with multinucleate condition

2) Middle layer of anther wall

3) Outer most layer of microsporangium with diploid condition

4) Inner most layer of ovule with multinucleate condition

6. Find out the mis-matched pair

1) Microsporophyll - Stamen

2) Megasporophyll - Pistil

3) Megasporangium - Ovule

4) Microsporangium - Pollen grain

7. **Assertion :** In Angiosperms, endosperm is triploid

Reason : In Angiosperms, the endosperm is formed as a result of syngamy

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false.

8. In Parthenocarpy :

1) The seed is formed by fertilization of egg and the male gamete

2) The embryo is formed by the fusion of egg and male gamete

3) Fruits develop without fertilization, hence seedless

4) Fruit is not formed because of absence of fusion of egg and male gamete

9. Double fertilization is essential for formation of

1) Nucellus and endosperm

2) Endosperm and embryo

3) Seed coat and perisperm

4) Nucellus and embryo

10. Free nuclear division in an Angiosperm takes place during

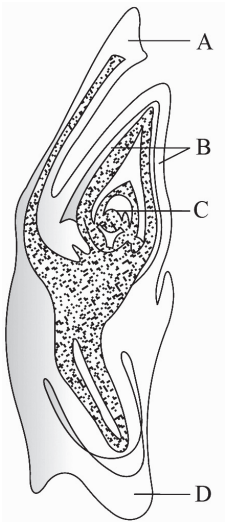
1) Endosperm and embryosac formation

2) Endosperm and pollen grain formation

3) Embryo and anther formation

4) Embryo sac and male gamete formation

11. In the given diagram of L.S of grass embryo, select the correct option in which all the labelled parts A, B, C and D are correctly identified



	A	B	C	D
1)	Scutellum	Coleoptile	Shoot apex	Coleorhiza
2)	Scutellum	Shoot apex	Epiblast	Root cap
3)	Scutellum	Shoot apex	Radicle	Coleorhiza
4)	Scutellum	Coleoptile	Epiblast	Radicle

12. Which cell of pollen grain is small and is spindle shaped with dense cytoplasm and a nucleus:

1) Vegetative cell

2) Generative cell

3) Central cell

4) Both 1 and 3

13. Select the incorrect statement from the following

1) Tapetum nourishes developing pollen grains

2) Stalk of the ovule is called funicle

3) Aquatic plants like Water hyacinth and Water lily are pollinated by water

4) Primary endosperm nucleus is triploid

14. Choose the correct statement from the following

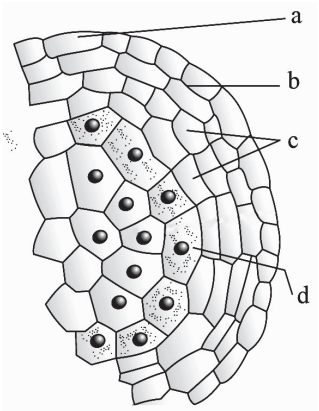
1) Cleistogamous flowers always exhibit autogamy

2) Chasmogamous flower always exhibit geitonogamy

3) Cleistogamous flower exhibit both autogamy and geitonogamy

4) Chasmogamous flower never exhibit autogamy

15. Which of the following wall layer nourishes the developing pollen grain



1) a 2) b

3) c 4) d

16. In some plants, thalamus contributes to fruit formation and such fruits are seen in

1) Mango 2) Banana

3) Apple 4) Coconut

Assertion - Reason Type Questions

1) If both assertion and reason are true and the reason is the correct explanation of the assertion

2) If both assertion and reason are true, but reason is not the correct explanation of the assertion

3) If assertion is true but reason is false

4) If both assertion and reason are false

17. **Assertion :** Geitonogamy is functionally cross pollination and genetically similar to self pollination

Reason : Geitonogamy involves pollinating agent and pollen grains come from different plant.

18. **Assertion :** Apomictic embryos are genetically similar to their parent.

Reason : During apomixis, reduction division takes place during gamete formation.

19. Match column I with column II and choose the correct combination from the options given

Column I		Column II	
A.	Barley	i.	Fleshy fruit
B.	Guava	ii.	Dry fruit
C.	Beet	iii.	Albuminous seed
D.	Groundnut	iv.	Perispermic seed

1) A - i, B - iv, C - iii, D - ii

2) A - iv, B - ii, C - iii, D - i

3) A - iii, B - i, C - iv, D - ii

4) A - iii, B - ii, C - iv, D - i

20. Yucca plant is pollinated by

1) Moth 2) Honey bee

3) Butterfly 4) Birds

21. Which of the following is not correct about insect pollinated flowers

1) Pollen grains are rough and sticky

2) Flowers are large and colourful

3) Well exposed stamens and feathery stigma

4) Flowers are fragrant and rich in nectar

22. Both autogamy and geitonogamy cannot occurs in

1) Papaya

2) Commelina

3) Castor

4) Maize

23. What would be the number of chromosomes in the cells of the endosperm in a plant species with 8 chromosomes in its synergids

1) 16 2) 32

3) 8 4) 24

24. Pollen grains remain viable for months in members of

1) Rosaceae 2) Leguminoseae

3) Solanaceae 4) All the above

25. In Angiosperms, pollen tube liberates their gametes into the

1) Cytoplasm of egg cell

2) Cytoplasm of antipodal cell

3) Cytoplasm of central cell

4) Cytoplasm of synergid cell

26. Which of the following statement is not correct

1) Pollen grains of many species can germinate on the stigma of a flower but only one pollen tube of the same species grows into the style

2) Growth of pollen tube is mediated by chemical component of pollen interacting with those of the pistil

3) Some reptiles have also been reported as pollinating agents in some plant species

4) In some species, floral rewards are in providing safe places to lay eggs

27. A typical Angiosperm embryo sac at maturity is

1) 8 nucleate 2) 2 nucleate

3) 3 nucleate 4) 16 nucleate

28. Female flowers remain submerged in water and the pollen grains are released inside the water in

1) Sea grasses

2) Vallisneria

3) Water lily

4) Water hyacinth

29. Identify the correct statement from the following

1) There and Mango show polyembryony

2) There is segregation of characters in the hybrid progeny when the hybrid are made in to apomicts

3) *Phoenix dactylifera* shows 10000 years of seed dormancy

4) There is no relationship between number of ovules in an ovary and the number of seeds in a fruit

30. Embryo sac develop from megaspore mother cell through

1) 1 meiosis and 2 mitosis

2) 1 meiosis and 1 mitosis

3) 2 meiosis and 2 mitosis

4) 1 meiosis and 3 mitosis

31. Read the following statements and choose the correct option

Statement I : In Orchid, each fruit contain very large number of seeds

Statement II : In parasitic plants like *Orobanche and Striga,* the fruits contain thousands of tiny seeds

1) Statement I and II are correct

2) Statement I is correct but II wrong

3) Statement II correct but I wrong

4) Statement I and II are wrong

32. In Angiosperms, the functional megaspore develops into

1) Embryo sac

2) Female gametophyte

3) Both 1 and 2

4) Male gametophyte

33. Scutellum is found in the embryo of

1) Pea 2) Beans

3) Grass 4) Ground nut

34. Identify the incorrect statement from the following

1) Coconut water is free nuclear endosperm

2) Formation of embryo always precedes the development of the endosperm

3) In Pea and Groundnut, the endosperm is completely consumed during the embryo formation

4) Emasculated flowers have to be covered with suitable bag to prevent contamination

35. Select the incorrect match from the following

1) Ovary → Fruit

2) Ovary wall → Pericarp

3) Ovule → Seed

4) Integument → Fruit wall

36. Wind pollinated flowers generally do not have:

1) Feathery stigma

2) Single ovule in each ovary

3) Well exposed stamens

4) Large, colourful flower

37. Select the diploid one from the following

1) Synergids

2) Secondary nucleus

3) Female gamete

4) Antipodals

38. In an Angiospermic ovule, central cell of embryo sac prior to entry of pollen tube contains

1) Two haploid antipodal cells

2) Two diploid polar nuclei

3) Two haploid polar nuclei

4) One diploid and one haploid polar nuclei

39. Xenogamy is

1) Pollination between two flowers of two different plants of same species

2) Pollination between two different flowers of same plant

3) Pollination between anther and stigma of same flower

4) Pollination between two flowers of two different plants of different species

40. The point of attachment of funicle with the body of the ovule is

1) Nucellus 2) Chalaza

3) Micropyle 4) Hilum

41. Which of the following feature is common to both wind and water pollinated flowers

1) Pollen grains are long and ribbon like

2) Stigma is large and feathery

3) The flowers are not colourful and do not produce nectar

4) Pollen grains are rough and sticky

42. At maturity the female gametophyte in an Angiosperm has

i) Three cells grouped together at the micropylar end constituting the egg apparatus

ii) Three cells at chalazal end are called the antipodals

iii) Two polar nuclei are situated in the large central cell

1) Only i is correct

2) Only ii is correct

3) i, ii and iii are correct

4) i and ii are incorrect

43. Filiform apparatus is a characteristic feature of

1) Antipodal cells

2) Central cell

3) Synergids

4) Egg cell

44. Even in the absence of pollinating agents, seed setting is assured in

1) Commelina

2) Zostera

3) Amorphophallus

4) Yucca

45. Which one of the following event takes place after double fertilization

1) The pollen tube enters into the ovule through micropyle

2) Two male gametes are discharged into the embryo sac

3) The generative cell divides and forms the two male gametes

4) The primary endosperm nucleus divides by mitosis to form endosperm

ANSWER KEY

1.	2	21.	3	41.	4	61.	3	81.	3
2.	3	22.	1	42.	3	62.	1	82.	4
3.	1	23.	2	43.	4	63.	1	83.	2
4.	2	24.	2	44.	2	64.	1	84.	4
5.	3	25.	1	45.	3	65.	3	85.	1
6.	4	26.	4	46.	2	66.	2	86.	3
7.	1	27.	1	47.	1	67.	4	87.	1
8.	4	28.	3	48.	2	68.	4	88.	4
9.	4	29.	3	49.	1	69.	1	89.	2
10.	3	30.	4	50.	1	70.	2	90.	3
11.	1	31.	1	51.	3	71.	4	91.	4
12.	2	32.	4	52.	3	72.	4	92.	4
13.	3	33.	1	53.	3	73.	4	93.	2
14.	4	34.	2	54.	2	74.	1	94.	2
15.	3	35.	2	55.	4	75.	2	95.	1
16.	2	36.	3	56.	4	76.	3	96.	2
17.	1	37.	1	57.	4	77.	2	97.	3
18.	1	38.	3	58.	2	78.	4	98.	1
19.	2	39.	2	59.	2	79.	2	99.	1
20.	1	40.	4	60.	1	80.	3	100.	1

SAMPLE QUESTIONS

1.	3	10.	1	19.	3	28.	1	37.	2
2.	2	11.	1	20.	1	29.	1	38.	3
3.	4	12.	2	21.	3	30.	4	39.	1
4.	4	13.	3	22.	1	31.	1	40.	4
5.	1	14.	1	23.	4	32.	3	41.	3
6.	4	15.	4	24.	4	33.	3	42.	3
7.	3	16.	3	25.	4	34.	2	43.	3
8.	3	17.	3	26.	1	35.	4	44.	1
9.	2	18.	3	27.	1	36.	4	45.	4

WORK BOOK

Chapter 11

BIOTECHNOLOGY : PRINCIPLES AND PROCESSES

INTRODUCTION AND TOOLS IN RECOMBINANT DNA TECHNOLOGY

1. Antibiotic resistance gene introduced by Cohen and Boyer was expressed in which organism ?

1) Yeast

2) E.coli

3) Agrobacterium

4) *Bacillus thuringiensis*

2. What is the first step in genetic engineering

1) Screening of transformed cells

2) Amplification of the gene

3) Creation of recombinant DNA

4) Isolation of the gene

3. "BR" in pBR322 stands for

1) Bacteriophage and Recombinant

2) Bolivar and Rodriguez

3) Boyer and Replicative

4) Bacteria and Replicate

4. Biotechnology is

1) A science of culturing bacteria

2) Use of biological organisms to study genetics

3) Use of biological organisms, systems to manufacture industrial products useful to mankind

4) The technology used to culture micro-organisms

5. Which of the following is not a tool of genetic engineering

1) cloning vector

2) restriciton enzyme

3) foreign DNA

4) GMO

6. The first restriction endonuclease isolated was

1) Eco RI 2) Hind II

3) Bam HI 4) Sal I

7. The letter 'R' in ECo RI is derived from

1) The name of genus

2) The name of species

3) The name of restriction enzyme

4) The name of strain

8. Making of multiple identical copies of DNA template is called :

1) Tissue culture

2) IVF

3) Cloning

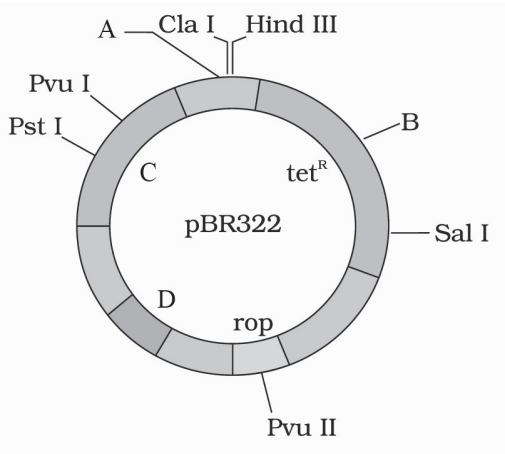
4) Genetic engineering

9. Recognition site of pvu II is present in :

1) amp^R 2) tet^R

3) ori 4) rop

10. Identify A, B, C and D in the given figure of E.Coli cloning vector pBR 322 and select the correct option



	A	B	C	D
1.	Hind II	ECoR1	amp^R	Ori
2.	Hind II	Bam HI	Kan^R	amp^R
3.	Bam HI	Pst1	Ori	amp^R
4.	EcoR1	Bam HI	amp^R	Ori

11. To convert RNA into cDNA, the enzyme used is

1) Ribonuclease

2) Ligase

3) Exonuclease

4) Reverse Transcriptase

12. The first step in making a genetically modified organism is

1) culturing the host cell in a medium

2) transfering the DNA into the host

3) identification of DNA with desirable characters

4) fragmentation of DNA by restriction endonucleases

13. EcoRI cuts the bases between :

1) A and A 2) T and G

3) G and A 4) T and C

14. The region on pBR 322 that codes for proteins involved in replication of the plasmid is :

1) Ori 2) Sal I

3) Hind III 4) rop

15. Bacteria protect their own genome from restriction enzymes with the help of :

1) Methylase

2) Restriction endonuclease

3) Ligase

4) Polymerase

16. Restriction enzymes belongs to a larger class of enzyme called :

1) Nucleases 2) Isomerase

3) Ligase 4) Lipase

17. The mechanism which has the ability to change in the genotype of organism is known as

1) Totipotency

2) Down stream process

3) Genetic engineering

4) Splicing

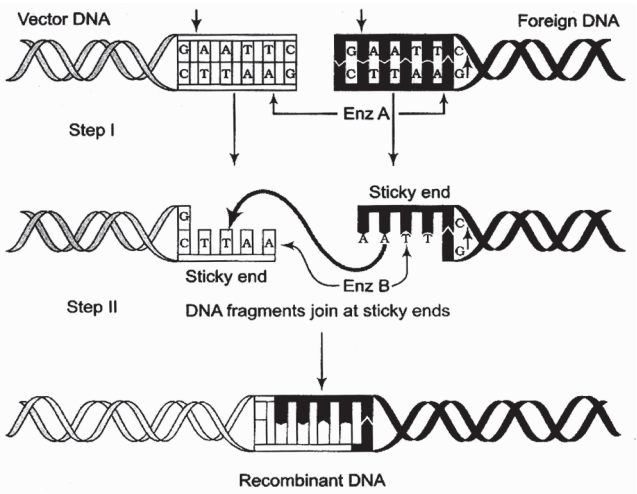
18. Which one of the following is a restriction enzyme ?

1) Bam HI
2) EcoRI
3) Sal I
4) All of these

19. Restriction endonuclease is produced by

1) Virus
2) Bacteria
3) Plants and animals
4) Fungus

20. Study the given diagram and identify the enzymes A and B involves in steps I and II.



	Step I	Step II
1)	Eco RI	DNA ligase
2)	Alu I	DNA ligase
3)	Hind II	DNA polymerase
4)	Restriction endonucleas	DNA polymerase

21. Stickiness of the sticky ends of the DNA is due to the

1) Action of DNA ligase and these ends joined together vertically
2) Action of DNA ligase and these ends joined together end-to-end
3) Action of Taq polymerase
4) Action of restriction enzyme

22. If a plasmid vector is digested with EcoRI at a single site, then

1) One sticky end will be produced
2) Two sticky ends will be produced
3) Four sticky ends will be produced
4) Six sticky ends will be produced

23. In recombinant DNA technology, a plasmid vector is cleaved by

1) DNA ligase
2) DNA polymerase
3) The same enzyme that cleaves the donor DNA
4) The different enzyme that cleaves the donor DNA

24. There are three basic steps in genetically modifying an organism. Arrange these steps in correct sequence.

a) Introduction of the identified DNA in to the host.

b) Maintenance of introduced DNA in the host and transfer of the DNA to its progeny.

c) Identification of DNA with desirable genes.

1) a → b → c
2) b → c → a
3) c → b → a
4) c → a → b

25. First recombinant DNA was constructed in the year

1) 1963 2) 1974

3) 1981 4) 1972

26. The enzyme which catalyses the removal of nucleotides from the ends of DNA is

1) Endonuclease

2) Exonuclease

3) DNA ligase

4) DNA polymerases

27. What is responsible for controlling the copy number of the linked DNA in a plasmid ?

1) Cloning sites

2) Origin of replication

3) Restriction endonuclease

4) Gene of interest

ASSERTION-REASON TYPE QUESTIONS

1) If both assertion and reason are true and reason is correct explanation of assertion.

2) If both assertion and reason are true and reason is not a correct explanation of assertion.

3) If assertion is true but reason is false.

4) If both assertion and reason are false.

28. **Assertion :** Restriction endonucleases are called molecular scissors.

Reason : When fragments cut by restriction endonucleases are mixed along with DNA ligase, they join together due to their sticky ends.

29. **Assertion :** In recombinant DNA technology, human genes are often transferred into bacteria and yeast.

Reason : Both bacteria and yeast multiply very fast and form multiple copies of gene of interest.

30. Read the following statements and choose the appropriate option.

Statement I : The first restriction endonuclease to be isolated was Hind-II.

Statement II : Hind-II always cut DNA molecules at a particular point by recognising a specific sequence of six base pairs.

1) Both statement I and II are correct

2) Statement I is false and statement II is true

3) Statement I is true and statement II is false

4) Both statement I and II are false.

31. In the E.coli cloning vector pBR322, the number of selectable marker is

1) 4 2) 1

3) 2 4) 3

ISOLATION AND SEPARATION OF FOREIGN GENE

32. Southern blotting is related to

1) DNA isolation

2) RNA isolation

3) mRNA isolation

4) Protein isolation

33. In DNA isolation chilled ethanol is used for

1) the removal of RNA

2) the removal of proteins

3) the precipitation of purified DNA

4) the precipitation of polysaccharides and lipids

34. After gel electrophoresis where would you find the smallest fragments of DNA

1) Near the positive electrode farthest away from the wells

2) Near the top, near the negative electrode

3) Near the negative electrode close to the wells

4) Near the middle

35. In gel electrophorosis which of the following is used a matrix?

1) Silica 2) Paper

3) Glass 4) Agarose

36. A direct procedure to amplify a gene without a vector is

1) PCR

2) Gel electrophorosis

3) Invivo gene cloning

4) Insertional inactivation

37. Precipitated DNA is taken out from the test tube by a process called

1) Spooling

2) Elution

3) Electrophoresis

4) Downstream processing

38. DNA is loaded in the well near the _____ electrode of the Gel.

1) Positive

2) Negative

3) Either positive or negative

4) Neither of them

39. For precipitating DNA which chemical is used :

1) Chilled Ethanol

2) Ethidium Bromide

3) Bromophenol blue

4) Cellulase and lysozyme

40. Agarose used in Gel electrophoresis is obtained from :

1) Virus

2) Fungus

3) Sea weeds

4) Bacteria

41. In gel electrophoresis, the separated bands of DNA are cut out and extracted from the gel piece. This step is called:

1) Elution 2) Spooling

3) Annealing 4) Denaturation

42. DNA fragments can be separated by a technique known as:

1) Transformation

2) Transcription

3) Gel electrophoresis

4) Cloning

43. Which of the following is not correctly matched for the organism and its cell wall degrading enzyme?

1) Plant cells - Cellulase

2) Algae - Methylase

3) Fungi - Chitinase

4) Bacteria - Lysozyme

44. Longest fragments of DNA can be seen towards :

1) positive electrode

2) Any where in gel

3) Negative electrode

4) Middle

45. In gel electrophoresis, the separated DNA fragments are visualised after staining the DNA with _A_ followed by exposure to _B_. Here A and B refers to

	A	B
1)	B-galactosidase	Infrared radiation
2)	Ethidium bromide	UV radiation
3)	Ethidium nitrate	γ-rays
4)	Ethidium chloride	Radio wave

46. After electrophoresis, the separated DNA fragments can be visualized in ethidium bromide gel exposed to UV light. These DNA fragments appears as :

1) Orange bands

2) Blue bands

3) Silver bands

4) Green bands

47. Which of the given statements is correct in the context of observing DNA separated by agarose gel electrophoresis?

1) DNA can be seen in visible light

2) DNA can be seen without staining in visible light

3) Ethidium bromide stained DNA can be seen in visible light

4) Ethidium bromide stained DNA can be seen under exposure to UV light

48. In the isolation of DNA, removal of protein and RNA is carried out by enzymes _____ and _____ respectively :

1) Lysozyme, Ribonuclease

2) Protease, Cellulase

3) Protease, Ribonuclease

4) Ribonuclease, Chitinase

49. Consider the assertion and reason given below.

Assertion : Agarose gel electrophoresis, is used for the separation of DNA fragments, larger fragments move faster through the gel matrix.

Reason : Larger fragments, being more negatively charged, have more attraction towards the anode end in the gel matrix and move faster.

Choose the correct option.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

50. How many fragments will be generated on the digestion of a closed circular DNA molecule with a restriction enzyme having six recognition sites on the DNA?

1) 5 2) 7

3) 6 4) 9

51. While isolating DNA from bacteria, which of the following enzymes is not used ?

1) Lysozyme

2) Ribonuclease

3) Deoxyribonuclease

4) Protease

52. The procedure in which DNA fragments are separated by gel electrophoresis and then transferred on to a filter for radioactive probing is known as :

1) Gene mapping

2) Gene cloning

3) Polymerase chain reaction

4) Southern blotting

AMPLIFICATION AND INSERTION OF FOREIGN GENE

53. Which of the following steps are catalysed by Taq polymerase in PCR

1) Denaturation of template DNA

2) Annealing of primer to template DNA

3) Synthesis of primer from template DNA

4) Extension of primer end on the template DNA

54. If the gene of interest is inserted at Bam HI site in pBR 322 the recombinant bacteria will die on a medium containing antibiotics like

1) Kanamycin

2) Neomycin

3) Tetracycline

4) Ampicillin

55. The correct sequence of different steps of polymerase chain reaction is

1) Annealing → Denauration → Extension

2) Extension → Denaturation → Annealing

3) Denaturation → Extension → Annealing

4) Denaturation → Annealing → Extension

56. What will be the effect if pBR322, a cloning vector, does not carry 'Ori' site

1) sticky ends will not produce

2) Transformation will not take place

3) The cell will transform into a tumour cell

4) Replication will not take place

57. Denaturation takesplace with the help of the :

1) Joining of primers

2) Increase in temperature

3) Addition of dNTPs

4) Decrease in temperature

58. Crown gall tumour is caused by

1) Azotobacter

2) Pseudomonas

3) Clostridium

4) Agrobacterium

59. What are the absolute requirement of PCR :

1) Taq polymerase, primer, RNA and dNTPs

2) Taq polymerase, DNTPs, Primers and Template DNA

3) Restriction enzymes, primers and DNA

4) Exonulceases, RENs, dNTPs

60. Biolistics (Gene gun) is suitable for

1) Transformation of animal cells

2) Transformation of plant cells

3) Construction of recombinant DNA by joining with vectors

4) DNA finger printing

61. In biolistics, microparticles coated with DNA is bombarded in to target cell. This microparticles are made upof

1) DNA and RNA

2) Gold and ethidium bromide

3) Gold or tungsten

4) Ca^{2+} and polyethylene

62. Significance of heat shock method in bacterial transformation is

1) Binding of DNA to the cell wall

2) The expression of gene of interest

3) Uptake of DNA through transient pores in the bacterial cell wall

4) Expression of antibiotic resistant gene

63. I. _A_ is the ability of a cell to take up foreign DNA

II. The cell is treated with specific concentration of a divalent cation such as _B_ to increase pore size in cell wall

III. In __C__ method, recombinant DNA is directly injected into the nucleus of an animal cell. The most appropriate option regarding A, B and C is

1) A - competency, B - calcium, C-gene gun

2) A - transformation, B - sodium, C - microinjection

3) A - competency, B-calcium, C-microinjection

4) A - transformation, B-sodium, C-gene gun

64. Which of the following statement is not true?

I. DNA being a hydrophilic molecule cannot pass through cell membranes.

II. *Agrobacterium tumefaciens* delivers a piece of DNA known as 'Z-DNA' which transforms normal plant cells into tumour cells and produce chemical against pathogens.

III. Retrovirus, now used as vectors in animals because of their ability to transform normal cells into cancerous cell.

IV. In genetic engineering, DNA from different sources are cut with the same restriction enzymes so that both DNA fragments have same kind of ends.

1) Only I

2) Only II

3) Only III

4) Only IV

65. Chemically synthesised oligonucleotides used in PCR is called as

1) Probes

2) Primers

3) Template DNA

4) Polymerase

66. Indirect gene transfer is done with the help of

1) Cloning vector

2) Microinjection

3) Expression vector

4) Biolistics

67. An antibiotic resistance gene in a vector usually help in the selection of

1) Recombinant cells

2) Non-transformed cells

3) Competent cells

4) Non-recombinant cells

68. Which is correctly matched?

1) *Agrobacterium tumefaciens* - Tumour

2) *Thermus aquaticus* - Bt gene

3) Ligase - Molecular scissors

4) Hind II - Plasmid

69. Match the terms given in column 1 with their definitions in column II and select the correct answer from codes given below.

Column I		Column II	
A.	Transformation	i.	Sequences cut by restriction enzymes
B.	Recognition site	ii.	Process by which DNA fragments are separated based on their size
C.	Gel electrophoresis	iii.	DNA that has incorporated with foreign DNA
D.	Recombinant DNA	iv.	Process by which bacteria take up foreign DNA

1) A-iii, B-i, C-ii, D-iv

2) A-iv, B- i, C- ii, D- iii

3) A-i, B-ii, C-iii, D-iv

4) A-ii, B-iii, C-iv, D-i

70. The method of selection of transformed cells on the basis of their ability to produce color in the presence of a chromogenic substrate is due to :

1) PCR

2) Autoradiography

3) ELISA

4) Insertional inactivation

71. Chemicals commonly used for making cell competent

1) Ca^{2+}

2) Ethidium bromide

3) Chilled ethanol

4) Agarose

72. Micro-injection is a method used to

1) Produce sticky ends of DNA

2) Provide protection against pathogen

3) Purify DNA

4) Inject recombinant DNA into the nucleus of an animal cell

73. Lac z gene codes for :

1) β-galactoside

2) β-galactosidase

3) Ethidium bromide

4) Ampicillin

ASSERTION-REASON TYPE QUESTIONS

1) If both assertion and reason are true and reason is correct explanation of assertion.

2) If both assertion and reason are true and reason is not a correct explanation of assertion.

3) If assertion is true but reason is false.

4) If both assertion and reason are false.

74. **Assertion :** *Agrobacterium tumifaciens* is popular in genetic engineering because this bacterium can infect Dicot plants.

Reason : A gene incorporated in the bacterial chromosomal genome gets automatically transferred to the crop with which the bacterium is associated.

75. **Assertion :** In P^{UC} 8, Lac z gene is used as a selectable marker.

Reason : Lac z gene codes for β-galactosidase, which can produce a colour if a chromogenic substrate is used.

OBTAINING FOREIGN GENE PRODUCT

76. Isolation and purification of recombinant protein is called :

1) Upstream processing

2) Downstream processing

3) Electrophoresis

4) PCR

77. Which of the following statements are correct with respect to a bioreactor?

I. It can process small volume of culture

II. It provides optimum temperature, pH, salt, vitamins and oxygen

III. Sparged stirred-tank bioreactor is a stirred type reactor in which air is bubbled

Choose the correct option

1) I and II

2) I and III

3) II and III

4) I, II and III

78. After the biosynthetic phase, the product is separated and purified by the process called

1) Agarose gel electrophoresis

2) PCR

3) Downstream processing

4) Insertional inactivation

79. Which of the following should be chosen for best yield if one were to produce a recombinant protein in large amounts?

1) A stirred-tank bioreactor without in-lets and out-lets

2) Laboratory flask of largest capacity

3) A continuous culture system

4) None of these

80. Stirred tank bioreactors have been specially designed for

1) Availability of oxygen to the cells

2) Ensuring anaerobic conditions

3) Culturing cells to produce a product

4) Addition of preservatives to the product

81. A bioreactor refers to :

1) distillation tank

2) tank for biochemical reactions

3) organisms reacting to a stimulus

4) nuclear reactor for biological studies

82. Production of a recombinant product involves :

1) Biosynthesis

2) Downstream processing

3) Making the product into a suitable formulation

4) All the above

83. Optimal conditions for growth of GMO in a bioreactor include how many of the following?

(pH, Salt, Temperature, Vitamin, Oxygen)

1) 3

2) 2

3) 5

4) 4

84. Find out the mismatched pair :

1) Downstream process - purification of desired product

2) Expression vectors - Vehicles for gene transfer

3) Plasmid - Found in all eukaryotes

4) Restriction enzymes - Recognizes palindromes

85. Curved base of a stirred tank bioreactor facilitates :

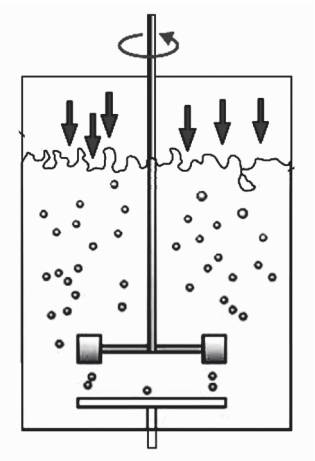
1) to cool the contents

2) to increase air bubbles

3) to store the products

4) mixing of the reactor contents

86. Identify the correct match for the given apparatus :



	Apparatus	Functions
1)	Gene gun	Vectorless direct gene transfer
2)	Column chromatograph	Separation of chlorophyll pigments
3)	Sparged tank bioreactor	Carry out fermentation process
4)	Respirometer	Finding out rate of respiration

87. Which of the following is true for downstream processing?

1) The product is formulated with suitable preservatives

2) The formulations undergo clinical trial in case of drugs

3) Strict quality control testing for each product is done

4) All of the above

88. Which of the following statements are correct with respect to a bioreactor?

I) It can process large volumes of culture.

II) It provides optimum temperature and pH

III) It has an oxygen delivery system

1) I and III 2) I, II and III

3) I only 4) II and III

89. Consider the following statements.

I. Bioreactor provides optimum temperature, but does not provide pH , salt, vitamins and oxygen.

II. Sparged stirred tank bioreactor is a stirred type reactor in which air is bubbled.

Choose the correct option.

1) Statement I is true, but II is false

2) Statement I is false, but II is true

3) Both statements I and II are true

4) Both statements I and II are false

90. Consider the following statements.

I. The downstream processing and quality control testing vary from product to product.

II. In bioreactors raw materials are biologically converted to specific products.

Choose the correct option.

1) Statement I is true, but II is false

2) Statement I is false, but II is true

3) Both statements I and II are true

4) Both statements I and II are false

91. The device in which substances are treated to stimulate biochemical reaction inside living cell :

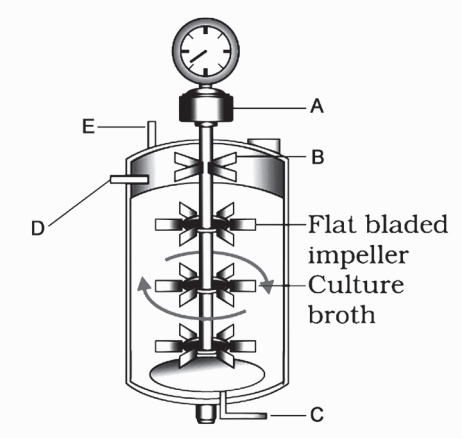
1) PCR

2) Electrophoresis device

3) Bioreactor

4) Biochips

92. Simple stirred-tank bioreactor given below. Identify the parts labelled as A, B, C, D and E.



	A	B	C	D	E
1)	Motor	Foam breaker	Sterile air	Steam for sterilisation	Acid or base for pH control
2)	Foam breaker	Sterile air	Steam for sterilisation	Acid or base for pH control	Motor
3)	Acid or base for pH control	Motor	Foam breaker	Sterile air	Steam for sterilisation
4)	Sterile air	Steam for sterilisation	Foam breaker	Motor	Acid or base for pH control

93. Consider the following statements.

I) Bioreactors are vessels of large volumes in which raw materials are biologically converted into specific products.

II) One of the most commonly used bioreactor is of stirring type.

III) Shake flasks are used for growing and mixing the desired materials on a small scale in the laboratory.

IV) A large scale production of desired biotechnological product is done by using bioreactors.

Which of the statements given above are correct?

1) I and II 2) I and III

3) I, II and III 4) I, II, III and IV

94. Which is correct regarding genetically engineered insulin using *E.coli* in a bioreactor ?

1) Difficulty in purifying the product

2) Obtained in large unlimited quantities

3) Possibility of transmission of animal diseases

4) Insulin obtained varies in chemical structure

95. Bioreactors are useful in :

1) Separation and purification of a product

2) Microinjection

3) Processing of large volume of culture

4) Isolation of genetic material

96. A typical bioreactor has :

a) An agitator system

b) An oxygen delivery system

c) A foam control system

d) A temperature control system

e) A pH control system

f) Sampling ports

1) a, b and c

2) a, b, c and d

3) a, b, d and e

4) a, b, c, d, e and f

97. After introducing desired genes, microbes are grown in large tanks called :

1) Fermentors

2) Culture vessel

3) Bioreactors

4) All of these

98. For large scale production of recombinant product the most commonly used bioreactors are of :

1) Sparged type

2) Stirring type

3) Both 1 and 2

4) None of these

99. Function of air bubbles in sparged stirred-tank bioreactor :

1) Increases oxygen transfer area

2) Sterilization

3) Increases product quality

4) Decreases medium temperature

100. Which of the following is not a component of downstream processing?

1) Separation

2) Purification

3) Preservation

4) Transformation

SAMPLE QUESTIONS

1. Which of the following can't be related to biotechnology ?

1) Integration of natural science and organisms

2) Techniques to alter the chemistry of DNA

3) Introducing undesirable genes into the target organism

4) Maintenance of sterile ambience to enable growth of only the desired microbes

2. Autonously replicating circular extra chromosomal DNA of prokaryotic cell is called:

1) Satellite DNA

2) Plasmid

3) Recombinant DNA

4) Nucleoids

3. The cornerstone of recombinant DNA technology is a class of enzymes called

1) Reverse transcriptase

2) Restriction endonuclease

3) DNA ligase

4) Lyases

4. Plasmid (pBR322) are used in genetic engineering because they are

1) Easily available

2) Able to replicate

3) Able to integrate with host chromosome

4) Inert in nature

5. Which of the following is not used in genetic engineering

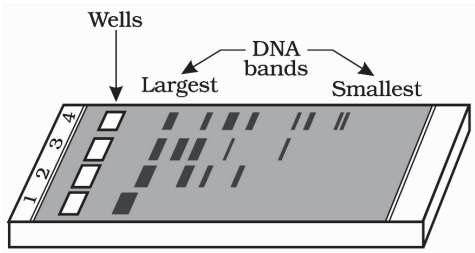
1) Restriction endonuclease

2) DNA ligase

3) Reverse transcriptase

4) RNA polymerase

6. The technique shown in the figure



1) Electrophoresis

2) Electroporation

3) Chromatography

4) PCR

7. Who is regarded as Father of Genetic Engineering ?

1) Paul Berg

2) Cohen and Boyer

3) Beadle and Tatum

4) Jacob and Monod

8. Which of the following is the most important discovery that lead to the development of rDNA technology

1) Discovery of double helix model of DNA

2) Discovery of DNA as the genetic material

3) Discovery of restriction endonucleases

4) Discovery of DNA polymerase

9. Chemical scalpels used in genetic engineering are

1) DNA ligase

2) DNA polymerase

3) Restriction endonucleases

4) RNA polymerase

10. Palindromic sequences are recognised by

1) DNA ligase

2) DNA polymerase

3) Restriction endonuclease

4) RNA polymerase

11. Which of the following is a restriction endonuclease

1) pUC 8 2) pBR 322

3) pSC 101 4) Hind II

12. Which of the following tools of genetic engineering is incorrectly matched

	(a)	(b)
1)	Restriction endonuclease	cuts DNA
2)	DNA ligase	joins DNA
3)	DNA polymerase	replicates DNA
4)	Reverse transcriptase	makes RNA from DNA

13. The plasmid used by Cohen and Boyer was

1) pUC 8 2) pBR 322

3) pSC 101 4) E.coli plasmid

14. Which of the following cloning vectors were created for the Human Genome Project

1) BAC 2) YAC

3) Ti plasmid 4) Both 1 and 2

15. Which of the following is correctly matched

	(a)	(b)
1)	*Thermus aquaticus*	cry gene
2)	Hind II	plasmid
3)	pBR322	enzyme
4)	*Agrobacterium tumefaciens*	Ti plasmid

16. Bolivar and Rodriguez developed

1) pUC 8 2) pBR 322

3) BAC 4) YAC

17. Match items in column I with those of column II

Column I		Column II	
A)	Paul Berg	1.	Discovered restriction endonucleases
B)	Karry Mullis	2.	Invented recombinant DNA technology
C)	Cohen and Boyer	3.	Father of genetic engineering
D)	Nathan, Arber and Smith	4.	Invented PCR

1) A-1, B-2, C-3, D-4

2) A-3, B-4, C-2, D-1

3) A-2, B-3, C-1, D-4

4) A-4, B-3, C-2, D-1

18. Which of the following is also called RNA dependant DNA polymerase

1) Reverse transcriptase

2) DNA polymerase

3) Restriction endonuclease

4) DNA ligase

19. In Recombinant DNA technology Expression vectors are usually :

1) Ti plasmids

2) Viruses

3) Bacteria

4) Both 1 and 2

20. The markers present in pBR322 are

1) Kanamycin resistance gene

2) Tetracycline resistance gene

3) Ampicillin resistance gene

4) Both 2 and 3

21. Which of the following is a cloning vector ?

1) DNA of lambda phage

2) DNA of M-13 phage

3) DNA of Murine leukemia virus

4) pBR322

22. DNA is a

1) Hydrophilic molecule

2) Hydrophobic molecule

3) Lipolytic molecule

4) Proteolytic molecule

23. pBR322 is resistant to

1) Ampicillin

2) Chloramphenicol

3) Tetracyclin

4) Both 1 and 3

24. Plasmids are naturally occuring :

1) Linear single stranded DNA

2) DNA

3) Linear duplex DNA

4) Circular duplex DNA

25. Restriction enzymes belongs to a larger class of enzyme called :

1) Polymerases 2) Ligases

3) Lyases 4) Nucleases

26. Given below are two statements :

Statement I : The DNA fragments extracted from gel electrophoresis can be used in construction of recombinanat DNA.

Statement II : Smaller size DNA fragments are observed near anode while larger fragments are found near the wells in an agarose gel.

In the light of the above statements, choose the most appropriate answer from the options given below :

1) Statement I is incorrect but statement II is correct

2) Both statement I and statement II are correct

3) Both statement I and statement II are incorrect

4) Statement I is correct but statement II is incorrect

27. Bacterial DNA is not cleaved by their own restriction endonucleases because bacteria add _____ to their own DNA

1) Nucleotides

2) Peptides

3) Methyl groups

4) Nitrogen bases

28. The blue and white selectable markers have been developed which differentiate recombinant colonies from non-recombinanat colonies in the presence of a chromogenic substrate.

Given below are two statements about this method :

Statement I : The blue coloured colonies have DNA insert in the plasmid and they are identified as recombinant colonies.

Statement II : The colonies without blue colour have DNA insert in the plasmid and are identified as recombinant colonies.

In the light of the above statements, choose the most appropriate answer from the options given below :

1) Statement I is incorrect but statement II is correct

2) Both statement I and statement II are correct

3) Both statement I and statement II are incorrect

4) Statement I is correct but statement II is incorrect

29. Which of the following is known as joining enzyme of DNA ?

1) Ligase

2) Transcriptase

3) Polymerase

4) Kinase

30. The method elution is related to

1) cloning

2) RAPD

3) electrophoresis

4) gene gun

31. Isolation of the genetic material (DNA) can be achieved by treating the bacterial cells / plant / fungal tissue with enzymes respectively as

1) Chitinase, cellulase, pectinase

2) Chitinase, Pectinase, cellulase

3) Lysozyme, cellulase, chitinase

4) Lysozyme, chitinase, cellulase

32. Which of the following enzyme(s) are not essential for gene cloning ?

A. Restriction enzymes

B. DNA ligase

C. DNA mutase

D. DNA recombinase

E. DNA polymerase

Choose the correct answer from the options given below :

1) B and C only

2) C and D only

3) A and B only

4) D and E only

33. The restriction enzyme responsible for the cleavage of following sequence is

$^{5'}G$ - A - A - T - T - $C^{3'}$

$^{3'}C$ - T - T - A - A - $G^{5'}$

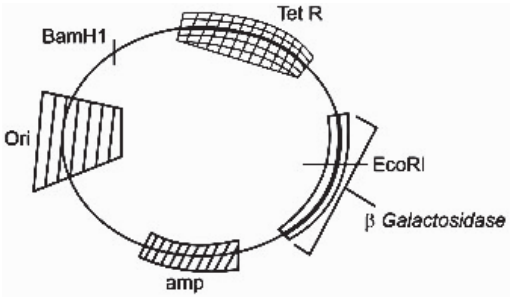
1) Hind II

2) EcoR I

3) Bam H I

4) ECO R II

34.



In the above represented plasmid an alien piece of DNA is inserted at EcoRI site. Which of the following strategies will be chosen to select the recombinant colonies ?

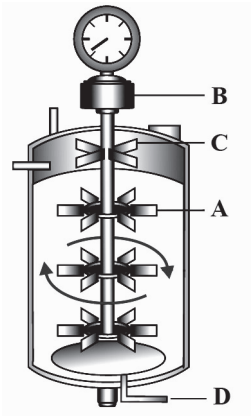
1) Blue color colonies grown on ampicillin plates can be selected

2) Using ampicillin and tetracyclin containing medium plate

3) Blue color colonies will be selected

4) White color colonies will be selected

35. Identify the part of a bio-reactor which is used as a foam braker from the given figure.



1) C

2) A

3) B

4) D

36. In which of the following method the recombinant DNA is directly injected in to the nucleus of an animal cell

1) DNA hybridisation

2) Biolistic method

3) Gene gun method

4) Micro injection

37. After gel electrophoresis where would you find the largest fragments of DNA

1) Near the positive electrode farthest away from the wells

2) Near the top, away from the negative electrode

3) Near the negative electrode close to the wells

4) Near the middle

38. After completion of a biosynthetic stage in the bioreactor, the product undergoes separation and purification processes. Which are collectively termed as

1) Upstream processing

2) Downstream processing

3) Transformation

4) Electrophoresis

39. Polymerase chain reaction (PCR) amplifies DNA following the equation

1) $2N^2$ 2) N^2

3) 2^n 4) $2n + 1$

40. The function of stirrer in a bioreactor is

1) Facilitates even mixing and oxygen availability

2) Controls foam formation

3) Controls temperature

4) Maintains constant temperature and pH

41. The procedure through which a piece of DNA is introduced in a host bacterium is called :

1) Translation

2) Transcription

3) Transformation

4) Translocation

42. Ethidium bromide stained gel exposed to UV light gives :

1) Bright orange coloured bands

2) Bright red coloured bands

3) Light orange coloured bands

4) Dark blue coloured bands

43. The stickiness of the cutting ends of DNA facilitates the action of the enzyme

1) RNA ligase

2) DNA ligase

3) DNA polymerase

4) Protease

44. Herbert Boyer and Stanley Cohen genetically modified which bacterium :

1) E.coli

2) Salmonella

3) Agrobacterium

4) Bacillus

45. Match the following

Column I		Column II	
a.	Restriction enzymes	1.	PCR
b.	Ligase	2.	Fungal enzyme
c.	Chitinase	3.	Molecular gum
d.	Gene amplification	4.	Molecular scissors

1) a–3, b–2, c–1, d–4

2) a–1, b–2, c–3, d–4

3) a–4, b–3, c–2, d–1

4) a–2, b–3, c–1, d–4

ANSWER KEY

1.	2	21.	2	41.	1	61.	3	81.	2
2.	4	22.	2	42.	3	62.	3	82.	4
3.	2	23.	3	43.	2	63.	3	83.	3
4.	3	24.	4	44.	3	64.	2	84.	3
5.	4	25.	4	45.	2	65.	2	85.	4
6.	2	26.	2	46.	1	66.	3	86.	3
7.	4	27.	2	47.	4	67.	1	87.	4
8.	3	28.	2	48.	3	68.	1	88.	2
9.	4	29.	1	49.	4	69.	2	89.	2
10.	4	30.	1	50.	3	70.	4	90.	3
11.	4	31.	3	51.	3	71.	1	91.	3
12.	3	32.	1	52.	4	72.	4	92.	1
13.	3	33.	3	53.	4	73.	2	93.	4
14.	4	34.	1	54.	3	74.	3	94.	2
15.	1	35.	4	55.	4	75.	1	95.	3
16.	1	36.	1	56.	4	76.	2	96.	4
17.	3	37.	1	57.	2	77.	3	97.	4
18.	4	38.	2	58.	4	78.	3	98.	2
19.	2	39.	1	59.	2	79.	3	99.	1
20.	1	40.	3	60.	2	80.	1	100.	4

SAMPLE QUESTIONS

1.	3	10.	3	19.	4	28.	1	37.	3
2.	2	11.	4	20.	4	29.	1	38.	2
3.	2	12.	4	21.	4	30.	3	39.	3
4.	2	13.	3	22.	1	31.	3	40.	1
5.	4	14.	4	23.	4	32.	2	41.	3
6.	1	15.	4	24.	4	33.	2	42.	1
7.	1	16.	2	25.	4	34.	4	43.	2
8.	3	17.	2	26.	2	35.	1	44.	1
9.	3	18.	1	27.	3	36.	4	45.	3

WORK BOOK

Chapter 12

BIOTECHNOLOGY AND ITS APPLICATIONS

BIOTECHNOLOGICAL APPLICATION IN AGRICULTURE

1. The application of biotechnology includes :

1) Production of biopharmaceuticals

2) Diagnostics

3) Genetically modified crop for agriculture

4) All of these

2. The critical research areas of biotechnology are

1) Provide best catalyst as microbe or pure enzyme

2) Creation of optimal condition for a catalyst to act

3) Down stream processing for the purification of recombinant product

4) All of the above

3. Which among the following is a GMO :

1) Bt-cotton

2) Flavr Savr Tomato

3) Nematode resistant tobacco

4) All of these

4. Which of the following is not an advantage of GM crops?

1) Reduced dependence on pesticides

2) Early exhaustion of soil fertility

3) Enhanced nutritional value

4) Reduction in post harvest loss

5. Identify the correct statements regarding golden rice.

1) It is a genetically modified rice

2) It has precursors of vitamin A

3) It has enhanced nutritional value

4) All of the above

6. Which one of the following is not related to green revolution, the great increase in production of food grains is due to :

1) Introduction of high yielding varieties

2) Use of Agrochemicals

3) Use of genetically modified crops

4) Better management practices

7. The capacity to generate a whole plant from any cell / explant is called

1) Tissue culture

2) Totipotency

3) Micro-propagation

4) RNA integration

8. Cloning of Bt toxin genes results in the formation of insecticidal plant. Which among the following are cultivated in India in large scale.

1) Cotton and corn

2) Rice and potato

3) Tomato and soybean

4) Bt cotton only

9. Study the following statements regarding Bt toxins produced by bacterium *Bacillus thuringiensis* and select the correct option.

1) Toxin proteins do not kill the bacteria themselves because the toxic proteins occur in an inactive form called protoxins

2) When an insect ingests the inactive Bt toxin, it is converted to an active form of toxin due to alkaline pH of the gut which solubilizes the protein toxin

3) cry gene codes for crystalline endotoxins

4) all of the above

10. The condition which convert inactive form of Bt toxin to the active form in the insect body

1) Temperature of the gut

2) Acidic pH of the gut

3) Alkaline pH of the gut

4) Enzymes present in the saliva

11. Bt toxin genes producing toxins can target which of the following pests

(i) Lepidopterans and fungi

(ii) animals and bacteria

(iii) bacteria and fungi

(iv) Coleopterans and Dipterans

(v) Lepidopterans

1) (ii) and (iii)

2) (i), (ii) and (iv)

3) (iii) and (v)

4) (iv) and (v)

12. Bt toxins produced by cry 1 Ac and cry 1Ab specifically targets the organism respectively :

1) bollworms

2) cornborers

3) bollworms and cornborers

4) cornborers and bollworms

13. Which of the following is the reason that the Bt toxin doesn't kill the bacteria itself ?

1) bacteria are resistant to the toxin

2) toxins occur as inactive protoxins in bacteria

3) temperature of the bacterium

4) all of these.

14. The mode of action of Bt toxin can be best described as

1) inhibiting protein synthesis

2) generating excessive heat

3) creating pores in the midgut epithelial cells, leading to cell swelling and lysis

4) obstructing a biosynthetic pathway.

15. Match the following correctly.

	Column I		Column II
A.	*Bacillus thuringiensis*	1.	Lepidopterans
B.	Tobacco bud worm	2.	CryIAb
C.	Cotton bollworm	3.	Bt gene
D.	Corn borer	4.	Coleopterans
E.	Beetles	5.	CryIAc and CryIIAb

1) A - 4; B - 1; C - 2; D - 5; E - 3

2) A - 3; B - 1; C - 5; D - 2; E - 4

3) A - 3; B - 1; C - 5; D - 4; E - 2

4) A - 1; B - 2; C - 5; D - 4; E - 3

16. Read the following statements and choose the correct option given below.

A) Bt toxin protein is an intracellular crystaline protein that exist as protoxin

B) Protoxin is converted into active form in alkaline pH of the midgut of insects

C) For the production of Bt plants selection of gene is depends on crop and targeted pests.

D) The process of RNA interference was used to make tobacco plant resistant to *Meloidegyne incognitia*.

1) A and B only

2) A, B and D only

3) A, C and D only

4) A, B, C and D are correct

17. Find the incorrect matching.

1) Micropropagation - Producing large number of plants

2) Somaclones - Genetically identical to original plant

3) Somatic hybrid - Fusion of isolated protoplast from two different variety plant.

4) Glucose - Carbon source of nutrient medium in tissue culture

18. Toxins produced by *Bacillus thuringiensis* can kill coleopterans such as :

1) Tobacco budworm

2) Army worm

3) Both 1 and 2

4) Beetles

19. **Statement I :** Crystal proteins from *Bacillus thuringiensis* are employed against pest.

Statement II : These crystals enter the body of insect when it ingest.

1) Both statements I and II are correct.

2) Statement I is correct but statement II is incorrect

3) Statement I is incorrect but statement II is correct.

4) Both statements I and II are incorrect.

20. Bt toxin gene has been cloned from the bacteria and expressed in plants to provide resistance to insects without the need for insecticides. Examples of such plants are

1) Cotton and Corn

2) Rice and Potato

3) Tomato and Soybean

4) All of these

21. What is the biomolecular nature of Bt toxins

1) Intracellular lipids

2) Intracellular crystalline proteins

3) Extracellular crystalline proteins

4) Intracellular polysaccharides

22. **Assertion :** Insect resistant Bt cotton has been produced by inserting Bt gene

Reason : The Bt gene is derived from a bacterium

1) If both assertion and reason are true and reason is the correct explanation of assertion.

2) If both assertion and reason are true but reason is not a correct explanation of assertion.

3) If assertion is true but reason is false

4) If both assertion and reason are false

23. Which of the following is the nematode which was silenced by the RNA interference?

1) *Agrobacterium tumefaciens*

2) *Rhizobium leguminosarum*

3) *Meloidegyne incognitia*

4) *E.coli*

24. Identify the incorrect statements regarding the process of RNAi

(i) This is used as a cellular defense

(ii) It takes place in some eukaryotic and all prokaryotic organisms.

(iii) The method involves silencing of a specific mRNA due to a complementary dsDNA molecule.

(iv) It is a novel strategy to produce disease resistant cotton plants.

1) (iii) and (iv)

2) (i) and (iii)

3) (i) and (ii)

4) (ii), (iii) and (iv)

25. Vector used to transfer nematode specific gene in to tobacco plants for inducing RNAi is :

1) Retrovirus

2) *Agrobacterium tumefaciens*

3) pBR 322

4) $P^{UC}8$

26. Fire and Mello were awarded Nobel prize in 2006 for the discovery of :

1) RNAi

2) Gelelectrophoresis

3) SCID

4) PCR

27. What is correct about RNA interference ?

1) Cellular defence in all prokaryotic and eukaryotic organisms

2) It is the silencing of specific mRNA due to complementary dsRNA

3) It prevent translation of mRNA of Nematode

4) Both 2 and 3 are correct

28. Mobile genetic elements are

1) Primers 2) Markers

3) Transposons 4) Vectors

29. Tobacco plant resistant to a nematode, will produce

1) Sense strand only

2) Anti-sense strand only

3) A Prohormone

4) Both sense and antisense RNA

30. Silencing of a gene could be achieved through the use of :

1) Antisense RNA

2) Short interfering RNA

3) ds RNA

4) All of these

31. An example of cellular defense method?

1) Genetic engineering

2) Production of Humulin

3) Gene therapy

4) RNA interference

32. Select a statement which is not correct in relation to transgenic tobacco :

1) RNAi takes place in all eukaryotic organisms as a part of their cellular defense.

2) In this method RNA inference strategy is used

3) The nematode parasite could not survive in a transgenic host

4) mRNA silencing occurs in transcriptional level

33. Silencing of specific mRNA in RNAi is due to :

1) Complimentary dsDNA

2) Complimentary dsRNA

3) Complimentary rRNA

4) Complimentary protein

34. Transposons can be used during which one of the following ?

1) Gene silencing

2) Autoradiography

3) Gene sequencing

4) Polymerase Chain Reaction

35. Which part of the tobacco plant is infected by *Meloidegyne incognitia* ?

1) Flower

2) Leaf

3) Stem

4) Root

36. Which of the following is commonly used in transfer of foreign DNA into crop plants

1) *Meloidegyne incognitia*

2) *Agrobacterium tumefaciens*

3) *Penicillium notatum*

4) *Trichoderma harzianum*

37. Study the following statements regarding RNA interference and select the correct statement.

1) RNAi which is employed in making tobacco resistant to *meloidegyne*, is essentially the prevention of translation of mRNA.

2) A Nematode specific gene is introduced into the host plant by using *Agrobacterium* vector.

3) The nematode specific DNA introduced into host plant produce both sense and antisense RNA

4) All of these

38. **Assertion :** RNAi takesplace inside all eukaryotic organisms as a method of cellular defense

Reason : RNAi involves silencing of tRNA which prevents translation

1) If both assertion and reason are true and reason is the correct explanation of assertion.

2) If both assertion and reason are true but reason is not a correct explanation of assertion.

3) If assertion is true but reason is false

4) If both assertion and reason are false

BIOTECHNOLOGICAL APPLICATION IN MEDICINE

39. Human insulin is being commercially produced from a transgenic species of

1) Mycobacterium

2) Rhizobium

3) Saccharomyces

4) Escherichia

40. Which of the following statements regarding the structure of proinsulin and mature insulin are not correct?

(i) Proinsulin is made up of three polypeptide chains, A, B and C

(ii) C - polypeptide chain is removed prior to insulin formation.

(iii) Mature insulin consist of two polypeptide chain of equal size.

(iv) Polypeptide chains A and B are interconnected by only one S- S linkage.

1) (i) and (ii) 2) (iii) and (iv)

3) (i) and (iv) 4) (iii) and (iv)

41. Which of the following statements regarding gene therapy is/are correct?

1) Defective gene is replaced by introduction of a normal, healthy and functional gene.

2) The genetic disorders that are being treated include severe combined immuno-deficiency (SCID).

3) The first clinical gene therapy was given in 1990 a 4-year old girl with adenosine deaminase deficiency

4) All of these

42. Which of the following statements is **not correct**?

1) Insulin used for diabetic patients was earlier extracted from pancreas of slaughtered cattle and pigs which was more efficient than the genetically engineered insulin

2) PCR technique is applied to detect HIV in suspected AIDS patients and to detect mutations in genes of suspected cancer patients.

3) Periodic infusion of genetically engineered lymphocytes is required in ADA deficient patients as 'T' lymphocytes are not immortal.

4) Bioremediation is the one of the applications of biotechnology.

43. Technique used to detect the mutations in a given DNA sample is

1) Polymerase chain reaction

2) Gel electrophoresis

3) Chromatography

4) Autoradiography

44. Which of the following statements is correct regarding ELISA?

1) Used for the early diagnosis of diseases.

2) Based on the principle of antigen antibody interaction.

3) Infection by pathogen can be detected by the presence of antigens or antibodies

4) All of the above

45. PCR is not used in :

1) Confirming presence of pathogen during early infection

2) Identifying the mutated gene in suspected cancer patients.

3) Isolating the gene of interest from host DNA

4) Detection of the presence of HIV in suspected AIDS patients.

46. Match column I with column II and select the correct option from the given codes.

Column I		Column II	
A.	α-1-antitrypsin	i)	AIDS
B.	Transposons	ii)	Gene therapy vector
C.	ELISA	iii)	Emphysema
D.	Retrovirus	iv)	RNA interference

1) A-(i), B-(iii), C-(ii), D-(iv)

2) A-(iii), B-(iv), C-(i), D-(ii)

3) A-(i), B-(ii), c-(iii), D-(iv)

4) A-(iii), B-(i), c-(ii), D-(iv)

47. Probes are used in which diagnostic technique :

1) Autoradiography

2) PCR

3) ELISA

4) Gene therapy

48. Expansion of SCID is

1) Severe communal immuno deficiency syndrome.

2) Severe combined immunological deficiency syndrome

3) Severe combined immuno sorbent assay

4) Severe combined immuno deficiency syndrome

49. How many recombinant therapeutics are being marketed in the world and in India respectively ?

1) 8 and 10 2) 12 and 20

3) 15 and 12 4) 30 and 12

50. Which is not involved in the process of creating the Humulin through rDNA technology

1) Synthesis polypeptide chain A

2) Synthesis polypeptide chain B

3) Removal of polypeptide chain C

4) Usage of E.coli plasmid

51. The polypeptide A and B chains of insulin are linked together by :

1) Hydrogen bond

2) Disulphide bond

3) Peptic bond

4) Covalent bond

52. Which of these is used as vector in gene therapy for ADA deficiency ?

1) Ti-plasmid

2) pBR-322

3) Retrovirus

4) E.coli plasmid

53. ADA deficiency can be permanently cured by which of the following methods

1) Bone marrow transplantation

2) Enzyme replacement therapy

3) Gene therapy at early embryonic stages

4) All of these

54. **Assertion :** Insulin extracted from the pancreas of slaughtered animals may leads to immune reaction and side effects.

Reason : Insulin from non-human has a slight different aminoacid sequence from human insulin.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

55. The technique that is based on the principle of antigen – antibody interaction is

1) PCR 2) ELISA

3) ADA 4) RNAi

56. Which of the following is not a step of gene therapy for ADA deficiency.

1) Isolate lymphocyts from the blood of the patient

2) Introduce non-functional ADA gene into cDNA isolated from retrovirus

3) Reintroduce the genetically modified lymphocyte into the patient

4) Functional cDNA with ADA gene is introduced in to the lymphocyte

57. Consider the following statements and select the correct option.

a) Bone marrow transplantation is one of the remedial method of ADA deficiency

b) Lactalbumin is the storage protein in human milk

c) At present, 30 recombinant therapeutics have been approved for human use the world over

1) a, b and c are true

2) Only b is true

3) Both a & b are false

4) Both a & c are false

58. Match the following column -I with column-II and choose the correct option

Column I		Column II	
a.	Vaccine	i)	1990
b.	Insulin	ii)	E.coli
c.	Gene therapy	iii)	1997
d.	Bt	iv)	Mice
e.	Rosie	v)	Maize

1) a-5, b-2, c-3, d-1, e-4

2) a-1, b-2, c-3, d-4, e-5

3) a-4, b-2, c-1, d-5, e-3

4) a-5, b-4, c-3, d-2, e-1

59. How many polypeptide chains are present in a mature insulin molecule is

1) 1 2) 2

3) 3 4) 4

60. During the processing of proinsulin into the mature 'insulin'

1) C-peptide is added to proinsulin

2) C-peptide is removed from proinsulin

3) B-peptide is added to proinsulin

4) B-peptide is removed from proinsulin

61. In conventional diagnostic methods like serum testing the early detection of disease is not possible. Some techniques that help in early detection of disease is/are

1) DNA recombinant technology

2) PCR

3) ELISA

4) All of these

62. **Assertion :** Recombinant therapeutic drugs are safe and more effective.

Reason : They do not induce unwanted immunological response.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

63. The foreign DNA used to cure SCID is

1) E.coli plasmid

2) Retrovirus

3) Ti-plasmid

4) ADA cDNA

64. The main challenge for the production of insulin using rDNA technique was

1) Getting insulin assembled into mature form

2) Isolation of polypeptide A

3) Removal of C-peptide

4) Isolation of Polypeptide

65. In which year Eli Lilly company produce insulin chains

1) 1883 2) 1983

3) 1980 4) 1990

66. The probe used in autoradiography is

1) ssRNA

2) ssDNA

3) dsRNA

4) Radioactive mediated ssRNA or ssDNA

67. ADA deficiency is caused due to the _____ of gene coding for enzyme adenosine deaminase.

1) Substitution

2) Translocation

3) Deletion

4) Inversion

68. Antigen - Antibody interaction is the basis of :

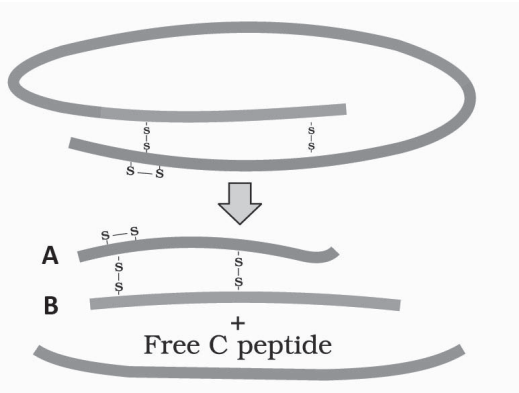
1) PCR

2) ELISA

3) Gene therapy

4) Autoradiography

69. The given figure shows the maturation of a substance which is naturally formed in our body by the :



1) Liver 2) Pancreas

3) Kidney 4) Spleen

70. Small radioactive oligonucleotides capable of recognising complementary sequence are :

1) Probe

2) Primer

3) Template DNA

4) cDNA

71. The adenosine deaminase deficiency results into

1) Addison's disease

2) Malfunction of Immune system

3) Parkinson's disease

4) Digestive disorder

72. Which of the following statements is correct regarding ELISA?

1) It is used for the early diagnosis of diseases.

2) It is based on the principle of antigen antibody interaction.

3) Detection of antigens is by direct ELISA

4) All of these

TRANSGENIC ANIMALS AND USE

73. A human protein enriched milk obtained from transgenic animal Rosie which can be a more balanced product for human babies. Which is the protein ?

1) alpha-lactalbumin

2) α-1 antitrypsin

3) Blood clotting factor

4) Insulin

74. Match column I containing transgenic organism with their specific characteristics in column II and select the correct option from the given codes.

Column I		Column II	
A.	Rice with trans gene	i)	Protein - enriched milk
B.	Bt cotton	ii)	Increased shelf life
C.	Flavr Savr tomato	iii)	Enriched with vitamin A
D.	Transgenic Rosie	iv)	High yield and insect resistant

1) A-(iii), B-(iv), C-(ii), D-(i)

2) A-(iii), B-(ii), (-(iv), D-(i)

3) A-(ii), B-(iv), C-(iii), D-(i)

4) A-(i), B-(iv), C-(ii), D-(iii)

75. Transgenic plants are

1) Generated by introducing foreign DNA into a cell and regenerating a plant from that cell

2) Produced after protoplast fusion in artificial medium

3) Grown in artificial medium after hybridization in the field

4) Produced by a somatic embryo in artificial medium

76. Transgenic cow-Rosie milk contain

1) 24g alpha-lactalbumin / lit

2) 4.2g alpha-lactalbumin / lit

3) 2.4g alpha-lactalbumin / lit

4) 42g alpha-lactalbumin / lit

77. Read statements a-d. Which of them are wrong.

a) First transgenic buffalo Rosie produced milk which was human alpha lactalbumin enriched.

b) Alpha-1 antitrypsin is used for the treatment of emphysema

c) Disease models exist for human disease like Cancer, Cystic fibrosis, Alzheimers

d) Transgenic animals are made to carry genes which make them more sensitive to toxic substances than non-transgenic

1) a only 2) c & d

3) a & c 4) a & b

78. Identify the name of transgenic organism from which alpha antitrypsin was obtained

1) Rosie 2) E.coli

3) Tracy 4) Dolly

79. Transgenic organisms are formed by

1) Crossing two hybrids

2) Inducing mutation by chemicals

3) Introducing foreign genes

4) Crossing genes of somatic cells of same organism

80. Which of the following statements about transgenic animals is/are false?

i) Transgenic animals are designed to study how genes are regulated.

ii) They are specially made to serve as models for human diseases.

iii) Transgenic cow Rosie was created to produce the human protein α-1 antitrypsin

1) i only

2) ii and iii

3) iii only

4) i and ii

81. **Assertion :** Transgenic animals can be used for testing toxicity of drugs.

Reason : Transgenic animals are designed to study how genes are regulated.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

82. Read the given statements and select the correct option.

Statement I : Transgenic mice are being used to test the safety of the polio vaccine.

Statement II : Over 95% of all existing transgenic animals are mice

1) Both statements 1 and 2 are correct.

2) Statement 1 is correct but statement 2 is incorrect

3) Statement 1 is incorrect but statement 2 is correct.

4) Both statements 1 and 2 are incorrect.

83. Which of the following statements is incorrect?

1) Alpha - 1 interferon is a human protein used to treat emphysema

2) In 1990, the first transgenic cow, Rosie, produced human protein enriched milk

3) Transgenic models exist for many human diseases such as Cystic fibrosis and Cancer

4) All except 3

84. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product to treat :

a) Emphysema

b) Cystic fibrosis

c) Phenylketonuria (PKU)

d) Alzheimer's disease

1) a, b, c and d

2) a, b and c

3) b, c and d

4) b and d

85. The biological product alpha-1- antitrypsin is used to treat

1) Thalassemia

2) Emphysema

3) Rheumatoid arthritis

4) Cystic fibrosis

86. The protein α-1 antitrypsin is obtained from a transgenic

1) Cow

2) Mice

3) Sheep

4) Fish

87. Which of the following statements is incorrect?

1) Alpha - 1 interferon is a human protein used to treat emphysema

2) In 1990, the first transgenic cow, Rosie, produced human protein enriched milk

3) Transgenic models exist for many human diseases such as cystic fibrosis and phenylketonuria only.

4) All the above

88. Which one of the following is a transgenic animal ?

1) Rabbit

2) Sheep

3) Fish

4) All of the above

89. Read the statement regarding transgenic animal and select the correct option.

Statement I : Transgenic animals can be specifically designed to allow the study of how genes are regulated.

Statement II : Animals that have had their RNA manipulated to possess and express an extra (Foreign) gene are known as transgenic animals.

1) Statement I only correct

2) Statement II only correct

3) Both statements are correct

4) Both statements are wrong

ETHICAL ISSUES AND VACCINE

90. The organisation which makes decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services is

1) Genetic Engineering Approval Committee

2) Genome Environment Action Committee

3) Genetic Environment Approval Committee

4) Genetics and Ethical Issue Action Committee

91. Which step has been taken by Government of India to cater to the requirement of patent terms and other emergency provisions in this regard?

1) Biopiracy Act

2) Indian Patents Bill

3) Environmental Pollution Act

4) Both 2 and 3

92. Hepatitis B vaccine was produced by using

1) Mycoplasma

2) Nematodes

3) Yeast

4) Transgenic cow

93. Biopiracy is related to which of the following

1) Traditional knowledge

2) Bioresources

3) Biomolecules

4) Both 1 and 2

94. A monopoly granted to a person who has either invented a new and useful article, made improvement in an existing article or invented a new process of making an article is called

1) Biopiracy

2) Bioethics

3) Patent

4) Genetic modification

95. Which Indian plants is/are try to patent by foreign company ?

1) Cotton, Ginger, Neem

2) Basmati rice, Turmeric, Neem

3) Basmati rice, Cotton, Neem

4) Basmati rice, Tobacco, Potato

96. **Assertion :** The manipulation of living organisms by the human race cannot go on any further, with out regulation.

Reason : Genetic modification of organisms can have unpredictable results when such organisms are introduced in to ecosystem.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

97. How many documented varieties of Basmati rice are grown in India.

1) 200,000 2) 200,00

3) 1000 4) 27

98. Which is correct about vaccine ?

1) are biological agents

2) It guides the body to defending pathogens

3) Recombinant DNA technology has no role in generating vaccines

4) Both 1 and 2 only

99. Recombinant hepatities B vaccine is produced by cloning which gene in Yeast cell

1) HBsIg

2) HBsAg

3) HBsYg

4) HBsMg

100. Edible vaccines are available for reducing which of the following diseases in developing countries.

1) Measles

2) Cholera

3) Diarrhea

4) All of these

SAMPLE QUESTIONS

1. The Bt endotoxin is coded by a gene named

1) ori

2) taq

3) lac

4) cry

2. The incorrectly matched pair is

1) Lepidopterans : Tobacco budworm

2) Coleopterans : Beetles

3) Agrobacterium : Bt- cotton

4) Pest resistant plant : Nematode resistant

3. A collection of methods that allows correction of a gene defect that has been diagnosed in an embryo is called

1) Gene therapy

2) Vaccine safety

3) Chemical safety

4) Molecular diagnosis

4. The method of antisense RNA technology can be used against

1) Bacillus

2) Meloidegyne

3) Bollworm

4) Corn borer

5. The polio vaccine that is tested by using

1) Bt maize

2) alpha lactalbumin

3) transgenic pig

4) transgenic mice

6. The DNA segment which is capable of changing its location is :

1) Base analogue

2) Hybridoma

3) Introns

4) Transposon

7. Find out the mis-matching pair:

1)	Humulin	EliLilly	1986
2)	First gene therapy	ADA	1990
3)	Rosie	Transgenic cow	1997
4)	Army worm	Dipterans	Tobacco

1) 1 & 3

2) 1 & 4

3) 2 & 4

4) Only 1

8. Read the following statements carefully and select the appropriate option given below

(i) Specific Bt toxin gene were isolated from *Bacillus thuringiensis* and incorporated into several crop plants such as cotton

(ii) Bt toxin gene has been cloned from the plant and been expressed in bacteria to provide resistance to insects without the need for insecticide

(iii) Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called GMO.

(iv) Using Agrobacterium vectors, cestode specific gene were introduced into the tobacco plant.

(v) In gene therapy, genes are isolated from the donors cells and tissues to treat a disease

1) (i) and (ii) are incorrect
2) (ii) and (iii) are incorrect

3) (ii) and (iv) are incorrect 4) (iv) and (v) are incorrect

9. Which one of the following can be used as a permanent cure for ADA deficiency?

1) Bone marrow transplantation on detection of disorder in adults

2) Enzyme replacement therapy at any point in life

3) Both 1 and 2

4) Gene therapy at early embryonic stages

10. First gene therapy was done to cure :

1) Diabetis

2) Haemophilia

3) ADA deficiency

4) Muscular dystrophy

11. Cry II Ab and Cry I Ab produce toxins that control

1) Cotton bollworms and cornborer respectively

2) Corn borer and cotton bollworms respectively.

3) Tobacco budworms and nematodes respectively

4) Nematodes and tobacco budworms respectively

12. Molecular diagnosis ELISA for

1) Cancer 2) TB

3) AIDS 4) Both 1 & 2

13. The first step in production of insulin using E.coli is

1) Isolation of mRNA transcribing for insulin from pancreas cell

2) Isolation of nucleotides transcribing for insulin from pancreas cell

3) Isolation of gene producing insulin from human DNA

4) Attachment of gene producing insulin from human DNA to plasmid using ligase

14. Which of the following is/are true?

a) Biowar - Biowar is the use of biological weapons against humans and or their crops and animals

b) Bioethics - Bioethics is the unauthorised use of bioresources and traditional knowledge related to bioresources for commercial benefits

c) Biopatent - Exploitation of bioresources of other nations without proper anthorisation

1) b only

2) a only

3) a and b only

4) c only

15. Miracle or Golden rice produces

1) Vitamin D

2) Vitamin B2

3) Vitamin E

4) Vitamin A

16. PCR is not used in :

1) Confirming presence of pathogen during early infection

2) Identifying the mutated gene in suspected cancer patients

3) Isolating the gene of interest from host DNA

4) Detection of the presence of HIV in suspected AIDS patients

17. Gene therapy means

1) Addition of faulty gene

2) Removal of normal gene

3) Addition of normal gene

4) Replacement of faulty gene by a normal healthy gene

18. Which Bt crop is recently recommended for cultivation in India :

1) Wheat

2) Cotton

3) Rice

4) Soyabean

19. RNA interference (RNAi) techniques involves

1) Destroying of specific DNA

2) Silencing of a specific mRNA due to a complimentary tRNA molecule that binds to and prevent translation of mRNA

3) Duplicating of mRNA using a complimentary ssRNA molecule

4) Silencing of a specific mRNA due to a complimentary dsRNA molecule that binds to and prevent translation of mRNA

20. Transgenic organism is called

1) GMF

2) T DNA

3) GMO

4) Ti DNA

21. The genetic defect adenosine deaminase deficiency may be cured permanently by

1) Introducing gene isolate from marrow cells producing ADA into cells at early embryonic stage

2) Enzyme replacement therapy

3) Periodic infusion of genetically engineered lymphocytes having functional ADA cDNA

4) Bone marrow transplantation

22. The novel strategy adopted to prevent the infestation of pests was based on the process of

1) RNA interference

2) DNA interference

3) DNA transference

4) RNA transference

23. Mobile genetic elements are

1) Primers

2) Markers

3) Transposons

4) Vectors

24. Which of the following is / are the biotechnological application in agriculture?

1) Made crops more tolerant to abiotic stresses

2) Reduced reliance on chemical pesticides

3) Helped to reduce post harvest losses

4) All of these

25. Rosie, the transgenic cow produce milk with

1) Lactalbumin

2) Lactoferrin

3) Interleukin

4) Factor VIII

26. Patenting and selling Basmati rice by Ricetech of U.S.A. is an example of

1) Biofertilizer

2) Bioinsecticide

3) Bioprospecting

4) Biopiracy

27. Prefix 'Bt' in Bt cotton stands for

1) Barium treated cotton seeds

2) Bio-technologically produced using restriction enzyme

3) Bigger-thread variety of cotton with better tensile strength

4) Variety of cotton having a toxic protein producing gene from "*Bacillus thuringenesis*"

28. **Assertion :** A crop expressing a cry gene is usually resistant to a group of insects

Reason : Cry protein produced from *Bacillus thuringiensis* is toxic to certain insects

1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

3) Assertion is true, but Reason is false

4) Both Assertion and Reason are false

29. Nematode specific genes were introduced in to tobacco plants in such a way that it has to produce a

1) ds DNA 2) ss DNA

3) ss RNA 4) ds RNA

30. **Assertion :** 'Cry' proteins are named so because they are crystal proteins

Reason : 'Cry' proteins are solubilized in acidic environment of insect midgut and then release toxic core fragments after proteolytic action

1) Both assertion and reason are correct and reason is the correct explanation for assertion

2) Both assertion and reason are correct but reason is not the correct explanation for assertion

3) Assertion is correct but reason is incorrect

4) Both assertion and reason are incorrect

31. The most commonly used plant hormones in nutrient medium is

1) Glucose

2) Maltose

3) Auxin and cytokinins

4) Starch

32. Virus free plant can be produced through the culturing of

1) Pollen grain

2) Cell from mature root

3) Meristem

4) Pollen sac

33. Match the following column - I with column - II and choose the correct option.

Column I		Column II	
a.	ELISA	1.	Early diagnosis
b.	PCR	2.	Basmati rice
c.	Biopiracy	3.	Insulin
d.	C peptide	4.	Vector
e.	Agrobacterium	5.	Amplification of DNA

1) a-5, b-4, c-1,d-2, e-3

2) a-1, b-2, c-3, d-4, e-5

3) a-1, b-2, c-3, d-5, e-4

4) a-1, b-5, c-2,d-3, e-4

34. **Assertion :** 'Cry' proteins are named so because they are crystal proteins.

Reason : 'Cry' proteins are solubilized in acidic environment of insect midgut and then release toxic core fragments after proteolytic action.

1) Both assertion and reason are correct and reason is the correct explanation for assertion

2) Both assertion and reason are correct but reason is not the correct explanation for assertion

3) Assertion is correct but reason is incorrect

4) Both assertion and reason are incorrect

35. A patent is granted for :

I. An invention

II. A microbial strain

III. Process of generating a product

IV. An improvement in an earlier invention

1) I, II, III

2) II, III, IV

3) I, III and IV

4) I, II, IV

36. Which of the following statement is not correct?

1) The proinsulin has an extra peptide called C-peptide

2) The functional insulin has A and B chains linked together by hydrogen bonds

3) Genetically engineered insulin is produced in E. Coli

4) In man, insulin is synthesised as proinsulin

37. For effective treatment of a disease

1) early diagnosis is required but understanding of its pathophysiology is not required.

2) early diagnosis is not required but understanding of its pathophysiology is required.

3) early diagnosis and understanding of its pathophysiology are required.

4) neither early diagnosis nor understanding of its pathophysiology is required.

38. What is the advantage of clinical use of humulin over use of conventional insulin?

1) It does not cause immunological problems

2) It is naturally produced by E.coli

3) It is produced by E. coli in our intestine

4) There is no advantage

39. 'Golden rice' developed through transgene approach is enriched with

1) high lysine content

2) high methionie content

3) high glutenin content

4) high vitamin - A content

40. Match the following columns and select the correct option.

	Column I		Column II
a.	Alzheimers	i.	Gene therapy
b.	Retro virus	ii.	RNAi
c.	Agrobacterium virus	iii.	Mutation
d.	PCR virus	iv.	Transgenic model

	(a)	(b)	(c)	(d)
1)	iii	ii	i	iv
2)	ii	iii	iv	i
3)	i	ii	iii	iv
4)	iv	i	ii	iii

41. Indian Basmati rice is patented through

1) US patent and trade mark office

2) GEAC

3) Indian parliament

4) CSIR

42. Micropropagation is

1) Propagation of microbes in vitro

2) production of large number of plants invitro

3) Propagation of virus in vitro

4) Growing plants on smaller scale

43. The aims and objectives of Genetic Engineering Approval Committee are

I) To permit the use of genetically modified organisms and their product of commercial applications.

II) To adopt the procedures for restriction, production and applications of GM organisms

III) Approval to conduct large scale field trial and release of transgenic crops in the environment.

Which of the above statements are correct ?

1) I and II 2) I and III

3) II and III 4) I, II and III

44. First synthetic vaccine produced is

1) Polio vaccine

2) Rabis vaccine

3) Covid vaccine

4) Heptitis B vaccine

45. Somatic hybrids are produced by the fusion of _____.

1) protoplast of two cells

2) cytoplasm of two cells

3) nucleus of two cells

4) DNA of two cells

ANSWER KEY

1.	4	21.	2	41.	4	61.	4	81.	2
2.	4	22.	2	42.	1	62.	1	82.	1
3.	4	23.	3	43.	4	63.	4	83.	4
4.	2	24.	4	44.	4	64.	1	84.	1
5.	4	25.	2	45.	3	65.	2	85.	2
6.	3	26.	1	46.	2	66.	4	86.	3
7.	2	27.	4	47.	1	67.	3	87.	4
8.	4	28.	3	48.	4	68.	2	88.	4
9.	4	29.	4	49.	4	69.	2	89.	1
10.	3	30.	4	50.	3	70.	1	90.	1
11.	4	31.	4	51.	2	71.	2	91.	2
12.	3	32.	4	52.	3	72.	4	92.	3
13.	2	33.	2	53.	3	73.	1	93.	4
14.	3	34.	1	54.	1	74.	1	94.	3
15.	2	35.	4	55.	2	75.	1	95.	2
16.	4	36.	2	56.	2	76.	3	96.	1
17.	4	37.	4	57.	1	77.	1	97.	4
18.	4	38.	3	58.	3	78.	3	98.	4
19.	1	39.	4	59.	2	79.	3	99.	2
20.	4	40.	2	60.	2	80.	3	100.	4

SAMPLE QUESTIONS

1.	4	10.	3	19.	4	28.	1	37.	3
2.	3	11.	1	20.	3	29.	4	38.	1
3.	1	12.	3	21.	1	30.	3	39.	4
4.	2	13.	3	22.	1	31.	3	40.	4
5.	4	14.	2	23.	3	32.	3	41.	1
6.	4	15.	4	24.	4	33.	4	42.	2
7.	2	16.	3	25.	1	34.	3	43.	4
8.	3	17.	4	26.	4	35.	3	44.	4
9.	4	18.	2	27.	4	36.	2	45.	1

WORK BOOK

Chapter 13

ORGANISM AND POPULATION

I. ORGANISM AND ENVIRONMENT

1. Ecology is defined as :

1) Interaction between living organisms only

2) Interaction between cells of a single organism

3) Interaction among organisms, and between the organism and its physical environment

4) Interaction between non living things

2. Ecology is basically concerned with four levels of organisation; it includes :

1) Cell, populations, communities, biomes

2) Organisms, populations, communities, biomes

3) Organisms, ecosystems, biomes, biosphere

4) Cell, tissue, organs, organisms

3. A large regional unit characterised by specific flora and fauna supported by specific climate with proper rainfall and temperature form -

1) Organism

2) Population

3) Biome

4) Biological community

4. Match the following correctly.

Column I		Column II	
A.	Tropical rain forest	1.	Very low temperature
B.	Desert	2.	Heavy rainfall
C.	Polar region	3.	High temperature with low moisture

1) A-1; B-2 ; C-3 2) A-2; B-3 ; C-1

3) A-3; B-2 ; C-1 4) A-3; B-1 ; C-2

5. Each organism has an invariably defined range of conditions that it can tolerate, diversity in the resources it utilises and a distinct functional role in the ecological system, all these together comprises its :

1) Niche

2) Habitat

3) Environment

4) Biome

6. Which of the following are major biomes of India?

1) Tropical rain forest and deciduous forest

2) Deserts

3) Sea coast

4) All the above

7. The sum total of all living and non-living factors that surrounds and potentially influence an organism :

1) Atmosphere

2) Hydrosphere

3) Temperature

4) Environment

8. What will happen to a well growing herbaceous plant in the forest if it is transplanted outside the forest in a park.

1) It will grow normally

2) It will grow well because it is planted in the same locality

3) It may not survive because of change in its micro climate

4) It grow very well because the plant gets more sunlight

9. Aquatic animals which can tolerate wide range of salinity are said to be :

1) Euryhaline

2) Stenohaline

3) Poikilotherms

4) Eurythermal

10. The algae that are adapted to live deeper in sea water

1) Green algae

2) Brown algae

3) Red algae

4) Blue green algae

11. Match the columns I and II, and choose the correct combination from the options given.

Column I Example		Column II Salt concentration (In parts per thousand)	
a.	Sea	1.	< 5
b.	Hypersaline lagoons	2.	30 - 35
c.	Inland waters	3.	> 100

	a	b	c
1)	1	2	3
2)	2	3	1
3)	3	2	1
4)	2	1	3

12. Many fresh water animals cannot live for long in sea water and vice versa mainly because of the

1) Change in the atmosphere

2) Change in the levels of thermal tolerance

3) Variations in light intensity

4) Osmotic problems they would face

13. Which characteristics determine the vegetation in any area?

a) Soil composition

b) Grain size

c) Aggregation

d) pH

e) Mineral composition

f) Topography

1) a, b and c

2) d, e and f

3) a, b, c, d and e

4) a, b, c,d, e and f

14. Identify the incorrect statement .

1) Temperature is the most important abiotic factor that control life of an organism

2) Temperature control various metabolisms through regulating enzyme kinetics

3) Temperature of earth surface ranges from subzero level to >100°C

4) Temperature decreases progressively from poles to equator

15. Regarding temperature and osmotic concentration nearly all plants are

1) Regulator

2) Partial regulator

3) Conformers

4) Both 1 and 2

16. Evolutionary biologists believe that the success of mammals is largely due to,

1) Maintenance of a constant body temperature

2) They are cold blooded

3) They are partial regulators

4) Both 1 and 2

17. It can be said that some animals in their evolutionary development preferred to be conformers than regulators. Which of the following can be the best suited reason for it?

1) The metabolic reactions of these organisms can occur at a very wide range of temperature

2) Maintaining homeostasis is an energetically expensive process

3) The enzymes of these organisms are functional at high temperatures

4) Both 2 and 3

18. Which of the following organisms are indeed capable of thermoregulation and osmoregulation?

1) All birds

2) All mammals

3) All vertebrates

4) Both 1 and 2

19. Problem faced by small sized animals like shrews and humming birds is/are :

1) Small surface area to volume ratio

2) They tend to lose body heat very fast when it is cold outside

3) Thermoregulation in cold condition is highly expensive to them

4) Both 2 & 3

20. Which of the following statement regarding responses of organisms to abiotic factors are false?

1) All birds and mammals are capable of thermoregulation

2) Majority of animals and nearly all plants cannot maintain a constant internal environment

3) Shivering is a kind of exercise which produces heat and raises body temperature

4) Very small animals are commonly found in polar regions as they have to spend less energy to generate body heat

21. Under unfavourable conditions seeds reduce their metabolic activity and going into state of:

1) Dormancy

2) Hibernation

3) Diapause

4) Migration

22. What is common to diapause, aestivation and hibernation?

1) To escape from extreme cold

2) To escape from extreme heat

3) Increased metabolic rate

4) Reduced metabolic activity

23. Match the columns I and II, and choose the correct combination from the options given.

Column I		Column II	
a.	Zooplankton	i.	Thermoregulation
b.	Birds	ii.	Aestivation
c.	Bears	iii.	Diapause
d.	Snail	iv.	Hibernation

1) a-ii, b-iv, c-ii, d-i

2) a-iii, b-i, c-iv, d-ii

3) a-iii, b-iv, c-i, d-ii

4) a-iv, b-iii, c-i, d-ii

24. **Assertion :** Small animals tend to lose body heat very fast when it is cold outside.

Reason : Small animals have a larger surface area relative to their volume.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but Reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

25. Keolado National Park is situated at ..... and is famous for ..... :

1) Gir (Gujarat), Lion

2) Bharatpur (Rajasthan), Siberian Cranes

3) Kaziranga (Assam), One horned rhino

4) Ranthambore (Rajasthan), Tiger

II. POPULATIONS

26. A group of individuals of the same species, live in a well defined geographical area, share or compete for similar resources, potentially interbreed, constitute :

1) Population

2) Organisms

3) Regulators

4) Conformers

27. The density of a population in a given habitat during a given period, fluctuates due to changes in basic processes like :-

1) Natality

2) Mortality

3) Immigration and Emigration

4) All the above

28. A population has certain attributes that an individual organism does not. These are

a. Birth rate

b. Death rate

c. Sex ratio

d. Age distribution

1) a and b 2) b and c

3) c and d 4) a, b, c and d

29. Proportion of young individuals is highest in case of

1) Declining population

2) Stable population

3) Both 1 and 2

4) Expanding population

30. Which of the following example signifies a population?

a) All the cormorants in a wetland

b) Rats in an abandoned dwelling

c) Teakwood trees in a forest tract

d) Bacteria in a culture plate

e) All the animals in a forest

f) Lotus plants in a pond

1) a, b, c, d and f

2) a, b, c, d and e

3) a, b, c, d, e and f

4) b, d, e and f

31. When does the growth rate of a population following the logistic model reaches zero? The logistic model is given as

$$\frac{dN}{dt} = rN\left(1 - N/K\right)$$

1) when N/K is exactly one

2) when N nears the carrying capacity of the habitat

3) when N/K equals zero

4) when death rate is greater than birth rate

32. Population density increases when :

1) Natality and emigration are high

2) Mortality and emigration are high

3) Natality and immigration are high

4) Mortality and immigration are low

33. An exponential growth curve is mathematically represented as :

1) $N_0 = N_t e^{rt}$

2) $N_{(t+1)} = N_t + [(B+I)-(D+E)]$

3) $\frac{dN}{dt} = rN$

4) $dN/dt = rN\left(\frac{K-N}{K}\right)$

34. Which contribute more significantly to population growth, if a new habitat is just being colonised :

1) Natality 2) Mortality

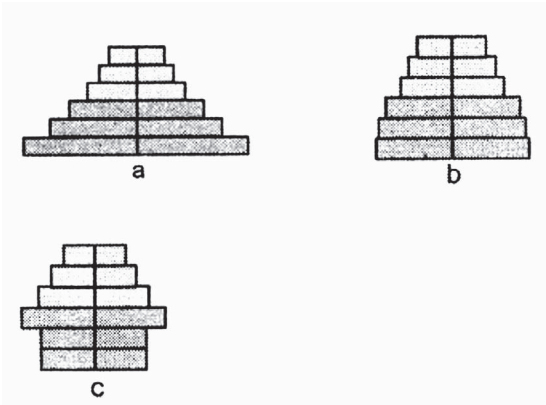
3) Immigration 4) 1 and 2

35. A biologist studied the population of rats in a barn. He found that the average natality was 250, average mortality 240, immigration 20 and emigration 30. The net increase in population is

1) 15 2) 5

3) Zero 4) 10

36. Which of the following reflects the declining population :



1) a 2) b

3) c 4) All of the above

37. A pond had 20 lotus plants in last year. This year 8 new plants were added through reproduction. The per capita natality rate of Lotus is :

1) 2.5 2) 0.25

3) 0.4 4) 0.04

38. If in a laboratory population of '80' Drosophila, '8' died during a week, the death rate in the population is ..... individuals per Drosophila per week.

1) 1.0 2) zero

3) 0.1 4) 10

39. In a population of an area, natality was equal to mortality for a given time period. However, the density of the population increased.

Which of the following may be the reason for the increase?

1) Number of immigrations = number of emigrants

2) Number of immigrants > Number of emigrants

3) Number of immigrants < Number of emigrants

4) Cannot be predicted

40. A population has more young individuals compared to the older individuals. What would be the status of the population after some years.

1) It will decline

2) It will stabilise

3) It will increase

4) It will first decline and then stabilise

41. Which of the following would necessarily decrease the density of a population in a given habitat :

1) Natality > mortality

2) Immigration > emigration

3) Mortality and emigration

4) Natality and immigration

42. In nature, a given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible. This characteristic feature of nature is known as :

1) Biotic potential

2) Carrying capacity

3) Natural selection

4) Homeostasis

43. What parameters are used for tiger census in our country's national parks and sanctuaries:

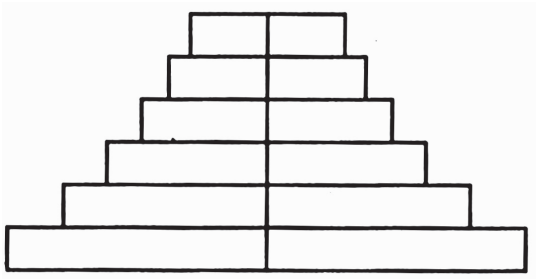
1) Pug marks only

2) Pug marks and faecal pellets

3) Faecal pellets only

4) Actual head counts

44. The age pyramid for human population is shown below.



Which of the following conclusion can be drawn from the given age pyramid?

1) It represents that the population is young and growing.

2) It is a pyramid of declining population

3) It shows that the population is stable

4) It shows that the population size is reduces slowly

45. The growth of a population includes lag phase, log phase, deceleration phase and asymptote. The shape of respective growth pattern is -

1) 'J' shaped

2) 'S' shaped

3) Linear shaped

4) Exponential

46. The integral form of exponential growth equation will be :

1) $N_0 = N_t e^{rt}$

2) $N_{(t+1)} = N_t + [(B+I)-(D+E)]$

3) $N_t = N_0 e^{rt}$

4) $dN/dt = rN\left(\frac{K-N}{K}\right)$

47. The size of a population for any species is not a static parameter. It keeps changing in time, depending on various factors including:

1) Food availability

2) Predation pressure

3) Adverse weather

4) All of the above

48. Growth of Rhizopus in a piece of bread characteristically shows -

1) 'S' shaped growth

2) 'J' shaped growth

3) Exponential growth

4) Both 2 and 3

49. **Statement I :** Logistic growth model is considered more realistic as compared to exponential growth model.

Statement II : Resources for growth for most animal populations are finite and limited.

1) Only statement I is correct

2) Only statement II is correct

3) Both statement I and II are correct

4) Both statements I and II are incorrect

50. In the formula

$$\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right);$$

Here $\left(\frac{K-N}{K}\right)$ stands for :

1) Environmental resistance

2) Reproductive potential

3) Growth rate

4) Carrying capacity

III. POPULATION INTERACTIONS

51. Which of the following statements regarding species interdependence are true?

a) An association of two species where one is benefitted and other remains unaffected is called mutualism

b) An interspecific association where both partners derive benefit from each other is called commensalism

c) A direct food relation between two species of animals in which one animal kills and feed on another is referred as Predation

d) A relationship between two species of organism where both partners are benefitted from each other is called mutualism

1) a and b only 2) c and d only

3) a and c only 4) b and c only

52. Select the interactions which have positive effects

a) Mutualism

b) Amensalism

c) Competition

d) Commensalism

e) Parasitism

1) Both a and b

2) b, c, d

3) a, b, c

4) a and d

53. Commensalism is an association between two species where :

1) One species is harmed and other is benefitted

2) One species is harmed and other is unaffected

3) One species is benefitted and other is unaffected

4) Both the species are harmed

54. Study the four statements given below and select the incorrect one out of them :

1) A Lion eating a Deer and a sparrow feeding on grain are ecologically similar in being consumers

2) Predator starfish *Pisaster* helps in maintaining species diversity of some invertebrates

3) Predators ultimately lead to the extinction of prey species

4) Plants produces chemicals such as nicotine, strychnine, quinine, caffeine and opium etc as defence against grazers and browsers.

55. In a field experiment, when all the starfish *Pisaster* were removed from an enclosed intertidal area, more than ...(a)... species of ...(b)... become extinct within ...(c)... because of ...(d)...

1) a - 20, b - vertebrates, c - a year, d-interspecific predation

2) a - 10, b - vertebrates, c - a decade, d- interspecific predation

3) a - 10, b - invertebrates, c - a decade, d- interspecific competition

4) a - 10, b - invertebrates, c - a year, d-interspecific competition

56. Which one of the following statements cannot be connected to Predation?

1) Both the interacting species are negatively impacted

2) It is necessitated by nature for maintaining the ecological balance and energy transfer.

3) It helps in maintaining species diversity in a community

4) Predators are prudent in nature.

57. **Statement I :** Predators are prudent in nature.

Statement II : Predation ultimately results in the extinction of prey species and reducing species diversity in a community.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

58. Which of the following interactions are examples of competition :

1) Balanus and Chathamalus

2) Abingdon tortoise and Goats

3) Monarch butterfly and Birds

4) Ophrys and Wasp

1) 1 and 3 only

2) 1 and 2 only

3) 1, 2 and 3 only

4) 4 only

59. A species whose distribution is restricted to a small geographical area because of the presence of a competitively superior species, is found to expand its distributional range dramatically when the competing species is experimentally removed. This is the observation of :

1) Resource partitioning

2) Competitive release

3) Interference competition

4) Competitive exclusion

60. More recent studies point out that species facing competition might evolve mechanisms that promote co-existence rather than exclusion. One such mechanism is :

1) Resource partitioning

2) Competitive release

3) Interference competition

4) All of the above

61. Gause's principle of competitive exclusion states that

1) More abundant species will exclude the less abundant species through predation

2) Competition for the same resources excludes species having different food preferences

3) No two species can occupy the same niche indefinitely for the same limiting resources and the inferior one will be eliminated eventually.

4) Larger organisms exclude smaller ones through mutualism

62. 'Resource Partitioning' is an important mechanism which promotes :

1) Competitive release

2) Co-existence

3) Competitive exclusion

4) Amensalism

63. In Galapagos Island, Abingdon tortoise became extinct within a decade after goats were introduced on the Island, because :

1) Over exploitation

2) Intraspecific competitions

3) Greater browsing efficiency of the goats

4) Resources are unlimited

64. Human liverfluke depends on which of the following two intermediate hosts to complete their life cycle:

1) Snail 2) Fish

3) Pig 4) Mosquito

1) 1 and 2

2) Only 2

3) Only 3

4) Only 4

65. Choose correct option with regards to parasites

a) Loss of unnecessary sense organs

b) Presence of adhesive organs

c) Presence of suckers

d) High reproductive capacity

e) Well developed digestive system

1) All are correct

2) Only a, b, d and e are correct

3) Only a, b,c, d are correct

4) Only d and e are incorrect

66. Which of the following is not an ectoparasite ?

1) Cuscuta on plants

2) Copepods on marine fish

3) Malarial parasite

4) Lice on humans

67. Cuckoo bird lays egg in the nest of crows, plasmodium in RBC and mycorrhizae are examples respectively

1) Commensalism, parasitism and mutualism

2) Brood parasitism, mutualism and commensalism

3) Parasitism, Amensalism and obligate mutualism

4) Brood parasitism, Endoparasite and mutualism

68. The association between clown fish and sea anemone is same as between :

1) Cuckoo and Crow

2) Fig and Wasp

3) Cuscuta and Hedge plant

4) Orchid and Mango tree

69. An orchid plant growing on the branch of mango tree, what is the interaction between orchid and mango :

1) Parasitism

2) Commensalism

3) Amensalism

4) Mutualism

70. Mark the odd one

1) Bacteria in the gut of Cattle

2) Barnacles growing on the back of a whale

3) Epiphytes and plants

4) Clown fish and sea anemone

71. Pollination in Ophrys (Mediterranean orchid) occurs by :

1) Wind

2) Water

3) Insect through pseudocopulation mechanism

4) Both 1 and 3

72. Types of interaction that occur between Wasp and Fig :

1) +, +

2) –, –

3) +, 0

4) +, –

73. Mycorrhizae are the example of

1) Amensalism

2) Parasitism

3) Mutualism

4) Commensalism

74. Which of the following are true about species interdependence ?

(a) One is benefitted and other unaffected in mutualism

(b) Both partners are benefitted in commensalism

(c) One kills and feeds on another in predation

(d) Both partners are benefitted in symbiosis.

1) a and b only

2) a and c only

3) b and c only

4) c and d only

75. Match column I, II and III and select the correct option given below.

Column I	Column II	Column III
1) Mutualism	a) +/–	I) Visiting falmingoes and resident fishes of South American Lakes
2) Competition	b) +/0	II) Starfish Pisaster in American Pacific Coast
3) Predation	c) +/+	III) Cattle egret birds and cattle
4) Commensalism	d) –/–	IV) Lichens

1) 1 - d - IV ; 2 - c - I ; 3 - a - II ; 4 - b - III

2) 1 - c - IV ; 2 - d - I ; 3 - a - II ; 4 - b - III

3) 1 - c - IV ; 2 - d - III ; 3 - a - II ; 4 - b - I

4) 1 - d - IV ; 2 - c - I ; 3 - b - II ; 4 - a - III

SAMPLE QUESTIONS

1. Father of Indian ecology is :

1) Prof. Ramdeo Misra

2) Edward Wilson

3) M.S.Swaminathan

4) Arthur Tansley

2. Physiological ecology describes :

1) Adaptation of organism to their environment for their survival

2) Adaptation of organism to their environment for their reproduction.

3) Different physiological processes that are occuring in an ecosystem.

4) Both 1 and 2

3. Which of the following is/are responsible for seasonal variations :

1) Rotation of planet around the sun

2) Tilt of earth's axis

3) Edaphic characters of earth

4) Both 1 and 2

4. Which of the following is most ecologically important abiotic factor :

1) Light

2) Temperature

3) Soil

4) Water

5. Salinity of a fresh water lake is :

1) 30 - 35 ppt

2) 15 ppt

3) less than 5 ppt

4) 20 - 25 ppt

6. Red algae is generally seen deepest regions of ocean because :

1) Red algae use blue light for photosynthesis.

2) They contain special photosynthetic pigment like phycoerythrin

3) They can perform photosynthesis in low light availability

4) All of the above

7. Identify the incorrect statement.

1) The celestial source of energy is sun

2) Red algae are the deepest growing algae in aquatic ecosystem

3) Salinity of water control geographical distribution of organisms

4) In aquatic area sediment characteristics determine the growth of planktonic organisms

8. How many of the following statements are wrong regarding conformers :

1) All animals and 99 percent of plants are conformers

2) Thermoregulation is not energetically expensive to many organism

3) Small animals have large surface area relative to their body volume

4) Regulators are more evolutionary successful than conformers

1) 2

2) 4

3) 3

4) 1

9. During the course of evolution to more successful life, some organisms regulate only upto a limit and beyond which they conform. They are known as -

1) Regulators

2) Conformers

3) Partial regulators

4) Migraters

10. Homeostasis is :

1) Tendency to change with change in environment

2) Tendency to resist change by maintenance of internal body conditions

3) Disturbance in regulatory control

4) Plants and animals extracts used in homeopathy

11. A biological community in ecological hierarchial system includes :

1) Group of different populations

2) Group of organisms belongs to different species

3) All living organisms in an area

4) All the above

12. Asymptote in a logistic growth curve is obtained when :

1) B > D

2) K = N

3) K > N

4) K < N

13. Which term is used to describe the number of people living per square kilometer in a specific area:

1) Population density

2) Population growth

3) Birth rate

4) Mortality

14. If a new habitat being colonised, which of the following population attributes more significantly contribute to population growth ?

1) Natality

2) Birth rate

3) Immigration

4) Both 1 and 2

15. If you have a dense laboratory culture of bacteria in a petridish what is a best measure to report its density :

1) Sample collection

2) Total number

3) Total biomass

4) Indirect counting method

16. A biologist studied the population of deer in a grass land. He found that the average natality was 250, average mortality 200, immigration 30 and emigration 20. The net increase in population is :

1) 10 2) 60

3) 20 4) Zero

17. **Assertion :** The size of a population for any species is not a static parameter.

Reason : Population size depending on various factors including food availability, predation pressure and adverse weather :

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but Reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

18. **Statement I :** Density of a population in a given habitat during a given period, fluctuates due to changes in four basic process.

Statement II : Population size of any species is influenced by natality, mortality, emigration & immigration.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

19. Find out the correctly matched pair :

	Column I	Column II
1)	Norway Rat	r = 0.12
2)	Flour Beetle	r = 0.015
3)	Human population in India in 1981	r = 0.0205
4)	Population density of Siberian cranes	More than 10

20. In the exponential Growth equation $N_t = N_0 e^{rt}$, here 'e' represents :

1) The base of geometric logarithms

2) The base of number logarithms

3) The base of exponential logarithms

4) The base of Natural logarithms

21. Match the columns I and II, and choose the correct combination from the options given.

	Column I		Column II
a.	Breed only once in life time	1.	Bird and mammals
b.	Breed many times in their life time	2.	Oysters and pelagic fishes
c.	Produce large number of small sized offsprings	3.	Bamboo
d.	Produce small number of large-sized offsprings	4.	Pacific salmon fish

	a	b	c	d
1)	3	1	2	4
2)	4	1	4	3
3)	3	4	2	1
4)	4	1	2	1

22. Which of the following sentence is/are correct:

1) Ecological effects of any factors on a population are generally reflected in its size (population density) which may be expressed in different ways (number, biomass, per cent cover etc.) depending on the species.

2) The intrinsic rate of natural increase (r) is a measure of the inherent potential of a population to grow

3) Predation is a very important process through which trophic energy transfer is facilitated and predators help in controlling their prey populations

4) All statements are correct

23. Consider the following statements (a-d) each with one or two blanks :

a) Polar bears go into_(1)_ during winter to (2)_cold weather

b) A conical age pyramid with a broad base represents_(3)_human population.

c) A wasp pollinating a fig flower is an example of _(4)_.

Find the correct fill up.

1) 3 - stable, 4 - commensalism

2) 1 - aestivation, 2 - escape, 3 - stable, 4 - sexual deceit

3) 3 - expanding, 2 - commensalism

4) 1 - hibernation, 2 - escape, 3 - expanding, 4 - mutualism

24. Match the following correctly.

Column I		Column II	
A.	Mutualism	1.	- -
B.	Commensalism	2.	+ +
C.	Competition	3.	+ 0
D.	Amensalism	4.	- 0

1) A-1 ; B-2 ; C-3 ; D-4

2) A-4 ; B-3 ; C-2 ; D-1

3) A-2 ; B-3 ; C-1 ; D-4

4) A-3 ; B-1 ; C-4 ; D-2

25. Secondary metabolites such as Nicotine, Strychnine and Caffeine are produced by plants for their :

1) Nutritive value

2) Growth response

3) Defence action

4) Effect on reproduction

26. Biological control methods adopted in agricultural pest control are based on the principle of :

1) Competition

2) Commensalism

3) Predation

4) Parasitism

27. If the predator is too efficient and overexploits its prey then the prey might become extinct and following it :

1) Prey will increase number

2) Number of plants will become limited

3) The predator will also become extinct

4) The predator will expand its distribution range

28. Cattle or goats never browse on calotropis growing in abandoned field because of the presence of :

1) Poisonous cardiac glycosides

2) Alkaloid like quinine

3) Chemical like opium

4) Chemical like strychnine

29. Types of interaction that occur in predation and parasitism are :

1) +/ + 2) - / 0

3) + / 0 4) + / -

30. The largest animal group on earth is constituted by insects. Approximately 25 - 30 % of the insect species are herbivores globally. Green plants have persisted inspite of such huge herbivore pressure. What can be the possible reason for this persistence?

1) Herbivore population has been kept in check by predator

2) Herbivore insects have become inefficient feeders of green plants

3) Decline in reproduction of herbivores with time

4) Food preference of insects has tended to change with time

31. **Statement I :** Nicotine, caffeine, quinine, strychnine and opium are produced by plants actually as defences against grazers and browsers.

Statement II : Thorns of *Acacia* and cactus are most common physiological means of defence.

1) Only statement I is correct

2) Only statement II is correct

3) Both statement I and II are correct

4) Both statements I and II are incorrect

32. When Darwin spoke of the struggle for existence and survival of the fittest in the nature, he was convinced that

1) Commensalism is a potent force in organic evolution

2) Competition is a potent force in organic evolution

3) Intensive reproduction is the potent force in organic evolution

4) Intensive predation is the potent force in organic evolution

33. Which of the following organisms is an example for "totally unrelated species could also compete for the same resources".

1) Warblers and native fish

2) Flamingoes and native fish

3) Abingdon tortoise and native fish

4) Balanus and Chathamalus

34. Mac Arthur's observation on closely related species of warblers is an excellent demonstration of :

1) behavioural differences in foraging activities can avoid competition among closely related species

2) competitively inferior species will be eliminated eventually

3) the distributional range of one species expands in the absence of another

4) the fitness of one species is significantly lower in the presence of another species

35. Inspite of interspecific competition in nature, which mechanism of the competing species might have evolved for their survival?

1) Predation

2) Resource partitioning

3) Competitive release

4) Mutualism

36. "Fitness of one species is significantly lower in presence of another species in terms of intrinsic rate of natural increase". This statement is applicable to :

1) Competition

2) Mutualism

3) Amensalism

4) Parasitism

37. In rocky sea coasts of Scotland, barnacle species Balanus dominates the intertidal area and excludes the Chathamalus due to :

1) Competitive co-existence

2) Mutualistic relation between barnacles

3) Interference competition

4) Resource partitioning

38. Match the following correctly.

Column I		Column II	
1)	Ectoparasite	A)	Cuscuta
2)	Endoparasite	B)	Plasmodium
3)	Brood parasitism	C)	Cuckoo bird

1) $\frac{123}{CBA}$

2) $\frac{123}{ABC}$

3) $\frac{123}{CAB}$

4) $\frac{123}{BAC}$

39. Which one of the following is not a parasitic adaptation?

1) Development of adhesive organs

2) Loss of digestive organs

3) Loss of reproductive capacity

4) Loss of unnecessary sense organs

40. Choose the incorrect statement

1) Parasite might render the host more vulnerable to predation by making it physically weak

2) Majority of the parasite harm the host and reduce the population density

3) Female mosquito is not considered as an ideal parasite

4) Malarial parasite does not need a vector (mosquito) to spread to other host

41. Select the endoparasite from the following?

1) Lice on humans

2) Copepods on marine fishes

3) Liver fluke

4) Ticks on dogs

42. Which of the following is characteristic of parasitism?

1) One organism kills and consumes another

2) Two organisms live together and neither is harmed

3) Two organisms feed side by side from the same food

4) One organism lives in or on another and benefited

43. In population interactions, one species benefits and the other is neither harmed nor benefited, such type of interaction is called :

1) Amensalism

2) Commensalism

3) Predation

4) Mutualism

44. Which of the following is not a commensalistic relationship?

1) Orchid on mango tree

2) Cuscuta on hedge plants

3) Cattle egret and grazing cattle

4) Sea anemone and clown fish

45. Which of the following interactions, co-evolution is generally observed :

1) Predation 2) Parasitism

3) Mutualism 4) Both 2 and 3

46. To get pollinated by a bee, the mediterranean orchid, ophrys employs :

1) Sexual deceit

2) Pseudo-copulation

3) Reward in the form of nectar

4) Place for laying eggs

47. Select the interactions which have negative effects

a) Mutualism

b) Amensalism

c) Competition

d) Commensalism

e) Parasitism

1) Both a and b

2) b, c, d

3) a, b, c

4) b,c and e

48. Find the wrong matching :

1) Cattle egret and cattle - Commensalism

2) *Penicillium* and bacteria - Amensalism

3) Fig tree and wasp - Mutualism

4) Monarch butterfly and bird - Competition

49. Match the items in column I with those in column II

Column I		Column II	
a.	Herbivores - Plants	i.	Commensalism
b.	Algae-Fungi	ii.	Mutualism
c.	Sheep-Cattle	iii.	Predation
d.	Orchid-Tree	iv.	Competition

Select the correct option.

1) a-iv, b-iii, c-ii, d-iv

2) a-iv, b-ii, c-i, d-iii

3) a-iii, b-ii, c-iv, d-i

4) a-ii, b-i, c-iii, d-iv

50. Match the following correctly.

Column I		Column II	
A.	Mutualism	1.	Plasmodium and Humans
B.	Commensalism	2.	Balanus and Chathamalus
C.	Competition	3.	Sea anemone and Clown fish
D.	Parasitism	4.	Rhizobium and legumes

1) A - 1 ; B - 2 ; C - 3 ; D - 4

2) A - 3 ; B - 2 ; C - 1 ; D - 4

3) A - 4 ; B - 3 ; C - 2 ; D - 1

4) A - 2 ; B - 3 ; C - 1 ; D - 4

ANSWER KEY

1.	3	16.	1	31.	1	46.	3	61.	3
2.	2	17.	2	32.	3	47.	4	62.	2
3.	3	18.	4	33.	3	48.	1	63.	3
4.	2	19.	4	34.	3	49.	3	64.	1
5.	1	20.	4	35.	3	50.	1	65.	3
6.	4	21.	1	36.	3	51.	2	66.	3
7.	4	22.	4	37.	3	52.	4	67.	4
8.	3	23.	2	38.	3	53.	3	68.	4
9.	1	24.	1	39.	2	54.	3	69.	2
10.	3	25.	2	40.	3	55.	4	70.	1
11.	2	26.	1	41.	3	56.	1	71.	3
12.	4	27.	4	42.	2	57.	3	72.	1
13.	4	28.	4	43.	2	58.	2	73.	3
14.	4	29.	4	44.	1	59.	2	74.	4
15.	3	30.	1	45.	2	60.	1	75.	2

SAMPLE QUESTIONS

1.	1	11.	4	21.	4	31.	1	41.	3
2.	4	12.	2	22.	4	32.	2	42.	4
3.	4	13.	1	23.	4	33.	2	43.	2
4.	2	14.	3	24.	3	34.	1	44.	2
5.	3	15.	1	25.	3	35.	2	45.	4
6.	4	16.	2	26.	3	36.	1	46.	1
7.	4	17.	1	27.	3	37.	3	47.	4
8.	1	18.	1	28.	1	38.	2	48.	4
9.	3	19.	3	29.	4	39.	3	49.	3
10.	2	20.	4	30.	1	40.	4	50.	3

WORK BOOK

Chapter 14

ECOSYSTEM

INTRODUCTION

1. Which is incorrect about a pond ecosystem?

1) It is fairly a self sustainable unit

2) All the four basic components of an ecosystem are well exhibited

3) The abiotic component is the water with all the dissolved organic and inorganic substances and the rich soil deposit at the bottom of the pond

4) It performs all the functions of any ecosystem except the unidirectional flow of energy

2. The most stable ecosystem is :

1) Desert 2) Wet land

3) Grassland 4) Ocean

3. In an ecosystem, bacteria are :

1) Macroconsumers

2) Microconsumers

3) Primary consumers

4) Secondary consumers

4. The minimum biotic components required for an ecosystem to survive :

1) Producer and consumer

2) Producer and decomposer

3) Consumer and decomposer

4) Consumer and reducer

5. Which of the following could affect the rate of function of entire pond ?

1) Solar input

2) Temperature

3) Day and night duration

4) All of the above

6. Which of these are examples of man-made ecosystem ?

1) Crop field 2) River

3) Estuary 4) All of these

7. Select the incorrect statement from the following.

1) Interaction of biotic and abiotic components result in physical structure of ecosystem

2) Identification and enumeration of plant and animal species of an ecosystem gives its species composition

3) Vertical distribution of different species occupying different levels is called stratification.

4) Trees occupy the bottom layer of forest ecosystem.

8. In the structure of ecosystem, we can observe

1) Input of energy (productivity)

2) Transfer of energy (food chain and web)

3) Energy loss and degradation

4) All of the above

9. Read the following statements a - e

a) An ecosystem can be visualised as a structural and functional unit of nature

b) An ecosystem is an open system

c) Many ecologists regard the entire biosphere as a global ecosystem

d) Crop field and aquarium are ecosystem with least diversity

e) Wetland and estuaries are examples of aquatic ecosystem

Which of the above statements are correct ?

1) a, b and e only

2) d and e only

3) a, c and d only

4) All statements are correct

10. Match column I with column II and choose the correct combination :

Column I		Column II	
a.	Natural terrestrial ecosystem	i.	Orchard
b.	Man made terrestrial ecosystem	ii.	Savanna
c.	Anthropogenic aquatic ecosystem	iii.	Estuary
d.	Natural aquatic ecosystem	iv.	Aquarium

1) a - ii; b - iii; c - i; d - iv

2) a - iv; b - iii; c - i; d - ii

3) a - ii; b - i; c - iv; d - iii

4) a - iv; b - i; c - ii; d - iii

11. Find the correct statement.

1) Energy and nutrients enter into an ecosystem through producers

2) Characteristics of each ecosystem is the result of interaction between biotic and abiotic components.

3) Pond is an example for ecosystem, it is fairly self-sustainable

4) All the statements are correct

12. Find the incorrect matching related to ecosystem from the following.

1) Determination of species composition - Identification and enumeration

2) Solar input and cycle of temperature - Can regulate the function of entire pond ecosystem.

3) Unidirectional movement of energy - Energy dissipated as heat to the environment.

4) Secondary production - The rate at which consumers convert the chemical energy in their food into their biomass.

PRODUCTIVITY

13. In a terrestrial food chain, which group is responsible for the largest amount of energy loss?

1) Primary producers

2) Primary consumers

3) Secondary consumers

4) Decomposers

14. The amount of biomass or organic matter produced per unit area over a period of time by plants during photosynthesis is known as

1) Primary production

2) Secondary production

3) Net primary production

4) Net secondary production

15. Energy stored at the consumer level is

1) Gross primary productivity

2) Net primary productivity

3) Net productivity

4) Secondary productivity

16. Net Primary productivity (NPP) is :

1) Rate of production of organic matter during photosynthesis

2) Gross primary productivity minus respiratory losses

3) Rate of formation of new organic matter by consumers

4) All of the above

17. The rate of conversion of light energy in to chemical energy of organic molecules in an ecosystem is

1) Secondary productivity

2) Standing state

3) Net primary productivity

4) Gross primary productivity

18. The annual net primary productivity of land ecosystem is about :

1) 170 billion tons

2) 115 billion tons

3) 55 billion tons

4) 70 billion tons

19. Primary productivity of ecosystem depends on which of the following factors.

1) Plant species of area

2) Nutrient availability and environmental factors

3) Photosynthetic capacity of plant

4) All of the above

DECOMPOSITION

20. Which one of the following statement is correct

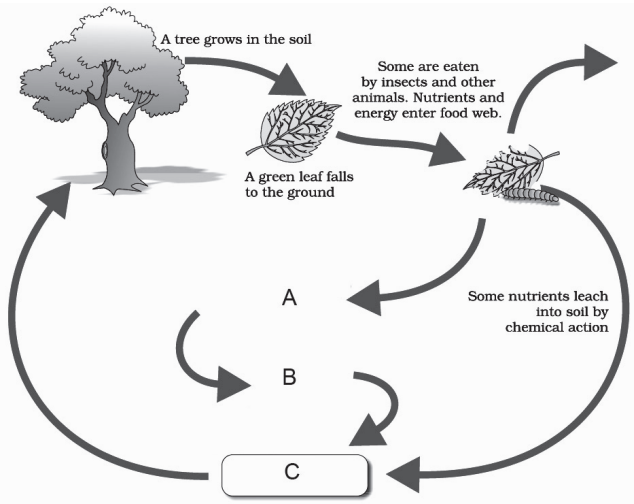
1) Warm and moist environment favour decomposition whereas low temperature and anaerobiosis inhibit decomposition

2) Warm and moist environment inhibit decomposition whereas low temperature and anaerobiosis favour decomposition

3) Warm, anaerobiosis and low temperature favours decomposition

4) Warm and low temperature and aerobic condition favour decomposition

21. Given figure is a diagrammatic representation of decomposition cycle in a terrestrial ecosystem, which of the following option is correct about A, B and C?



1) A-decomposition by earthworm; B-decomposition by fungus and bacteria; C-organic rich soil

2) A-decomposition by fungus and bacteria; B-decomposition by fungus, earthworm and soil mites; C-organic rich soil

3) A-decomposition by fungus and bacteria; B-organic rich soil; C-decomposition by fungus and earthworm

4) A-organic rich soil; B-decomposition by fungus and earthworm; C-decomposition by fungus and bacteria

22. Consider the following two statements and select the correct option

Statement I : The earthworms are referred to as the farmer's friend

Statement II : Earthworm help in the breakdown of complex organic matter as well as in loosening of the soil

1) Both statements I & II are correct

2) Statements I is false and statement II is true

3) Statement I is true and Statement II is false

4) Both Statement I and II are false

23. Which of the following is not a primary function of decomposers in an ecosystem

1) Breaking down dead organic matter

2) Recycling nutrients back to the soil

3) Producing their own food through photosynthesis

4) Maintaining nutrient cycling within the ecosystem

24. Decomposition rate is slow if detritus is rich in :

1) Nitrogen

2) Humus

3) Sugars

4) Lignin and Chitin

25. Which of the following are decomposers?

1) Bacteria

2) Fungi

3) Zooplanktons

4) Both 1 and 2

26. Match the columns.

Column I		Column II	
1)	Fragmentation	A.	Break down of detritus into smaller particles
2)	Leaching	B.	Precipitation of water soluble inorganic nutrients as unavailable salt
3)	Catabolism	C.	Degradation of detritus by bacterial and fungal enzymes

1) 1-A; 2-B; 3-C

2) 1-B; 2-C; 3-A

3) 1-C; 2-B; 3-A

4) 1-C; 2-A; 3-B

27. Which of these are true about humus ?

1) Dark coloured amorphous substance

2) Colloidal in nature

3) Reservoir of nutrient

4) All of these

28. Which of the following is expected to have the highest value (gm^{-2}/yr^{-1}) in a grassland ecosystem ?

1) Secondary production

2) Tertiary production

3) Gross production (GP)

4) Net production (NP)

29. Which one of the following processes during decomposition is correctly described ?

1) Fragmentation-carried out by organisms such as earthworm

2) Humification - The accumulation humus which undergoes microbial action at a very fast rate

3) Catabolism - Last step in the decomposition under fully anaerobic condition.

4) Leaching - water soluble inorganic nutrients rise to the top layers of soil

30. **Statement I :** The rate of decomposition is controlled by chemical composition of detritus and climatic factors.

Statement II : In a particular climatic condition, decomposition rate is faster if detritus is rich in lignin and chitin, and slower if detritus is rich in nitrogen and water soluble substances like sugar.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

31. The factors that favour fast decomposition of detritus matters are

A. Detritus rich in lignin

B. Moist environment

C. Aerobiosis

D. Low temperature

E. Nitrogen rich detritus

F. Anaerobiosis

1) A, D and E

2) B, C and E

3) C, D and F

4) All of these

32. Which of the following ecosystem has the maximum annual humification?

1) Sea coast 2) Grass land

3) Desert 4) Crop field

33. In the process of catabolism :

1) Detritus is broken down in to smaller particles by some detritivores

2) Water soluble inorganic nutrients go down in the soil horizon by the help of running water

3) Humus is degraded by some microbes and release of inorganic nutrients

4) Bacterial and fungal enzymes degrade detritus into simpler inorganic substances

34. Humus is :

1) Completely decomposed organic matter

2) Partially decomposed organic matter

3) Partially decomposed inorganic matter

4) Completely decomposed inorganic matter

35. Common detritivores in our ecosystem are :

1) Earth worms 2) Bacteria

3) Fungi 4) All

36. The most important steps in the process of decomposition that takes place in detritus are:

A) Fragmentation

B) Leaching

C) Catabolism

D) Humification

E) Mineralisation

1) A, B and C only

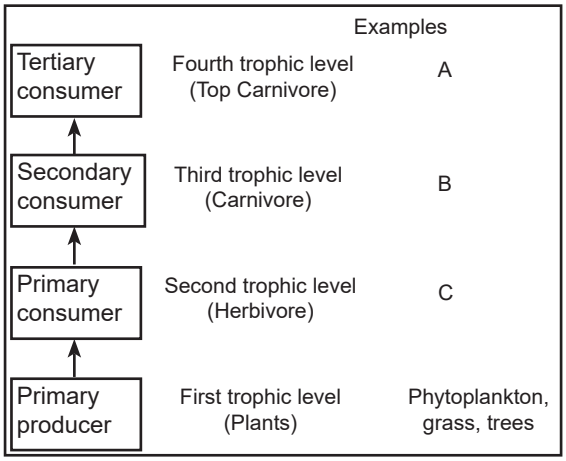
2) A, B and D only

3) A, B, C and D

4) B, C and D only

ENERGY FLOW

37. Which of the following option is correct about A, B and C?



1) A-Man ; B-Fish; C-Wolf

2) A-Cow ; B-Birds; C-Lion

3) A-Grasshopper; B-Birds; C-Fish

4) A-Lion ; B-Wolf; C-Cow

38. At each step of food chain when food energy is transferred from one trophic level to the next higher trophic level only about 10% of energy is passed onto next level. This is known as (A) given by (B). Here A, B refers to :

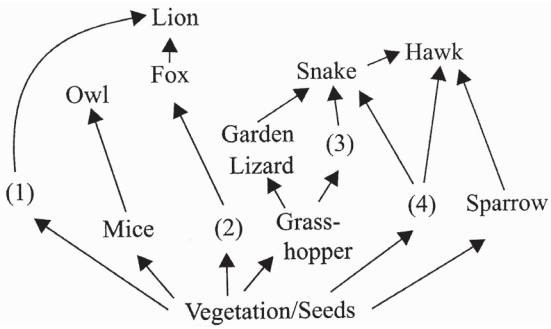
1) (A)-Ecological pyramid ; (B)-Lindeman

2) (A)-10% law ; (B)-Lindeman

3) (A)-Energy flow law ; (B)-Lindeman

4) (A)-Food chain ; (B)-Lindeman

39. Identify the likely organisms (1), (2), (3) and (4) in the food web shown below.



	1	2	3	4
1)	Deer	Rabbit	Frog	Rat
2)	Dog	Squirrel	Bat	Deer
3)	Rat	Dog	Tortoise	Crow
4)	Squirrel	Cat	Rat	Pigeon

40. In a food chain within a terrestrial ecosystem, which type of organism would you expect to be most abundant?

1) Primary producers, because they are at the base of the food chain

2) Secondary consumers, because they consume more energy

3) Tertiary consumers, due to their top position in the food chain

4) Insects, as they feed on herbs

41. If primary producers in a grassland ecosystem capture 10,000 kcal of energy, approximately how much energy would be available to the primary carnivores in the same food chain

1) 1000 kcal

2) 100 kcal

3) 10 kcal

4) 1 kcal

42. **Assertion :** All organism are dependent for their food on producer either directly or indirectly.

Reason : All animals are called heterotrophs.

1) Both Assertion and reason are correct and reasons explains assertion

2) Both assertion and reason are correct and reasons not explains assertion

3) Assertion is correct but reason is false

4) Assertion and reason are false

43. Which among the following organisms belong to second trophic level?

1) Bird, fishes and wolf

2) Man, lion and Hawk

3) Zooplankton, rabbit and cow

4) Phytoplankton, grass and trees

44. Amount of biomass present in an ecosystem is called :

1) Standing state

2) Humus

3) Minerals

4) Standing crop

45. In general, the biomass in an ecosystem will be maximum at the trophic level comprising :

1) Secondary consumers

2) Primary consumers

3) Producers

4) Tertiary consumers

46. The producers of the deep sea hydrothermal vent ecosystems are :

1) Green algae

2) Chemosynthetic bacteria

3) Coral reefs

4) Phytoplanktons

47. If '50J' energy trapped at producer level, then how much energy will be available to shark, as food in the following food chain?

Phytoplankton → Zooplankton → Small fishes →Shark

1) 5J 2) 0.5 J

3) 0.05 J 4) 0.005 J

48. Which among the following is/are true regarding food chain ?

i) Grazing food chain is restricted to limited number of trophic levels

ii) Any calculation of energy content, biomass or number has to include only a single organism at a trophic level

iii) The organisms at each trophic level depends on those at the higher trophic level for their energy demands

iv) When any organism dies, it is converted to detritus that serves as an energy source for decomposers

The true statements are :

1) i and iv 2) i and ii

3) i and iii 4) ii and iii

49. Which of the following statement(s) regarding energy flow is/are false ?

A) Detritus food chain begins with dead organic matter

B) In aquatic ecosystem, DFC is the major conduit for energy flow

C) In terrestrial ecosystem the larger fraction of energy flows through GFC

D) In GFC herbivores are the primary consumers and they belongs to trophic level 3

1) A and B

2) B and C

3) B and D

4) B, C and D

50. What percentage of solar radiation is converted into chemical energy ?

1) 10% 2) 1-5%

3) 2-10% 4) 25%

51. In a tropical rain forest maximum energy in ecosystem flows through :

1) Parasitic food chain

2) Detritus food chain

3) Grazing food chain

4) Herbivores

52. Carnivores are :

1) Usually primary consumers

2) Usually secondary consumers

3) Usually secondary or tertiary consumers

4) Usually decomposers rather than consumers

53. Which one is correct food chain ?

1) Phytoplankton → Zooplankton → Fishes → Man

2) Grass → Tiger → Birds → Man

3) Trees → Cow → Lion → Wolf

4) All of the above

54. Which one of the following has the largest population in a GFC ?

1) Producers

2) Primary consumes

3) Secondary consumers

4) Decomposers

55. Energy transfer from organism to organism in a natural community develops

1) Decomposition

2) Food chain

3) Ecological pyramid

4) Nutrient cycle

56. In grassland, mouse being swallowed by snake which in turn formed the meal for a hawk. What is the position of snake in the food chain ?

1) Producer

2) Primary consumer

3) Secondary consumer

4) Tertiary consumer

57. Match the column I and II, and choose the correct combination from the options given

List I		List II	
A.	Lion	I.	Primary producer
B.	Wolf	II.	Primary consumer
C.	Zooplankton	III.	Secondary consumer
D.	Phytoplankton	IV.	Tertiary consumer

1) A-III; B-IV; C-II; D-I

2) A-I; B-II; C-IV; D-III

3) A-IV; B-III; C-II; D-I

4) A-IV; B-I; C-II; D-III

58. GFC started with :

1) Grass 2) Goat

3) Man 4) None of these

Statement Type Questions

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

59. **Statement I :** Food web consists of several food chains.

Statement II : Food web decreases the stability of an ecosystem.

60. Which of the following food chain shows spindle shaped pyramid of number ?

1) Grass → Deer → Fox

2) Phytoplankton → Zooplankton → Small fish

3) Tree → Birds → Hawks

4) Tree → Birds → Parasites

61. Extinction of a species in a food chain is compensated by

1) Food chain

2) Ecological pyramid

3) Food web

4) None of these

62. Select the correct statement from the following.

1) Ecosystems are not exempt from the second law of thermodynamics

2) Ecosystem need a constant supply of energy to synthesis the molecule they require

3) Ecosystem counteract the universal tendency towards increasing disorderliness

4) All of the above

63. Find the incorrect matching

A) Largest population in GFC - Producers

B) Primary carnivores - Secondary consumers

C) Fourth trophic level - Top carnivores

D) Primary consumer - Herbivores

1) A and B only

2) A and C only

3) C and D only

4) All are correctly matched

64. What will be the energy of tertiary consumers in an ecosystem, if the available energy to primary consumer (NPP) is 1000 J ?

1) 100 J
2) 0.1 J
3) 10 J
4) 0.01 J

65. **Statement I :** The energy trapped by the producer is either passed on to the consumers or to the decomposers.

Statement II : The energy trapped in the decomposer level remains in it for ever.

1) Both statements are correct
2) Both statements are incorrect
3) Statement I correct II incorrect
4) Statement I incorrect II correct

Assertion and Reason Type Question

1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true but R is not the correct explanation of A
3) A is true and R is false
4) A is false and R is true

66. **Assertion (A) :** In an aquatic ecosystem, grazing food chain is the major conduit for energy flow.

Reason (R) : In aquatic ecosystem detritus availability and the rate of deposition is very less.

67. For gross primary productivity, energy captured by producer is :

1) 2 - 10% of incident solar radiation
2) 2 - 5% of PAR
3) 0.8 - 4% of incident solar radiation
4) 2 - 10% of PAR

68. Find the mismatched one :

1) Aquatic food chain - GFC is the major conduit for energy flow
2) Terrestrial ecosystem - DFC is the major conduit for energy flow
3) GFC and DFC - are not interconnect at any level
4) Tropic level in GFC restricted - As the transfer of energy follows 10 % law

69. Which one of the following organism occupy more than one trophic level?

1) Grasshopper
2) Fish
3) Zooplankton
4) Phytoplankton

Assertion and Reason Type Question

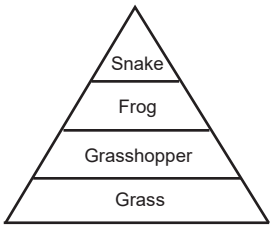
1) Both A and R are true and R is the correct explanation of A
2) Both A and R are true but R is not the correct explanation of A
3) A is true and R is false
4) A is false and R is true

70. **Assertion (A) :** In a food chain, members of successive higher levels are fewer in number

Reason (R) : Number of organisms at any trophic level depends upon the availability of organisms, which serve as food at the lower level.

ECOLOGICAL PYRAMIDS

71. Refer the following ecological pyramid. Find out the correct statements



A) In this ecosystem, the number of grass is higher than grasshopper

B) The amount of energy does not increase from first trophic level to other

C) In the above diagram, biomass remains the same at each trophic level

1) A & B only 2) A and C only

3) B only 4) C only

72. The pyramid of energy is always upright for any ecosystem. The situation indicate the fact that

1) Producers have the lowest energy conversion

2) Carnivores have a better energy conversion efficiency than herbivores

3) Amount energy present at each trophic level is same in a pyramid

4) Energy goes on decreasing at each successive trophic level

73. Which one of the following statement for the pyramid of energy is correct?

1) The pyramid of energy in the sea is inverted

2) Starting from the base and moving towards the apex of the pyramid there is a gradual increase in the amount of energy

3) Base of the pyramid represented by the decomposers

4) Each bar in the energy pyramid indicates the amount of energy present at each trophic level in a given time

74. How many statements are incorrect?

i) The base of each pyramid represents the producers or the first trophic level while the apex represents tertiary or top level consumer.

ii) An organism may occupy more than one trophic level simultaneously

iii) A species occupy only one trophic level in a food chain

iv) Trophic level represents a functional level, not a species as such.

v) Energy at a lower trophic level is always more than at a higher level

vi) Ecological pyramids do not take into account the same species belonging to two or more trophic levels.

vii) Ecological pyramids do not accommodate a food web

viii) Saprophytes are not given any place in ecological pyramids.

1) 1 2) 2

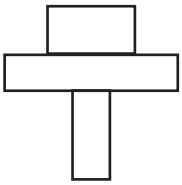
3) 3 4) 4

75. In a pyramid of biomass, primary producers have a dry biomass of 809 kg/m^2. The biomass at tertiary consumer level would be

1) 37 kg/m^2 2) 11 kg/m^2

3) 5 kg/m^2 4) 1.5 kg/m^2

76. Given below is one of the types of ecological pyramids. It represents :



1) Pyramid of number in grassland

2) Pyramid of biomass in lake

3) Pyramid of number in a big tree

4) Pyramid of energy in a river

77. The limitations of ecological pyramid is/are:

1) It has no place for decomposers and detritivores

2) It is based on simple food chain and not food web

3) Not include species belongs to two or more trophic level

4) All are correct

78. Which one of the following statements for pyramid of energy is incorrect?

1) It shows energy content of different trophic level organisms

2) It is inverted in shape

3) It is upright in shape

4) Its base is broad

79. The upright pyramid of energy is present in :

1) Pond 2) Forest

3) Lake 4) All of the above

80. Read the following statements

I) In a marine ecosystem, the biomass of phytoplanktons at any given time, is lower than the biomass of zooplanktons

II) In aquatic ecosystem much large fraction of energy flows through detritus food chain

III) Food chains are generally short with few trophic levels as only 10% of the energy is transferred from higher trophic level to lower one

IV) Pyramid of energy is always upright

Of the above statement

1) I and II are correct

2) III and IV are correct

3) I and IV are correct

4) I, III and IV are correct

SAMPLE QUESTIONS

1. The term ecosystem was coined by

1) A G Tansley 2) E. Haeckel

3) Ramdeo Misra 4) E P Odum

2. Vertical distribution of different plant species occupying different levels in a biotic community is known as

1) Standing crop

2) Stratification

3) Food chain

4) Ecological pyramids

3. System resulting from interaction among living organisms and their surrounding environment is

1) Ecological pyramid

2) Ecosystem

3) Ecology

4) Stratification

4. What is correct for the artificial ecosystem ?

1) Biodiversity is less

2) Biodiversity is high

3) Ecosystem cannot be made by human

4) It is more stable than natural ecosystem

5. Which of the following is an example of a biotic factor in an ecosystem ?

1) Temperature 2) Soil

3) Plants 4) Water

6. Which of the following is a man made artificial ecosystem ?

1) Grassland ecosystem

2) Forest

3) Dam

4) Estuaries

7. What does a biotic community called when it is regulated by abiotic components

1) Biomes

2) Biosphere

3) Ecosystem

4) Population

8. Consider the following statements.

Statement I : The annual net primary productivity of the whole biosphere is approximately 170 billion tons dry weight of organic matter.

Statement II : Majority of this contributed by ocean as they occupy larger area of earth.

1) Both statements I & II are correct and II explains I

2) Both statements I & II correct and II does not explains I

3) Statement I is true and Statement II is false

4) Both Statement I and II are false

9. The rate of formation of new organic matter by consumers is called as

1) Secondary productivity

2) Standing crop

3) Standing state

4) Net primary productivity

10. Most primary productivity in the surface water of lakes and oceans is contributed by

1) Fishes

2) Red algae

3) Zooplankton

4) Phytoplankton

11. Secondary productivity is the rate of formation of new organic matter by

1) Producer 2) Autotrophs

3) Consumers 4) All of these

12. Which of the following phenomenon is responsible for the initiation of a food chain ?

1) Decomposition

2) Respiration

3) Absorption

4) Photosynthesis

13. Who forms the new organic matter giving rise to secondary productivity ?

1) Producer 2) Consumer

3) Scavenger 4) Decomposer

14. Amount of biomass produced per unit area by green plant is called

1) Secondary productivity

2) Primary production

3) Primary productivity

4) Net primary productivity

15. The term 'detritivore' include

1) Detritus feeding invertebrates

2) Primary producers

3) Autotrophs

4) Both 2 and 3

16. The rate of decomposition of detritus is slow when

1) It contain nitrogen

2) It contains lignin and chitin

3) It contains water soluble substances like sugars

4) The environment is warm and moist

17. Why do we call the earthworm as farmers friend ?

1) It eats the pests

2) It prevents the growth of weeds

3) It reduces soil fertility

4) It helps in the breakdown of complex organic matter as well as loosening the soil

18. Decomposition would be fast if the detritus contains

1) Chitin

2) Lignin

3) Cellulose and lignin

4) Cellulose and pectin

19. Steps in decomposition operating simultaneously on detritus are

1) Fragmentation, leaching, catabolism

2) Fragmentation, humification and mineralisation

3) Humification, catabolism and mineralisation

4) Fragmentation, leaching and mineralisation

20. An organism that feeds on dead organic matter

1) Producer 2) Autotrophs

3) Detritivore 4) Decomposer

ENERGY FLOW

21. The global ecosystem is an open system with respect to

1) Organism

2) Chemicals

3) Energy

4) All of the above

22. Which is incorrectly defined

1) Carnivores - Secondary or tertiary consumers

2) Decomposer - Reducers

3) Herbivores - Primary consumer

4) Omnivores - Bacteria, Fungi

23. In general, biomass in an ecosystem will be greatest at the trophic level comprising

1) Secondary consumers

2) Primary consumers

3) Producers

4) Tertiary consumers

24. The producers of deep sea hydrothermal vent ecosystem are

1) Green algae

2) Chemosynthetic bacteria

3) Blue green algae

4) Coral reef

25. The mass of living material at a tropic level at a particular time is called

1) Gross primary productivity

2) Standing state

3) Net primary productivity

4) Standing crop

26. What is the missing level of the organization ?

Phytoplankton → Zooplankton → _____ → Man

1) Lion

2) Fishes

3) Aquatic plants

4) Fungi

27. The number of individuals in each trophic level depend on

1) Number of individual at upper trophic level

2) Number of individuals at top most trophic level

3) Number of individuals at lower trophic level

4) Amount of decomposition take place

28. What happens when the food energy passes from herbivores to carnivores and to the next organism ?

1) Amount of energy increases

2) Amount of energy decreases

3) Energy becomes zero

4) Energy remains unchanged

29. Which of the following is the driving force of an ecosystem ?

1) Biomass

2) Consumer

3) Producer

4) Solar energy

30. Which of the following event occurs in an ecosystem ?

1) Unidirectional movement of energy

2) Cycling of energy

3) Decomposition of minerals

4) All of these

31. Population of which of the following will be highest in an ecosystem ?

1) Decomposer

2) Primary producer

3) Consumer

4) All of these

32. Grass → Grasshopper → Frog → Snake

What is the place of snake in food chain ?

1) Producer

2) Primary consumer

3) Secondary consumer

4) Tertiary consumer

33. Which of the following uses maximum energy ?

1) Primary consumer

2) Secondary consumer

3) Decomposer

4) Primary producer

34. Through, which of the following, energy enters in an ecosystem

1) Sun

2) Herbivores

3) Producer

4) Decomposer

35. Why algae is placed in first place of food chain ?

1) Algae is synthesize food

2) Algae is first to consume food

3) Algae is producer

4) Both 1 and 3

36. As we proceed in food chain, biomass is generally

1) increases 2) decreases

3) remain same 4) constant

37. At each trophic level in which form of energy is lost

1) Heat 2) Chemical

3) Light 4) All of these

38. In an ecosystem, which organisms can be included in more than one trophic level

1) Algae

2) Zooplankton

3) Deer

4) Sparrow

39. Select the correct statement from the following.

1) Some organism may occupy more than one trophic level

2) Trophic level represent functional level

3) Producers are belongs to first trophic level

4) All of these

40. Select the set which contain only terrestrial ecosystems

1) Forest, Desert and Estuary

2) Grass land, Ocean and Crop field

3) Grass land, Forest and Desert

4) Aquarium, Crop field and Dam

41. Flow of energy in our ecosystem takes place

1) Only in one direction

2) Bidirectional

3) Cyclic

4) All of these

ECOLOGICAL PYRAMID

42. Which ecosystem has the maximum biomass ?

1) Forest ecosystem

2) Grass land ecosystem

3) Pond ecosystem

4) Lake ecosystem

43. Which one of the following is a characteristic feature of crop land ecosystem ?

1) Least genetic diversity

2) Most stable ecosystem

3) Absence of weeds

4) Absence of soil organisms

44. When does the energy flow start in an ecosystem

1) when nutrient cycle starts

2) when chemical energy is convert to light energy

3) when light energy is convert to chemical energy

4) when decomposition starts

45. Which of the following is not an ecological parameter ?

1) Biomass

2) Number

3) Energy

4) Stratification

ANSWER KEY

1.	4	17.	4	33.	4	49.	4	65.	3
2.	4	18.	2	34.	2	50.	2	66.	1
3.	2	19.	4	35.	1	51.	2	67.	4
4.	2	20.	1	36.	1	52.	3	68.	3
5.	4	21.	2	37.	4	53.	1	69.	2
6.	1	22.	1	38.	2	54.	1	70.	1
7.	4	23.	3	39.	1	55.	2	71.	1
8.	4	24.	4	40.	1	56.	3	72.	4
9.	4	25.	4	41.	2	57.	3	73.	4
10.	3	26.	1	42.	1	58.	1	74.	1
11.	4	27.	4	43.	3	59.	3	75.	4
12.	4	28.	3	44.	4	60.	3	76.	3
13.	1	29.	1	45.	3	61.	3	77.	4
14.	1	30.	3	46.	2	62.	4	78.	2
15.	4	31.	2	47.	3	63.	4	79.	4
16.	2	32.	2	48.	1	64.	2	80.	3

SAMPLE QUESTIONS

1.	1	10.	4	19.	1	28.	2	37.	1
2.	2	11.	3	20.	3	29.	4	38.	4
3.	2	12.	4	21.	3	30.	1	39.	4
4.	1	13.	1	22.	4	31.	1	40.	3
5.	3	14.	2	23.	3	32.	4	41.	1
6.	3	15.	1	24.	2	33.	4	42.	1
7.	3	16.	2	25.	4	34.	3	43.	1
8.	3	17.	4	26.	2	35.	4	44.	3
9.	1	18.	3	27.	3	36.	2	45.	4

WORK BOOK

Chapter 01

ZOOLOGY

THE LIVING WORLD

WHAT IS LIVING ?

1. Which among the following are characteristic features of living organisms?

A) Reproduction

B) Metabolism

C) Cellular organisation

D) Consciousness

1) A and B only 2) A and C only

3) A, B and C only 4) A, B, C and D

2. The twin characteristics of growth are

1) Reproduction and metabolism

2) Increase in mass and increase in number

3) Increase in mass and response

4) Reproduction and sense environment

3. The sum total of all the chemical reactions occurring in our body is called

1) Growth

2) Cellular organisation

3) Metabolism

4) Reproduction

4. A multicellular organism grows by

1) Cell divisions

2) Reproduction

3) Interaction

4) Evolution

5. Which of the following occur as a result of cell division

1) Metabolism

2) Growth and repair

3) Sense their environment

4) Self regulation

6. True regeneration can be observed in :

1) Fungi 2) Planaria

3) Bacteria 4) Hydra

7. Bacteria mainly reproduce through

1) Fragmentation 2) Budding

3) Regeneration 4) Binary fission

8. Organism/s which do not reproduce is

1) Mule

2) Sterile worker bees

3) Lion

4) Both 1 & 2

9. The true statement is

1) Unicellular organism grow by cell division

2) In higher plants reproduction and growth are inclusive process

3) All organisms including viruses are self conscious

4) Increase in body mass is not considered as growth

10. The mismatched pair is

	Column I	Column II
1)	Living organism	Growth inside
2)	Amoeba	Binary fission
3)	Respond to environment	Photoperiod
4)	Non living object	Self replication

11. Fragmentation is seen in

1) Amoeba

2) Unicellular algae

3) Filamentous algae

4) Both 1 and 2

12. The incorrect statement is

1) Reproduction refers to production of progeny

2) Metabolic reaction cannot be demonstrated outside the body

3) Plants do not respond to light

4) Both 2 and 3

13. Find the mis-matching pair :

	Column I	Column II
A)	Self-regulatory mechanism	Human beings
B)	Response given by an organism to the stimulus	Consciousness
C)	Indeterminate growth	All plants and animals
D)	Metabolism	Defining property

1) A & C 2) A & D

3) B only 4) C only

14. Non-living objects show

1) Irreversible intrinsic growth

2) Cellular organisation

3) Extrinsic growth

4) Self regulation

15. Photoperiod affects reproduction of seasonal breeders like

1) Plant

2) Animal

3) Both (1) and (2)

4) None of the above

16. Reproduction is not considered as defining property of living organisms because

1) Some organisms reproduce by asexual method

2) Some organisms do not reproduce

3) Non- living objects can also reproduce

4) Both (2) and (3)

17. Read the following statements and select the correct option

Statement A : A multicellular organism grows by cell division

Statement B : Living organisms are self replicating, evolving and self regulating interactive system with consciousness

1) Both the statements are correct

2) Both the statements are incorrect

3) Only statement A is correct

4) Only statement B is correct

18. Among the following features, which is not a unique features of living organisms?

1) Increase in size

2) Response to stimuli

3) Cellular organization

4) Metabolic reactions

19. Growth and reproduction are mutually inclusive events for

1) Algae and higher plants

2) Higher plants and animals

3) LIverworts, dicots and ferns

4) Bacteria and Amoeba

20. Among the following which organism has self consciousness?

1) All organisms 2) Only Human

3) Only plants 4) All prokaryotes

DIVERSITY AND TAXONOMY

21. The process by which anything is grouped into convenient categories based on some easily observable characters is known as

1) Nomenclature

2) Identification

3) Characterisation

4) Classification

22. Read the following statements and select the correct option:

Statement I : The number of species that are known and described, range between 1.7 - 1.8 million and is referred to as biodiversity or the number and types of organisms present on earth.

Statement II : There is a need to standardise the naming of living organisms such that a particular organism is known by the same name all over the world and this process is called nomenclature

1) Both the statements are correct

2) Both the statements are incorrect

3) Only statement I is correct

4) Only statement II is correct

23. Binomial nomenclature is given by

1) Theophrastus

2) Julian Huxley

3) Carolus Linnaeus

4) Bentham & Hooker

24. Which naming system is practiced by biologists all over the world?

1) Binomial system

2) Common name

3) Artificial system

4) All of the above

25. Scientific names of plants are standardised by rules and regulations of the code :

1) ICNB

2) ICVN

3) ICBN

4) ICZN

26. ICBN stands for :

1) International Classification of Biological Nomenclature

2) International Code of Biological Nomenclature

3) International Classification of Botanical Nomenclature

4) International Code of Botanical Nomenclature

27. Which of the following scientific name is correct :

1) Mangifera indica

2) Mangifera Indica

3) Mangifera Indica Linn

4) *Mangifera indica* Linn

Assertion and Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

28. **Assertion** : Systematics is the branch of biology that deals with diversity of organisms and their relationship.

Reason : The aim of classification is to group the organisms in an orderly manner.

29. Scientific study of diversity of organisms and their evolutionary relationships is

1) Morphology 2) Anatomy

3) Cytology 4) Systematics

30. In binomial nomenclature proposed by Linnaeus, every organism has

1) Two names, One Latin and other common

2) Two names, one scientifics and other vernacular

3) One scientific name given by two scientists

4) One scientific or biological name with two words-a genus and species

31. Two words in binomial nomenclature represents

1) Genus + Species

2) Genus

3) Genus + Order

4) Genus + Species + Family

32. In *Mangifera indica*, indica represents

1) Name of the genus

2) Name of the species

3) Specific epithet

4) Both 2 and 3

33. There is a need to standardise the naming of living organisms such that a particular organism is known by the same name all over the world. This process is called

1) Systematics

2) Nomenclature

3) Cytotaxonomy

4) Phylogeny

34. Systematic arrangement of taxonomic categories is :

1) Taxonomy

2) Hierarchy

3) Key

4) Classification

35. Sequence of arrangement of taxonomic categories is known as:

1) Identification

2) Taxonomic variety

3) Taxonomic hierarchy

4) Taxon

TAXONOMIC CATEGORY

36. The basic unit of biological classification is

1) Species 2) Genus

3) Family 4) Class

37. In animal kingdom the category 'division' is replaced by :

1) Order 2) Phylum

3) Class 4) Kingdom

38. Which of the following pair is wrongly matched about taxonomic arrangement of Humans?

	Column I	Column II
1)	Scientific name	*Homo sapiens*
2)	Family	Hominidae
3)	Order	Diptera
4)	Class	Mammalia

39. Common similarity exhiited in Solanaceae and Convolvulaceae

1) Cytology 2) Floral characters

3) Anatomy 4) All morphology

40. Aggregation of closely related species is known as:-

1) Family 2) Genus

3) Order 4) Class

41. An organism is in the same class but not in the same family. It may belongs to same

1) Genus 2) Species

3) Variety 4) Order

42. How many of the following plants coming under the family Poaceae:

I. Mango II. Petunia

III. Wheat IV. Datura

1) One 2) Two

3) Three 4) Four

43. Polymoniales is:

1) an order, in which many plant families are arranged

2) an order, in which only one plant family is arranged

3) a class, in which many genus are arranged

4) a class, in which only one genus is arranged

44. Which of the following is an order :

1) Muscidae

2) Diptera

3) Poales

4) Both 2 & 3

45. Hominidae and Sapindales are ---------- and ---------- respectively :

1) Order and class

2) Family and order

3) Class and Family

4) Order and Family

Assertion - Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

46. **Assertion :** Family has a group of related orders

Reason : In plants families are characterised on the basis of only vegetative characters not by reproductive characters

47. **Assertion :** Species is a group of individuals with fundamental similarities

Reason : *indica*, *leo*, *tuberosum* represents various specific epithet

48. Match the following and choose the correct combination from the options given

Column I (Common name)		Column II (Taxonomic category family)	
a)	Man	1)	Poaceae
b)	Datura	2)	Anacardiaceae
c)	Mango	3)	Solanaceae
d)	Wheat	4)	Hominidee

1) a - 4 ; b - 3 ; c - 2 ; d - 1

2) a - 4 ; b - 3 ; c - 1 ; d - 2

3) a - 1 ; b - 2 ; c - 3 ; d - 4

4) a - 1 ; b - 3 ; c - 2 ; d - 4

49. Taxon refers to

1) A short term for taxonomy

2) A group of species

3) A taxonomic unit of any rank

4) An international rule of nomenclature

50. Category is

1) a rank in a hierarchy

2) any group of living objects

3) a basic unit of hierarchy

4) both 1 and 2

SAMPLE QUESTIONS

1. Which of the following statement is correct?

1) Only living organisms grow

2) Plants grow only upto a certain age

3) The growth in living organisms is from inside

4) All of the above

2. Which of the following is a defining feature of organism ?

1) Growth

2) Metabolism

3) Reproduction

4) All the above

3. In majority of higher animals and plants, ——— and ——— are mutually exclusive events.

1) Growth, nutrition

2) Nutrition, consciousness

3) Growth, reproduction

4) Reproduction, consciousness

4. Consider the following statements

Statement I : Cellular organisation of the body is a defining feature of life forms

Statement II : Metabolic reactions can be demonstrated outside the body in cell free systems.

In the light of above statements, choose the most appropriate answer from the following

1) Both statement I and statement II are correct

2) Statement I is correct but statement II is incorrect

3) Statement I is incorrect but statement II is correct

4) Both statement I and statement II are incorrect

5. Which of the following statements regarding the response of living organisms to external stimuli are correct?

i) The external environmental stimuli can be physical, chemical or biological

ii) All organisms, from the prokaryotes to the most complex eukaryotes can sense and respond to environmental stimuli

iii) Consciousness is the defining property of living organisms

iv) Photoperiod never affect reproduction in seasonal breeders

v) All organisms handle chemicals entering their bodies

1) i, ii and iii are correct

2) i, iii, iv and v are correct

3) i, ii, iii and v are correct

4) All are correct

Assertion and Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

6. **Assertion :** In single celled organisms, we are not very clear about the usage of the two terms-growth and reproduction

Reason : When it comes to unicellular organisms like bacteria, unicellular algae or amoeba, reproduction is synonymous with growth, i.e., increase in number of cells

7. Non-living objects also grow if we take increase in body mass as a criterion for growth. In mountains, builders and sand mounds growth is from

1) Out side

2) Inside

3) By use of metabolic energy

4) Cell division

Assertion and Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

8. **Assertion :** Consciousness is considered as the defining property of living organisms.

Reason : All organisms from the prokaryotes to the most complex eukaryotes can sense and respond to environmental stimuli

9. Who is known as Darwin of 20th century?

1) R.H. Whittaker 2) D.J. Ivanowsky

3) Ernst Mayr 4) T.O Diener

10. The usage of binomial names for species was accepted by all after the publication of the work by

1) Aristotle

2) Linnaeus

3) Bentham & Hookes

4) Darwin

11. 'Systema Naturae' is written by

1) Bentham and Hooker

2) Linnaeus

3) Ernst Mayr

4) Aristotle

12. Read the following statements and find out the incorrect one

i) Systematics deals with the diversity of different organisms and their interrelationship

ii) The word 'systematics' is derived from the Latin word 'systema'

iii) Ernst Mayr used 'Sytema Naturae' as the title of his publication

iv) Systematics takes into account evolutionary relationship between organisms

v) The scope of systematics include identification, nomenclature and classification

1) Both ii and iii

2) i, ii, iv and v

3) i, ii and iii

4) only iii

13. Taxonomic hierarchy refers to

1) Step-wise arrangement of all categories for classification of plants and animals

2) A group of senior taxonomists, who decide the nomenclature of plants and animals

3) A list of botanists or zoologists, who have worked on taxonomy of a species or group

4) Classification of a species based on fossil record

14. Each category of taxonomic hierarchy referred to as a unit of ————

1) Characterisation

2) Identification

3) Nomenclature

4) Classification

15. How many of the following statements are not correct:

a) Lower the taxon, more are the characteristics that the members within the taxon share

b) Class is the assemblage of genera which exhibit a few similar characters

c) Cat and dog are included in the same family Felidae

d) Binomial nomenclature was introduced by Carolus Linnaeus

1) 4 2) 3

3) 2 4) 1

16. Select the mismatched pair

	Column I	Column II
1)	*Panthera leo*	Belongs to class Mammalia
2)	*Solanum nigrum*	Belongs to the family Solanaceae
3)	*Mangifera indica*	A Dicotyledonous plant
4)	*Homo sapiens*	Belongs to order Mammalia

17. Identify the missing categories and select the correct answer from the options

i) '**A**' is the taxonomic category which contains a number of related genera

ii) Examples of category '**B**' in plants are Monocotyledonae and Dicotyledonae

iii) '**C**' represents the basic unit of taxonomic hierarchy

1) A-Family, B - Class, C - Species

2) A-Order, B-Class, C-Genus

3) A-Family, B-Phylum, C-Kingdom

4) A-Family, B-Order, C-Species

18. Families are characterised on which of the following features of plant species?

1) Ecology

2) Both vegetative and reproductive features

3) Anatomy of parts

4) Seasonal similarities

19. Consider the following statements

Statement I : Felidae and Canidae comes under the order Carnivora

Statement II : An order includes related families

In the light of above statements, choose the most appropriate answer from the following

1) Both statement I and statement II are correct

2) Statement I is correct but statement II is incorrect

3) Statement I is incorrect but statement II is correct

4) Both statement I and statement II are incorrect

20. Consider the following statements

Statements I : Higher the taxa, more are the characteristics that members within the taxon share

Statement II : Lower the category, greater is the difficulty of determining the relationship to other taxa at the same level

In the light of above statements, choose the most appropriate answer from the following

1) Both statement I and statement II are correct

2) Statement I is correct but statement II is incorrect

3) Statement I is incorrect but statement II is correct

4) Both statement I and statement II are incorrect

21. Which is correct sequence according to ascending order of taxonomic hierarchy?

1) Domestica → Musca → Insecta → Diptera → Muscidae

2) Musca → domestica → Insecta → Diptera → Muscidae

3) Musca → domestica → Insecta → Muscidae → Diptera

4) Domestica → Musca → Muscidae → Diptera → Insecta

22. Two different animals are classified into the same family. This means that they would be classified in

1) The same division, but different class

2) The same class, but different species

3) A different kingdom and a different phylum

4) A different class and a different order

23. One can find Wheat and Mango in the same category, that is

1) Species

2) Division

3) Class

4) Family

24. Biological name of wheat is

1) *Triticum aestivum*

2) *Pisum sativum*

3) *Solanum nigrum*

4) *Oryza sativa*

25. Two individuals belongs to the same species if they

1) are reproductively isolated each other

2) strictly belongs to same genus

3) can not interbreed

4) can interbreeding and produce fertile offspring

26. In hierarchial arrangement, the category which have greatest diverstity

1) Kingdom

2) Phylum

3) Order

4) Species

27. Taxon Felidae includes

1) Cats

2) *Pathera leo*

3) Tiger

4) All of the above

28. The family Solanaceae includes the genus/ genera

1) Solanum

2) Petunia

3) Datura

4) All of the above

29. Match the following columns and select the correct option

Column I		Column II	
a)	Angiospermae	i)	Presence of notochord
b)	Insects	ii)	Flower
c)	Chordata	iii)	Single cotyledon
d)	Monocotyledonae	iv)	Three pairs of jonted legs

	a	b	c	d
1)	ii	iii	iv	i
2)	iii	iv	i	ii
3)	i	ii	iii	iv
4)	ii	iv	i	iii

30. Select the mismatched pair

1)	Sapindales	Order
2)	Dicotyledonae	Species
3)	Angiospermae	Division
4)	Anacardiaceae	Family

ANSWER KEY

1.	4	11.	3	21.	4	31.	1	41.	4
2.	2	12.	4	22.	1	32.	4	42.	1
3.	3	13.	4	23.	3	33.	2	43.	1
4.	1	14.	3	24.	1	34.	2	44.	4
5.	2	15.	3	25.	3	35.	3	45.	2
6.	2	16.	2	26.	4	36.	1	46.	4
7.	4	17.	1	27.	4	37.	2	47.	2
8.	4	18.	1	28.	2	38.	3	48.	1
9.	1	19.	4	29.	4	39.	2	49.	3
10.	4	20.	2	30.	4	40.	2	50.	1

SAMPLE QUESTIONS

1.	3	7.	1	13.	1	19.	1	25.	4
2.	2	8.	1	14.	4	20.	4	26.	1
3.	3	9.	3	15.	3	21.	4	27.	4
4.	1	10.	2	16.	4	22.	2	28.	4
5.	3	11.	2	17.	1	23.	2	29.	4
6.	1	12.	4	18.	2	24.	1	30.	2

WORK BOOK

Chapter 02

ANIMAL KINGDOM : NON-CHORDATA

BASIS OF CLASSIFICATION

1. How many of the following statements are **correct** about Kingdom animalia?

i) Members in animal kingdom exhibit prokaryotic and multicellular condition.

ii) Over a billion species of animals have been described till now

iii) Fundamental features are common to various individuals, which are used as the basis of animal classification.

iv) Protozoans are believed to be primitive relative of animals

v) Classification helps in assigning systematic position to the newly described species.

1) 2 2) 4

3) 5 4) 3

2. Organ/ organ system level of organisation, bilateral symmetry, triploblastic condition and acoelom are the characteristics which firstly appeared in;

1) Round worms

2) Segmented worms

3) Ctenophores

4) Flat worms

3. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called;

1) Acoelomates

2) Pseudocoelomates

3) Coelomates

4) Haemocoelomates

4. In some animal groups, the body is found divided into compartments with serial repetition of atleast some organs. It is mainly found in;

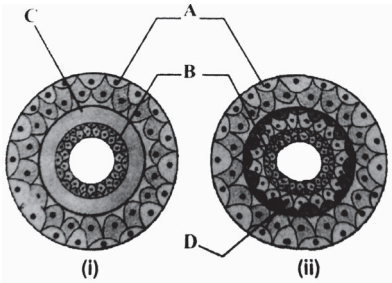
1) Platyhelminthes, Annelida, Arthropoda

2) Annelida, Arthropoda, mollusca

3) Annelida, Arthropoda, Echinodermata, Chordata

4) Annelida, Arthropoda

5. Examine the figures of diploblastic and triploblastic organisation in animals



1) D is present in cnidaria and ctenophora' C is present in sponges and cnidaria

2) C is present in cnidaria and ctenophora but D is present in Platyhelminthes

3) A, B, C are present in triploblastic animals

4) C is an undifferentiated layer between B and D

6. Digestive system with only a single opening to the outside of the body that serve as both mouth and anus is found in;

1) Sponges

2) Annelida

3) Arthropoda

4) Platyhelminthes

7. Select the **incorrect** statement from the following

1) When any plane passing through the central axis of the body divides the organism into two identical halves called radial symmetry

2) The germ layers differentiate in the animal embryos during the blastula stage

3) In open circulation blood is pumped out of the heart and the cells/tissues are directly bathed in it.

4) Segmetation is internal in chordates but external in Arthropods

8. In round worms, mesoderm is present as scattered pouches in between;

1) Gut wall and mesoglea

2) Ectoderm and endoderm

3) Ectoderm and mesoglea

4) Endoderm and mesoglea

9. Find the **incorrect** statement?

1) Kingdom : Animalia includes protozoans and metazoans

2) Classification helps in assigning systemic position to the newly described species

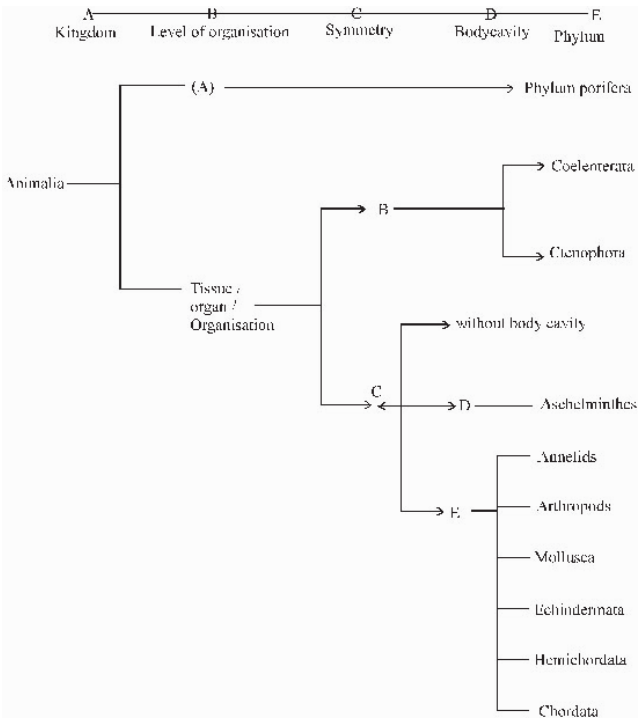
3) More than a million species of animals has been described till now

4) Members of kingdom : Animalia exhibit different levels of organisation

10. Find the **mismatched** pair regarding different levels of organisation?

1)	Porifera	Cellular level
2)	Coelenterata	Tissue level
3)	Ctenophora	Organ level
4)	Platyhelminthes	Organ level

11. Study carefully the given flow chart. Identify the correct option



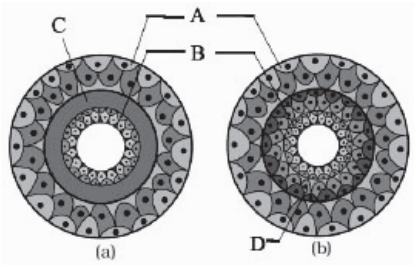
1) A - Cellular level, B - Bilateral symmetry, C- Radial symmetry, D- Psuedo coelomate, E - Colelomate

2) A- Cellular level, B - Radial symmetry, C-Bilateral symmetry, D - Coelomate, E Coelomate

3) A - Cellular level, B- BIlateral symmetry, C- Radial symmetry, D- Coelomate, E- Coelomate

4) A- Cellular level, B - Radial symmetry, C-Bilateral symmetry, D- Psuedo coelomate, E- Coelomates

12. Examine the figures of diploblastic and triploblastic organisation in animals. Identify the labelled part A to D



1) A- Mesoglea, B - Ectoderm, C- Endoderm, D- Mesoderm

2) A- Endoderm, B - Mesoderm, C- Mesoglea, D- Ectoderm

3) A- Mesoderm, B - Mesoglea, C- Ectoderm, D- Endoderm

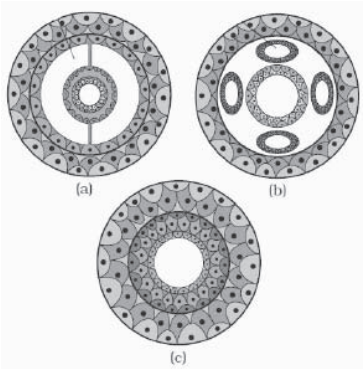
4) A- Ectoderm, B - Endoderm, C- Mesoglea, D- Mesoderm

13. An animal group with incomplete digestive tract and without body cavity is

1) Flat worm 2) Roundworm

3) Segmented worm 4) Echinoderm

14. The diagrammatic representation of three types of coelom are given below. Identify a,b,c respectively as:



1) Coelomate, psuedocoelomate, Acoelomate

2) Eucoelomate, Haemocoelomate, pseudocoelomate

3) Acoelomate, psuedocoelomate, coelomate

4) Schizocoelomate, enterocoelomate, Acoelomate

15. Identify the **mismatch**

1)	Sponges	Mostly asymmetrical
2)	Platyhelminthes	Metamerism
3)	Cnidarians	Mesoglea
4)	Ctenophora	Diploblastic

PHYLUM : PORIFERA

16. Identify the **incorrect** character related with pore bearing animals

1) Generally marine and mostly asymmetrical animals

2) Most primitive multicellular animals with cellular level of organisation and cell aggregate body plan

3) The pathway of water transport helps in food gathering, respiratory exchange, reproduction and removal of waste.

4) Digestion is extracellular and internal fertilization

17. Specialised cells that line the spongocoel and canal system which help in food gathering and creation of water current are;

1) Trophocytes 2) Choanocytes

3) Pinacocytes 4) Archaeocyte

18. How many of the following are **incorrect** about poriferans?

i) Eggs and sperms are produced by the same individual

ii) Ostia, Spongocoel and Osculum are related to water canal system

iii) Body is supported by a skeleton made of spicules or spongin fibres.

iv) Development is direct having a larval stage which is morphologically distinct from adult

v) Spongilla and venus flower basket are fresh water sponges

1) 3 2) 4

3) 2 4) 1

19. All the following statements are correct for poriferans, **except**

1) They are mostly marine and few freshwater forms

2) Sexes are united and perform sexual and asexual reproduction

3) External fertilization and direct development

4) Cellular level of organisation and cell aggregate body plan

20. Which of the following is **incorrect** regarding Porifera

1) Mostly asymmetry, cellular level and intra cellular digestion

2) Choanocytes line canal system and spongocoel

3) Canal system helps in food gathering, respiration and excretion

4) Monoecious, external fertilization and indirect development

PHYLUM : CNIDARIA (COELENTERATA)

21. Identify the **wrong** statement about phylum Cnidaria?

1) Diploblastic and tissue level of organisation

2) Sessile or free swimming

3) Presence of central gastro vascular cavity

4) Intracellular digestion only

22. Alternation of generation or metagenesis means

1) Polyp produces medusae sexually

2) Medusae form polyp asexually

3) Polyps produce medusae asexually and medusae form polyp sexually

4) Polyp produce medusae sexually and medusae form polyp asexually

23. Find the **incorrect** match

Column I		Column II
1)	Aurelia	Jelly fish, Medusa
2)	Obelia	Exhibits metagenesis
3)	Meandrina	Polyps, calcareous endoskeleton
4)	Physalia	Marine coelenterate

24. Which of the following is **not** a characteristic feature of cnidarians?

1) Name cnidaria is derived due to the presence of cnidocytes on body wall and tentacles

2) Cnidoblasts for anchorage, locomotion, respiration etc

3) Some cnidarians have skeleton formed of calcium carbonate

4) Coelenteron opens out through Hypostome

25. Stinging capsules present in cnidoblast on body wall and tentacles are;

1) Cnidocytes 2) Hypostome

3) Nematocyst 4) Coelenteron

26. Polypoid phase in obelia produce medusae by budding while medusae produce polypoid phase by sexually is called;

1) Polymorphism

2) Metagenesis

3) Bioluminescence

4) Metamorphosis

27. Find out the **incorrect** match

	Column II	Column II
1)	Adamsia	Sea anemone, polyps and shows mutualism
2)	Portugese man of war	Marine medusoid form
3)	Brain coral	Marine, Sessile and skeleton composed of $CaCO_3$
4)	Sea pen and sea fan	Fresh water, medusoid form with direct development

PHYLUM : CTENOPHORA

28. Exclusively marine, sexual reproduction only, Bioluminescence and comb plates for locomotion are the characters related with

1) Comb jellies or sea walnuts

2) Pore bearing animals

3) Coelenterates

4) Flatworms

29. From the following how many statements are common to both cnidaria and ctenophora.

a) Tissue grade of organisation and colloblasts

b) Radial symmetry, tissue level of organisation and diploblastic condition.

c) External fertilization and indirect development

d) Hermaphroditism and absence of cnidoblast

e) Digestion is both extracellular and intracellular

1) b, c, e 2) a, d, e

3) a, d 4) a, b, c

30. Which of the following is most diagnostic feature of pleurobrachia and ctenoplana?

1) Presence of 8-pairs of ciliated comb plates

2) Body bears 8 external rows of ciliated comb plates

3) Bioluminescence

4) 8–External rows of ciliated comb plates in tentacles for feeding

31. Choose the **correct** character applicable to ctenophora?

1) Organ system level of organisation

2) Mostly marine and few freshwater

3) Triploblastic and bilateral symmetry

4) Sexual reproduction and indirect development

32. Sea walnuts show special characters than cnidarians, **except**:

1) Bioluminescence

2) Extracellular and intracellular digestion

3) Exclusively marine

4) Only sexual mode of reproduction

33. Which of the following ctenophoran character is **not** exhibited by cnidarians?

1) Diploblasty and tissue level

2) Extra cellular and intracellular digestion

3) Only sexual reproduction and exclusively marine

4) External fertilization and indirect development

PHYLUM : PLATYHELMINTHES

34. Which of the following is **not true** for Platyhelminthes?

1) Triploblasty, bilateral symmetry, Pseudocoelom

2) Mostly endoparasites in animals

3) Flame cells for excretion and osmoregulation

4) Internal fertilization , indirect development with series of larval stages

35. Find the features **not** applicable to platyhelminthes

1) First triploblastic invertebrates

2) Acoelomate with organ or organ system level of organisation

3) Mostly ectoparasites in animals

4) Hooks and Suckers for parasitic mode of life

36. Which of the following is a matching pair of an animal and its special feature?

Column I		Column II
1)	Taenia	Metamerism
2)	Fasciola	Free living flatworm
3)	Planaria	Hooks and Suckers
4)	Liver fluke	Many larval stages

37. Tape worm has no alimentary canal because

1) It does not require nutrients

2) It feeds only during larval stages

3) It absorbs nutrients through body surface

4) It is sanguivorus

38. Which of the following is **not true** for platyhelminthes?

1) Mostly endoparasites in animals including humans

2) First triploblastic animals with organ level of organisation and bilateral symmetry

3) Flame cells for excretion and osmoregulation

4) External fertilization and indirect development through many larval stages.

39. Which of the following is a matching pair of an animal and its special feature?

Column I		Column II
1)	Taenia	Presence of Hooks and Suckers
2)	Fasciola	Pseudocoelom
3)	Planaria	Absorb nutrients from host through body surface with the help of suckers
4)	Schistosoma	Monoecious

PHYLUM : ASCHELMINTHES

40. Find the **relevant** character of phylum Aschelminthes

1) First to have complete alimentary canal with well developed muscular pharynx

2) Body is dorsoventrally flattened

3) All of them are endoparasites in plants and animals

4) Sexual dimorphism, often females are shorter than males

41. Find the characteristics **irrelevent** to Aschelminthes

1) Free living or parasite in plants and animals

2) First to have complete alimentary canal

3) Sexual dimorphism often males are longer than females

4) Internal Fertilization

42. Select the **Incorrect** match between pathogen and the disease from the following options

	Column I	Column II
1)	Human round worm	Ascariasis
2)	Hook worm	Ancylostomiasis
3)	Schistosoma	Fascioliasis
4)	Wuchereria	Filariasis

PHYLUM : ANNELIDA

43. How many of the following features are **not true** about Annelida?

a) Found in marine, freshwater and terrestrial habitat

b) Mostly free living and some are parasitic forms

c) Both longitudinal and circular muscles aid in locomotion

d) Metamerically segmented and acoelomate animals

e) Sexual and asexual reproduction

1) One

2) Two

3) Three

4) Four

44. Which of the following are applicable to Annelids?

1) Marine, freeliving, dorsal nerve cord, monoecious

2) Terrestrial, parasitic, asexual reproduction, dioecious

3) Aquatic, annulus, nephridium, ventral nerve cord

4) Aquatic, parapodia, monoecious and asexual reproduction

45. Which of the following does not match?

	Column I	Column II
1)	Annulus	Little ring
2)	Nereis	Monoecious
3)	Nereis	Parapodia
4)	Hirudinaria	Sanguivorous

46. Neural system of annelid consists of

1) Paired ganglia and double dorsal nerve cord

2) An unpaired ganglia and double dorsal nervecord

3) Paired ganglia and double ventral nerve cord

4) An unpaired ganglia and double ventral nerve cord

47. From the following which one is related to segmented worms?

1) Body wall possesses circular and longitudinal muscles for locomotion

2) True metamerism, schizocoelom and open circulation only

3) Paired ganglia connected by lateral nerves to double dorsal nerve cord

4) Mostly parasitic forms but some are freeliving with acoelom

48. Aquatic annelids like .....(i).... possess lateral appendages ....(ii)... which help in .... (iii)... Here i, ii and iii are respectively as;

1) i–Neries, ii–Parapodia, iii – Excretion

2) i–Neries, ii – Swimming, iii – Parapodia

3) i–Neries, ii–Parapodia, iii–Swimming

4 i–Leech, ii– Parapodia, iii – Swimming

49. Which of the following are **not** related with the characteristics of Annelida?

i) Closed circulation, with haemoglobin in blood cells

ii) All annelids are hermaphrodites and exhibit sexual reproduction

iii) Found in marine, freshwater and terrestrial habitat

1) i only 2) i, ii only

3) iii only 4) ii, iii only

50. Presence of nephridia, metamerism, schizocoelom and absence of asexual reproduction are the features related to;

1) Pheretima and Ancylostoma

2) Pheretima and Neries

3) Hirudinaria and Limulus

4) Peripatus and Bombyx

PHYLUM : ARTHROPODA

51. All the following are **true** regarding Arthropods **except**

1) Largest phylum under animal kingdom which includes insects

2) They contribute over two thirds of all named species.

3) All arthropods have a pair of simple eyes

4) Statocyst for balancing

52. All the following are economically important insects except

1) Bombyx 2) Laccifer

3) Apis 4) Limulus

53. Find the **mismatch** regarding respiratory organs in Arthropods

1)	Periplaneta	Tracheal system
2)	Prawn	Gills
3)	Limulus	Book gills
4)	Spider	Coxal glands

54. Match the following and choose the right option

a)	Gregarious pest	p)	Bombyx
b)	Living fossil	q)	Locust
c)	Silk worm	r)	King crab
d)	Vector	s)	Apis
e)	Wax	t)	Aedes

1) $\frac{abcde}{qrpts}$ 2) $\frac{abcde}{qespt}$

3) $\frac{abcde}{trspt}$ 4) $\frac{abcde}{tpsrq}$

55. i) Body consists of head, thorax and abdomen

ii) Jointed appendages

iii Body is covered with calcareous exoskeleton

iv) Open circulation with dorsal heart, haemolymph and haemocoel

v) All have malpighian tubules for excretion and osmoregulation.

From the above features of phylum arthropoda

1) i, ii, iv are incorrect

2) iii, iv, v are correct

3) i, ii, iv are correct

4) ii, iii, iv are incorrect

56. Consider the following statements regarding Arthropoda and choose the right option

i) Mostly dioecious

ii) Fertilisation is usually external

iii) They are mostly oviparous

iv) Development is direct only

v) Antennary glands are the respiratory organ in prawn

1) Two are incorrect

2) Three are incorrect

3) Four statements are true

4) All are wrong

57. Which is not true about Arthropods?

1) Largest phylum

2) Calcareous exoskeleton

3) Mostly tracheal respiration

4) Mostly oviparous

58. All the following are true regarding arthropods **except**

1) They constitute over two -thirds of all named animal species

2) Body is divided into head, thorax and abdomen

3) Statocysts for balancing

4) Fertilization is mainly external

59. Aedes mosquito transmits

1) dengue fever

2) Malaria

3) Yellow fever

4) Both 1 and 3

60. Find the **mismatch** regarding excretory organs

1) Prawn - Antennary glands

2) Limulus - Coxal glands

3) Insects - Malpighian tubules

4) Locust - Nephridia

PHYLUM : MOLLUSCA

61. Molluscans show all the following characteristics **except**

1) Triploblastic and bilaterally symmetrical

2) Segmentation

3) Calcareous exoskeleton

4) Head possess sensory tentacles

62. A soft and spongy glandular fold of skin enclosing the visceral mass of molluscs, that secretes shell is called

1) Mantle 2) Hump

3) Ctenedia 4) Tentacle

63. Closed circulatory system occur in;

1) Snail

2) Cockroach

3) Cuttle fish

4) All the above

64. All the following are true regarding molluscs **except**

1) Body is covered by calcareous shell

2) Posterior head region has sensory tentacles

3) Triploblastic and bilaterally symmetrical

4) Soft, unsegmented body

65. Mantle or pallium is ;

1) File like rasping organ for feeding

2) Pearl producing layer in visceral hump

3) Soft, spongy glandular layer of skin cover the visceral hump

4) Respiratory and excretory organ in molluscs

66. Feather like gills or ctenidia present between;

1) Shell and mantle
2) Visceral hump and shell

3) Visceral hump and mantle
4) Visceral hump and muscular foot

67. Absence of calcareous shell but the presence of closed circulation are the characters related to;

1) Dentalium, chiton, aplysia, unio

2) Pila, pinctada, chaetopleura, aplysia

3) Loligo, sepia, pila, aplysia

4) Sepia, loligo, octopus, devil fish

68. Molluscans are usually show bilateral symmetry but in some forms due to torsion the adult becomes asymmetrical. One example for this is ;

1) Chiton 2) Tusk shell

3) Octopus 4) Apple snail

PHYLUM : ECHINODERMATA

69. What is **true** about spiny skinned bodied animals?

1) All are marine with dorsal mouth and ventral anus

2) They have an endoskeleton of calcareous ossicles and hence the name echinodermata

3) All echinoderms are free swimming animals without any exception

4) Adult echinoderms have bilateral symmetry but larvae are radially symmetrical

70. The most distinctive feature of echinoderm is the presence of Ambulacral system which helps in;

1) Locomotion, capture and transport of food, respiration and excretion

2) Locomotion, respiration and reproduction

3) Locomotion, circulation, respiration and regeneration

4) Locomotion, capture and transport of food, and respiration

71. How many statements are **correct** about echinoderms?

i) Spiny body and segmented group

ii) Complete digestive system with ventral or lower anus and dorsal/ upper mouth

iii) External fertilization and indirect development with sessile larva.

iv) Head, brain and excretory systems are absent.

1) 1 2) 3

3) 4 4) 2

72. Which is not a free swimming echinoderm?

1) Ophiura

2) Echinus

3) Cucumaria

4) Sea lily / Feather star

73. What is **wrong** about Echinoderms?

1) An exclusively marine coelomate animals

2) Bilateral larva transforms to radial adult

3) Excretory system absent

4) Calcareous ossicles as exoskeleton

74. Find out the **true** description regarding Echinoderms

1) Spiny bodied and segmented group

2) Complete digestive system with dorsal mouth and ventral anus

3) Water vascular system consists of blood, blood vessels and heart

4) External fertilization and indirect development

75. Which one is a sedentary Echinoderm

1) Asterias 2) Echinus

3) Antedon 4) Cucumaria

76. The system of vessels conveying water for the purpose of feeding, respiration and locomotion in echinoderm is called

1) Water canal system

2) Ambulacral system

3) Circulatory system

4) Ring canal system

PHYLUM : HEMICHORDATA

77. Stomochord is a hollow outgrowth which arises from the roof of the buccal cavity present in

1) Urochordata

2) Cephalochordata

3) Vertebrata

4) Hemichordata

78. Earlier Hemichordata was considered as a

1) phylum under non chordata

2) phylum under chordata

3) subphylum under non chordata

4) subphylum under Chordata

79. Worm like body of hemichordata is divisible into:

1) Head, Thorax, Abdomen

2) Head, proboscis, trunk

3) proboscis, collar, trunk

4) Head, proboscis, tail

80. Consider the following statement regarding Hemichordate and choose the **correct** option

a) Exclusively marine worm like animals

b) Triploblastic, bilaterally symmetrical and acoelomate animals

c) Closed circulatory system with blood and lymph

d) Proboscis gland for excretion

e) External fertilisation and indirect development

1) a,b and d are correct

2) b,c and e are false

3) a,b,c and d are correct

4) a,d, and e are correct

81. Pharyngeal gill slits of hemichordates is in

1) Lateral position

2) Dorsal position

3) Ventral position

4) None of the above

82. Connecting link between chordates and non - chordates is

1) Peripatus

2) Balanoglossus

3) Sphenodon

4) Tachyglossus

83. Hemichordata was earlier considered as a ....(A)... under ....(B).... But now it is placed as a separate ....(C)...under .....(D)... .Here A, B, C, D are respectively as;

1) A–Phylum ; B–Non-chordata ; C–Division ; D–Chordata

2) A – Subphylum ; B–chordata; C–Class; D – non Chordata

3) A – Subclass; B–Chordata ; C–Phylum ; D–Non chordata

4) A–Subphylum; B–Chordata; C– Phylum; D– Non chordata

84. Which one is **incorrect** about Hemichordata?

1) It respiring through laterally opened pharyngeal gill slits

2) These are the connecting link between non-chordata to chordata

3) A hollow outgrowth arising from the roof of buccal cavity called stomochord or buccal diverticulum.

4) Dioecious and Indirect development

85.

Organ	Phylum	Function
Parapodia	Annelida	**a**
b	Ctenophora	Locomotion
c	Mollusca	Rasping organ
Malpighian tubules	Arthropoda	**d**
Cnidoblasts	Coelenterata	**e**

From the above table find out the missing organ or function-a,b,c,d and e respectively

1) a - swimming, b - comb plates, c- radula, d- excretion, e - defense

2) a- defense, b - radula, c- comb plates, d- excretion, e - swimming

3) a- defense, b - radula, c- comb plates, d- swimming, e- excretion

4) a- protection, b - parapodia, c- visceral mass, d - locomotion, e- excretion

86. Match column I with column II and select the correct option.

Column I		Column II	
i)	Incomplete digestive system	a)	Sponges
ii)	Cellular level of organization	b)	Coelenterates
iii)	Radial symmetry	c)	Annelids
iv)	Pseudocoelomate	d)	Platyhelminthes
v)	Metamerism	e)	Aschelminthes

1) i-c, ii-d, iii-a, iv-b, v-e

2) i-e, ii-e, iii-b, iv-c, v-a

3) i-d, ii-a, iii-b,iv-e,v-c

4) i-a, ii-b, iii-c, iv-d, v-e

87. Match column I with column II and column III. Choose the correct option

Column I		Column II		Column III	
1	Cnidocyte	A	Ctenoplana	i	Balancing
2	Statocyst	B	Fasciola	ii	Defence
3	Radula	C	Pennatula	iii	Feeding
4	Flame cells	D	Locusta	iv	Locomotion
5	Comb plates	E	Pila	v	Osmoregulation

1) 1-A-ii, 2-A-v, 3-E-iv, 4-C-i, 5-E-v

2) 1-B-ii, 2-A-iv, 3-E-v, 4-C-ii, 5-D-i

3) 1-C-ii, 2-D-i, 3-E-iii, 4-B-v, 5-A-iv

4) 1-D-i, 2-C-ii, 3-A -v, 4-B-iii, 5- A-v

Assertion and Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

88. **Assertion** : Those cnidarians which exist in both polyp and medusoid form exhibit metagenesis.

Reason : Polyp produce medusae asexually and medusae form polyp sexually.

89. **Assertion** : Parasitic flatworms absorb nutrients from the host directly through their body surface.

Reason : Mostly they are endoparasites is animals.

90. **Assertion** : Male ascaris is longer than female ascaris.

Reason : They are monoecious

91. **Assertion** : Tentacle in molluscs used for locomotion.

Reason : Tentacle lies attached to muscular foot

92. **Assertion** : Water vascular system is the most distinctive feature of echinoderms

Reason : It helps in locomotion , respiration, food capture and transport

93. Internal fertilization, indirect development and sexual reproduction are the characters of;

1) Pleurobrachia, Sycon, Euplectella

2) Dentalium, Chaetopleura, Gorgonia

3) Ctenoplana, Spongilla, Aurelia,Taenia

4) Euspongia, Spongilla, Sycon

94. Which of the following animals are Eucoelomates with bilateral symmetry?

1) Adult Echinoderms

2) Aschelminthes

3) Platyhelminthes

4) Annelids

95. Match the following genera with their respective phylum.

A)	Ophiura	i)	Mollusca
B)	Physalia	ii)	Platyhelminthes
C)	Pinctada	iii)	Echinodermata
D)	Planaria	iv)	Coelenterata

1) A-iv, B-i, C-iii, D-ii

2) A-iii, B-iv, C-i, D-ii

3) A-i, B-iii, C-iv, D-ii

4) A-iii, B-iv, C-ii, D-i

96. Consider the following features

A) Organ system level of organisation

B) Bilateral symmetry

C) True coelomates with segmentation of body

Select the correct option of animal groups which possess all the above characteristics

1) Annelida, mollusca and chordata

2) Annelida, arthropoda and chordata

3) Annelida, arthropoda and mollusca

4) Arthropoda, mollusca and chordata

97. Match the following with respective characteristics

A)	Pila	i)	Flame cells
B)	Bombyx	ii)	Comb plates
C)	Pleurobrachia	iii)	Radula
D)	Taenia	iv)	Malpighian tubules

Select the correct option from the following

	A	B	C	D
1)	iii	ii	iv	v
2)	iii	ii	iv	iv
3)	iii	iv	ii	i
4)	ii	iv	iii	i

98. Match the following list of animals with their level of organisation

Division of labour		Animal	
A)	Organ level	i)	Pheretima
B)	Cellular aggregate level	ii)	Fasciola
C)	Tissue level	iii)	Spongilla
D)	Organ system level	iv)	Obelia

1) A-ii, B- iii, C-i, D-iv

2) A-ii, B- i, C-iii, D-iv

3) A-ii, B- iii, C-iv, D-i

4) A-ii, B- iv, C-iii, D-i

99. Match the column A with column B and choose the correct option

Column I		Column II	
A)	Porifera	i)	Water vascular system
B)	Aschelminthes	ii)	Water canal system
C)	Annelida	iii)	Muscular pharynx
D)	Arthropoda	iv)	Jointed appendages
E)	Echinodermata	v)	Metameres

1) A-ii, B-iii, C-v, D-iv, E-i

2) A-ii, B-v, C-iii, D-iv, E-i

3) A-ii, B-iii, C-v, D-i, E-iv

4) A-ii, B-iii, C-iv, D-i, E-v

100. Given below are five different animals and some characterstics. Select the **correct** set of animals with their suitable characteristics.

Animals		Characters	
i)	Asterias	A)	Haemocyanin
ii)	Hirudinaria	B)	Tubefeet
iii)	Cucumaria	C)	Oviparous
iv)	Ancylostoma	D)	Ambulacral system
v)	Octopus	E)	Sanguivorous ectoparasite

1) ii, iv, v are exihibit character C and E

2) A and C are the characters of v and ii

3) B, C, D are the characters of i, iii and v

4) i, iii are exhibit character B, C, D

SAMPLE QUESTIONS

1. Coelom is a cavity developed

1) Within mesoderm

2) Outside mesoderm

3) Between mesoderm and ectoderm

4) Between mesoderm and endoderm

2. Unique feature of coelenterates, **not shared** by any other phylum is

1) Presence of tentacles

2) Presence of nematocysts

3) Presence of mesoglea

4) Radial symmetry

3. Select the **true one** regarding body cavity:

1)	Eucoelom	Platyhelminthes
2)	Pseudocoelom	Echinoderms
3)	False coelom	Aschelminthes
4)	Pseudocoelom	Coelenterates

4. In the course of evolution, true coelom appeared for the first time in

1) Aschelminthes 2) Annelids

3) Cnidarians 4) Echinoderms

5. Which of the following is **incorrect** regarding origin of coelom?

1) Enterocoel - developes as mesodermal pouches in primitive gut

2) Eucoelom - mesoderm as scattered pouches

3) Pseudocoel - developes from embryonic blastocoel

4) Acoelom - developes within the mesoderm

6. Schizocoel is exhibited by

1) Platyhelminthes, Aschelminthes, Annelida

2) Echinodermata, Hemichordata, Chordata

3) Annelida, Arthropoda, Mollusca

4) Mollusca, Hemichordata, Echinodermata

7. Any plane passing through the central axis that doesnot divide animal body into two identical halves. This condition is present in

1) Porifera

2) Coelentrata

3) Ctenophora

4) Echinodermata

8. Radial symmetry is advantagous for animals with:

1) Ciliary mode of feeding

2) Aquatic mode of life

3) Benthos and Sedentary nature

4) Incomplete alimentary canal

9. Alternation of generation in cnidaria is called

1) Metamorphosis

2) Metagenesis

3) Parthenogenesis

4) Metastasis

10. Metameric segmentation is exhibited by :

1) Tapeworm 2) Hydra

3) Hookworm 4) Earthworm

11. A triploblastic animal with bilateral symmetry and true coelom is:

1) Hydra 2) Planaria

3) Earthworm 4) Starfish

12. Locomotion structure of Nereis is called

1) Pseudopodia

2) Parapodia

3) Tentacle

4) Comb plate

13. Annelida, Arthropoda and Mollusca resemble in the presence of

1) Jointed legs

2) Ctenidia

3) Trachea

4) Ventral nerve cord

14. Annelida is more advanced than Aschelminthes in having

1) Bilateral symmetry

2) Triploblasty

3) Metamerism

4) Sexual dimorphism

15. Arthropod without antennae is

1) Cockroach 2) House fly

3) Scorpion 4) Prawn

16. What makes insects most unique among Arthropods?

1) Presence of antennae

2) Presence of haemocoel

3) Three pairs of walking legs

4) Presence of malpighian tubules

17. Spiders and scorpions belongs to class

1) Arthropoda

2) Insecta

3) Chordata

4) Non- chordata

18. Which of the following shows correct grouping?

1)	Euspongia, Gorgonia	Porifera
2)	Sea pen,. Sea urchin	Cnidaria
3)	Pinctada, Meandrina	Mollusca
4)	Echinus, Antedon	Echinodermata

19. Which is **incorrect** regarding Aschelminthes

1) Presence of pseudocoelom

2) Muscular pharynx in alimentary canal

3) Excretory tubes which opens out through excretory pore

4) Monoecious, females are longer than males

20. Which one of the following is **not** a characteristic of phylum Annelida?

1) Closed circulation

2) Segmentation

3) Protonephridia

4) Ventral nerve cord

21. Non - chordates are characterised by all of the following **except**

1) Ventral nerve cord

2) Absence of pharyngeal gill slits

3) Ventral heart

4) Absence of post - anal tail

22. Aplysia belongs to the group of animals characterised by

1) Pentamerous radial symmetry

2) Body differentiated as head, thorax, abdomen

3) Chitinous exoskeleton

4) Calcareous shell

23. Which group contains members of the same phylum?

1) Limulus, Sepia, Locusta

2) Echinus, Antedon, Asterias

3) Loligo, Aplysia,Hirudinaria

4) Apis, Salpa, Pinctada

24. A radially symmetrical animal with bilaterally symmetrical larva is

1) Jelly fish 2) Silver fish

3) Cuttle fish 4) Star fish

25. Which of the following character is **not** found in Echinoderms?

1) Water vascular system

2) Radial symmetry

3) Absence of excretory system

4) Internal fertilisation

26. Water vascular sysytem of echinoderms serves all the following except:

1) Locomotion

2) Food capture

3) Reproduction

4) Respiration

27. Animal and respiratory structures correctly matched is :

1)	Prawn	Book lungs
2)	Cockroach	Malpighian tubule
3)	Pila	Feather like gills
4)	Star fish	Parapodia

28. Find the **incorrect** one regarding Hemichordata

1) Body divisible as Proboscis, Collar and Trunk

2) Presence of stomochord or buccal diverticulum

3) Closed circulation

4) Dorsally positioned pharyngeal gill slits for breathing

29. The animals with bilateral symmetry in larval stage and radial symmetry in the adult stage belong to the phylum

1) Mollusca 2) Cnidaria

3) Echinodermata 4) Annelida

30. Organ system level of organisation is not found in

1) arthropods 2) annelids

3) molluscs 4) ctenophora

31. Which one of the following animals are triploblastic?

1) Corals 2) flatworms

3) sponges 4) ctenophorans

32. Select the incorrect pair

	Column I	Column II
1)	Metagenesis	*Obelia*
2)	Metamerism	*Pheretima*
3)	Monoecious	*Nereis*
4)	Triploblastic	*Pinctada*

33. All of the following statements are correct for poriferans except

1) Eggs and sperms are produced by the same individual

2) They are generally marine and mostly asymmetrical animals

3) They reproduce sexually as well as asexually

4) They have an extracellular type of digestion

34. Bio-luminescence is well -marked in which of the following phyla?

1) Ctenophora 2) Mollusca

3) Hemichordata 4) Annelida

35. Arthropoda is characterised by

1) Triploblastic, radial symmetry and abdominal appendages

2) Bilateral symmetry and pair of wings

3) Acoelomate and radial symmetry

4) Exoskeleton, segmentation and jointed appendages

36. Which of the following statement is incorrect about the phylum hemichordata?

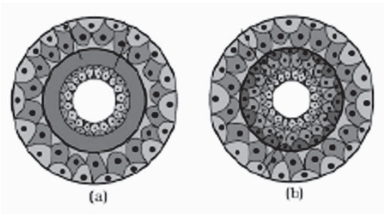
1) They are bilaterally symmetrical, triploblastic and coelomate animals

2) Circulatory system is closed

3) Excretory organ is proboscis gland

4) Fertilisation is external and development is indirect

37. Following figures showing diagrammatic representation of germinal layers. Choose the animal phylum represent 'a' and 'b' respectively as:



1) Porifera and coelenterate

2) Aschelminthes and platyhelminthes

3) Cnidarians and Annelids

4) Arthropods and Annelids

38. Platyhelminthes are

1) Diploblastic, Radially symmetrical and acoelomate

2) Triploblastic , Bilaterally symmetrical and pseudocoelomate

3) Triploblastic, Bilaterally symmetrical and coelomate

4) Triploblastic Bilaterally symmetrical and acoelomate

39. Match the following and choose the right option

Column I		Column II	
a)	Gregarious pest	p)	*Bombyx*
b)	Living fossil	q)	*Locusta*
c)	Silk worm	r)	*Limulus*
d)	Vector	s)	*Apis*
e)	Wax	t)	*Aedes*

1) $\frac{\text{abcde}}{\text{qrpts}}$ 2) $\frac{\text{abcde}}{\text{qrspt}}$

3) $\frac{\text{abcde}}{\text{trspt}}$ 4) $\frac{\text{abcde}}{\text{tpsrq}}$

40. The phenomenon by which body is externally and internally divided into segments with a serial repetition of atleast some organs, is called;

1) Metamorphosis

2) Metamerism

3) Metagenesis

4) Bioluminescence

41. Match column I with column II and select the correct option from the following.

Column I		Column II	
A)	Osmoregulation and excretion	i)	Little ring
B)	Muscular pharynx	ii)	Flatworms
C)	Flat body and suckers	iii)	Swimming
D)	Annulus	iv)	Flame cells
E)	Parapodia	v)	Roundworms

1) A-v; B-ii; C-iv; D-i; E-iii

2) A-v; B-iv; C-ii; D-i; E-iii

3) A-iv; B-v; C-i; D-ii; E-iii

4) A-iv; B-v; C-ii; D-i; E-iii

42. In Balanoglossus and Saccoglossus, their body is divisible into;

1) head, visceral hump and muscular foot

2) head, thorax and abdomen

3) proboscis, collar and trunk

4) head, trunk, visceral hump and muscular foot

43. Following are some of the characteristics about largest phylum under animal kingdom. Identify the irrelevant feature

1) Contributes over two- thirds of all named animal species on earth

2) Body is covered by calcareous exoskeleton

3) Sensory organs like antennae, eyes and statocysts are present

4) Fertilisation is usually internal

44. Given below are two statements

Statement I : In molluscs, certain feather like gills present in space between calcareous shell and mantle

Statement II : All molluscs have a calcareous shell without even a single exception

1) Statement I and statement II are correct

2) Statement I and statement II are incorrect

3) Statement I is correct but statement II is incorrect

4) Statement I is incorrect bit statement II is correct

45. Which of the following character is found in non-chordates ?

1) Presence of post anal tail

2) Paired pharyngeal gill slits

3) Dorsal heart

4) Ventral heart

46. In scypha and spongilla, water enter the

.....(i)..... through minute pores called ..... (ii)..... and the water goes out through the .....(iii)..... Here i, ii, iii are respectively as;

1) i - Coelenteron; ii - Ostia, iii - Osculum

2) i - Spongocoel; ii - Hypostome; iii - Anus

3) i - Spongocoel; ii - Mouth ; iii - Osculums

4) i - Spongocoel, ii - Ostia, iii - Osculum

47. Match the following

Column I		Column II	
1)	Ctenophora	a)	sea- urchin
2)	Aplysia	b)	sea hare
3)	Antedon	c)	sea lily
4)	Echinus	d)	sea walnut

1) 1-d, 2-c, 3-a, 4-b
2) 1-b, 2-c, 3-d, 4-a
3) 1-d, 2-b, 3-c, 4- a
4) 1-d, 2-b, 3-a, 4-c

48. Excretion in most annelids take place by

1) nephridia
2) malphigian tubules
3) flame cells
4) excretory pore

49. In some animals, the body cavity is not lined by mesoderm, instead the mesoderm is present as scattered pouches in between the ectoderm and endoderm. Which of the following phylum comes under this category?

1) Platyhelminthes
2) Aschelminthes
3) Annelida
4) Ctenophora

50. Match the animals given in column I with the identifying features in column II

Column I		Column II	
1)	Aurelia	A)	Ciliated comb plates
2)	Taenia	B)	Pseudocoelom and muscular pharynx
3)	Euspongia	C)	Tissue level, Medusoid body form
4)	Pleurobrachia	D)	Cellular level of organization
5)	Ancylostoma	E)	Hooks and suckers
		F)	Calcareous exoskeleton and cnidoblasts

1) $\frac{12345}{CEDAF}$
2) $\frac{12345}{DEABD}$
3) $\frac{12345}{CEDAB}$
4) $\frac{12345}{ECDFB}$

ANSWER KEY

1.	4	21.	4	41.	3	61.	2	81.	2
2.	4	22.	3	42.	3	62.	1	82.	2
3.	2	23.	3	43.	2	63.	3	83.	4
4.	4	24.	4	44.	3	64.	2	84.	1
5.	2	25.	3	45.	2	65.	3	85.	1
6.	4	26.	2	46.	3	66.	3	86.	3
7.	2	27.	4	47.	1	67.	4	87.	3
8.	2	28.	1	48.	3	68.	4	88.	1
9.	1	29.	1	49.	2	69.	2	89.	1
10.	3	30.	2	50.	2	70.	4	90.	4
11.	4	31.	4	51.	3	71.	4	91.	3
12.	4	32.	2	52.	4	72.	4	92.	1
13.	1	33.	3	53.	4	73.	4	93.	4
14.	1	34.	1	54.	1	74.	4	94.	4
15.	2	35.	3	55.	3	75.	3	95.	2
16.	4	36.	4	56.	2	76.	2	96.	2
17.	2	37.	3	57.	2	77.	4	97.	3
18.	3	38.	4	58.	4	78.	4	98.	3
19.	3	39.	1	59.	4	79.	3	99.	1
20.	4	40.	1	60.	4	80.	4	100.	4

SAMPLE QUESTIONS

1.	1	11.	3	21.	3	31.	2	41.	4
2.	2	12.	2	22.	4	32.	3	42.	3
3.	3	13.	4	23.	2	33.	4	43.	2
4.	2	14.	3	24.	4	34.	1	44.	2
5.	4	15.	3	25.	4	35.	4	45.	3
6.	3	16.	3	26.	3	36.	2	46.	4
7.	1	17.	2	27.	3	37.	3	47.	3
8.	3	18.	4	28.	3	38.	4	48.	1
9.	2	19.	4	29.	3	39.	1	49.	2
10.	4	20.	3	30.	4	40.	2	50.	3

WORK BOOK

Chapter 03

ANIMAL KINGDOM : CHORDATA

PHYLUM - CHORDATA

1. An important characteristic that hemichordata share with chordates is

1) Absence of notochord

2) Ventral tubular nervecord

3) Pharynx with gill slits

4) Pharynx without gill slits

2. All vertebrates are chordates but all chordates are not verebrates, why?

1) Notochord is replaced by a vertebral column in adult of most chordates

2) Ventral hollow nerve cord remains throughout life in some chordates

3) All chordates possess a vertebral column

4) All chordates possess notochord throughout their life

3. Which of the following statements are true for phylum-Chordata ?

i) In Urochordata notochord extends from head to tail and persists throughout their lives

ii) In chordata notochord is present during the embryonic period only

iii) CNS is dorsal and hollow

iv) Chordata is divided into 3 subphyla

1) i and ii 2) ii and iii

3) iv and iii 4) iii and i

4. Which one of the following statements is totally wrong about the occurrence of notochord?

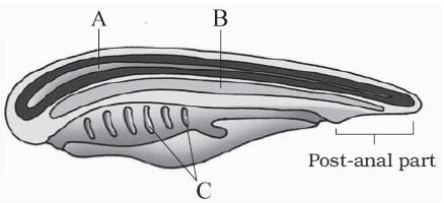
1) It is present throughout life in Amphioxus

2) It is present only in larval tail in Ascidians

3) It is replaced by vertebral column in adult frog

4) It is absent throughout life in humans from the very beginning

5. Observe the following diagram and identify A, B and C



1) A- notochord, B- nerve cord, C- gill slits

2) A-notochord, B- gill silts, C- nerve chord

3) A- nerve cord, B - notochord, C- gill slits

4) A- gill slits, B - notochord, C - nerve chord

6. Phylum chordata is classified into subphyla:

1) Urochordata, Tunicata, Vertebrata

2) Urochordata, Cephalochordata, Vertebrata

3) Tunicata, Hemichordata, Vertebrata

4) Cephalochordata, Hemichordata, Vertebrata

7. "Bilateral symmetry, coelom, dorsal hollow nerve cord and gill slits". These are characteristics of

1) Phylum Hemichordata

2) Phylum Chordata

3) Phylum Porifera

4) Phylum Echinodermata

8. Bilateral symmetry is seen in the body organisation of

1) Only chordates

2) Vertebrates only

3) Vertebrates, Annelids, Arthropods and Cnidarians

4) Annelids, Arthropods and Vertebrates

9. In Chordates, the notochord is for:

1) Circulation

2) Support

3) Digestion

4) Respiration

10. Chordates are distinguished from non-chordates by the presence of :

1) Ventral nerve cord

2) Dorsal double nerve cord

3) Brain and spinal cord

4) Dorsal tubular nerve cord

11. **Statement I** : The notochord persists throughout life in Salpa

Statement II : The notochord is present only in the larval tail of Ascidia.

1) Statements I and II are correct

2) Statement I is correct but II is incorrect

3) Both statements are incorrect

4) Statement II is correct and I is incorrect

12. **Statement I** : All chordates are vertebrates but all vertebrates are not chordates

Statement II : Sub phylum urochordata and cephalochordata are often referred to as proto-chordata

1) Both the statements I and II are incorrect

2) Statement I is correct but II is incorrect

3) Statement I is incorrect but II is correct

4) Both the statements I and II are correct

SUBPHYLUM - UROCHORDATA & SUBPHYLUM - CEPHALOCHORDATA

13. In Urochordates, the notochord is

1) Absent

2) Persistent throughout life

3) Present in the tail of larva

4) Extends from head to tail

14. "Protochordates are

1) Urochordates and cephalochordates

2) Cephalochordates and vertebrates

3) Tunicates and hemichordates

4) Hemichordates and vertebrates

15. The other name of Branchiostoma is

1) Amphioxus 2) Lancelet

3) Both 1 and 2 4) None of these

16. Ascidia, Salpa, Doliolum and Branchiostoma out of these 4 how many are Cepahlochordates

1) 1 2) 2

3) 3 4) 4

17. An organism with a test or tunic covering the body surface are

1) Ascidia 2) Lancelet

3) Salpa 4) Both 1 and 3

18. Find the incorrect statement regarding Cyclostomes

1) Locomotion with the help of paired fins

2) They have an elongated body bearing 6-15 pairs of gill slits for respiration

3) They have a sucking and circular mouth without jaws

4) Their body is devoid of scales

19. In which of the following organisms are the chordate characters present only in the larval stage?

1) Ascidia

2) Lancelet

3) Hagfish

4) Trygon

20. Retrogressive metamorphosis can be seen in:

1) Cephalochordata

2) Urochordata

3) Hemichordata

4) Protochordata

21. Which of the following has notochord throughout life?

1) Birds

2) Osteichthyes

3) Snakes

4) Amphioxus

22. Ascidia is also known as

1) Sea cucumber

2) Cepahlochordata

3) Sea squirt

4) Sea urchin

23. Identify the given organism and findout the correct statement about the organism

1) Notochord extend from head to tail

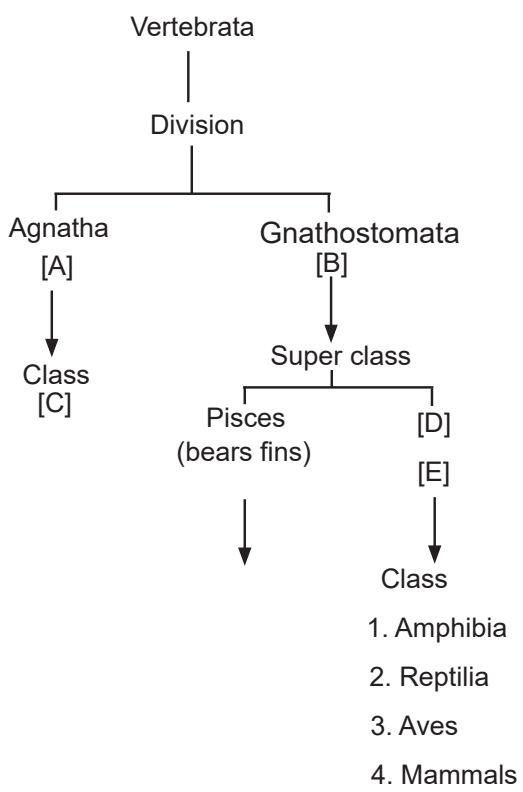
2) Exclusively fresh water

3) Notochord present only in larval tail

4) It is the member of subphylum cephalochordata

SUBPHYLUM - VERTEBRATA - CYCLOSTOMATA, CHONDRICHTHYES, OSTEiCHTHYES

24.



Carefully observe the given flowchart and identify A,B,C,D & E

	A	B	C	D	E
1)	Bears Jaw	lacks jaw	Amphibia	Bears limb	Tetrapoda
2)	Lacks Jaw	Bears Jaw	Cyclostomata	Tetra poda	Bears limbs
3)	Lacks Jaw	Bears Jaw	Cyclostomata	Reptilia	Bears limbs
4)	Bears Jaw	lacks jaw	Cyclostomata	Tetra poda	Bears limbs

25. *Lamprey* is not a fish since it does not have:
1) Closed blood vascular system
2) Fins
3) Body scales and paired fins
4) Cranium and vertebral column

26. Following chordate is not a vertebrate

1) *Branchiostoma* 2) *Petromyzon*

3) Salamander 4) *Bufo*

27. The cyclostomes are:

1) Marine and non-migratory

2) Fresh water form and non-migratory

3) Marine and migrate to fresh water for spawning

4) Fresh water form and migrates to sea for spawning

28. Which of the following is not exclusively marine ?

1) Protochordates

2) Urochordata or tunicata

3) Cephalochordata

4) Vertebrata

29. Which of the following character is not true for *Cyclostomata*?

1) Ectoparasites on some fishes

2) Bearing 6-15 pairs of gill slits

3) Sucking and circular mouth without jaws

4) Cranium and vertebral column are bony

30. Which of the following is correct about cyclostomata?

1) Ectoparasite on fishes during their adult stage

2) Skin with scales and contains unicellular mucous gland

3) One kidney for excretion

4) Heart is two-chambered and possess 4 pairs of gill slits for respiration

31. Which one of the following pairs of animals comprises "jawless fishes" ?

1) Lampreys and eels

2) Mackerel and Rohu

3) Lampreys and Hag fish

4) Guppies and hag fishes

32. Read the following statements

* Cartilaginous endoskeleton

* Ventral mouth, notochord persists throughout life

* Gill slits are separate without operculum

* Presence of placoid scales

* Absence of air bladder

All the above features are relared to

1) Class chondrichthyes

2) Class cyclostomata

3) Class osteichthyes

4) Class amphibia

33. Identify the true statements about class chondrichthyes

i) They are poikilothermous

ii) Sexes are separate and males bear claspers

iii) Internal fertilization and many of them are oviparous

1) All the statements are true

2) All the statements except i are true

3) All the statements except ii are true

4) All the statements except iii are true

34. In class osteichthyes gills are covered by an .....A.....on each sides. Skin is covered by .....B.....scales. Air bladder is .....C....Heart is .....D.....chambered, sexes are .....E...,fertilization is external, mostly oviparous and their development is .....F.....Identify A to F

	A	B	C	D	E	F
1	Operculum	Placoid	Absent	4	Separate	Indirect
2	Operculum	Ctenoid	Absent	3	Separate	Direct
3	Operculum	Ctenoid	Present	2	Separate	Direct
4	Operculum	Ctenoid	Present	2	Separate	Indirect

35. "Air bladder is present which regulates buoyancy", this feature is present in

1) Labeo

2) Petromyzon

3) Trygon

4) Pristis

36. Match the following

Column A		Column B	
i)	Petromyzon	p)	Saw fish
ii)	Myxine	q)	Dog fish
iii)	Electric organs	r)	Trygon
iv)	Scoliodon	s)	Lamprey
v)	Pristis	t)	Hag fish
		u)	Torpedo

1) i-t, ii-s, iii-r, iv-u, v -p

2) i-s, ii-q, iii-p, iv-t, v-u

3) i-s, ii-t, iii-u, iv-q, v-p

4) i-t, ii-u, iii-r, iv-s, v-q

37. In shark which one of the following is absent

1) Claspers

2) Placoid scale

3) Cartilagenous endoskeleton

4) Air bladder

38. In which class the given organism is included? Where do you find claspers in this organism?

1) Chondrichthyes - in males on pelvic fins

2) Chondrichthyes - in females on pelvic fins

3) Osteichthyes - in males on pectoral fins

4) Osteichthyes - in females on caudal fins

39. Find the incorrect statement about bony fishes

1) It includes both marine and fresh water fishes with bony endoskeleton

2) Mouth is mostly terminal and they have four pairs of gills which are covered by an operculum on each side

3) Skin is covered with placoid/ cycloid/ ctenoid scales

4) Sexes are separate. Fertilisation is usually external. They are mostly oviparous and development is direct

40. Heterocercal caudal fin, backwardly directed teeth, ventral large mouth. These are the features related to:

1) Pristis and Scoliodon

2) Betta and Saw fish

3) Scoliodon and Magur

4) Hippocampus and Clarias

41. The lateral line system is a sensory adaptation found in:

1) Pisces 2) Reptiles

3) Birds 4) Mammals

42. "Air bladder is present which regulates buoyancy". This feature is present in

1) Magur 2) Hag fish

3) Torpedo 4) Shark

43. Which of the following statements are true/ false about osteichthyes?

a) It includes both marine and fresh water fishes with bony endoskeleton

b) Gill slits without operculum

c) Usually external fertilization

d) Mouth is mostly terminal

e) Air bladder is absent

1) a,b,c are true and d and e are false

2) a,b,d are true and c and e are false

3) a and b are true and c,d,e are false

4) a,c,d are true, b and e are false

44. Which of the following is correct for Angel fish?

1) Possess cartilaginous endoskeleton

2) Teeth are modified placoid scales

3) Possess air bladder

4) Internal fertilization

CLASS : AMPHIBIA

45. The name "Amphibian' indicates that they can live in

1) Aquatic habitat 2) Terrestrial habitat

3) Both 1 and 2 4) Aerial habitat

46. Amphibian belongs to super class

1) Pisces 2) Agnatha

3) Gnathostomata 4) Tetrapoda

47. Which of the following tract opens into a common chamber cloaca in amphibians?

1) Alimentary canal 2) Urinary tract

3) Reproductive tract 4) All of these

48. Three-chambered heart, cold-blooded, external fertilization and indirect development is seen in

1) Labeo 2) Salpa

3) Frog 4) Myxine

49. Amphibians are characterised by all of the following characters, except

1) External fertilization

2) Indirect development

3) They are oviparous

4) They are amniotes

50. Which one of the following characters is not related with the amphibians?

1) Two pairs of limbs

2) Moist skin without scales

3) Poikilothermy or cold-bloodedness

4) Incompletely four-chambered heart

51. Amphibians share with reptiles all of the following characters except

1) Dioecious and oviparous

2) Poikilothermy and mostly terrestrial

3) External fertilization and indirect development

4) Ventral heart

52. Which of the following is not a characteristic feature of amphibians?

1) Body is divisible into head and trunk

2) Moist skin

3) Viviparity and direct development

4) Eyes have eyelids and tympanum present

CLASS- REPTILIA

53. Which one of the following statements is not true about reptiles?

1) They have creeping or crawling mode of locomotion

2) They are mostly terrestrial and body is covered by dry cornified skin, epidermal scales or scutes

3) Heart is partially four-chambered in most

4) Fertilisation is external

54. Naja, Vipera, Calotes and Chelone are grouped under class Reptilia. It is because of

1) creeping or crawling mode of locomotion

2) dual mode of life

3) circular, suctorial mouth without jaws

4) presence of scales on hindlimbs

55. Which one of the following is not a poisonous snake?

1) Cobra 2) Viper

3) Python 4) Krait

56. Match the columns and choose the correct answer from the options given below.

Column I		Column II		Column III	
i)	Naja	a)	Ajgar	k)	Poisonous
ii)	Bangarus	b)	Cobra	l)	Non-poisonous
iii)	Vipera	c)	Krait		
iv)	Python	d)	Viper		

1) i/b/k, ii/c/k, iii/d/l, iv/a/l

2) i/b/k, ii/c/k, iii/d/k, iv/a/l

3) i/c/k, ii/b/k, iii/d/k, iv/a/l

4) i/d/k, ii/b/k, iii/a/k, iv/c/l

57. Match the columns and choose the correct answer from the options given below.

Column I		Column II	
i.	Chelone	a)	Garden lizard
ii.	Testudo	b)	Crocodile
iii.	Chameleon	c)	Tortoise
iv.	Calotes	d)	Turtle
v.	Crocodilus	e)	Tree lizard

1) i-c, ii-b, iii-a, iv-e, v-d

2) i-d, ii-c, iii-e, iv-b, v-a

3) i-c, ii-d, iii-e, iv-b, v-a

4) i-d, ii-c, iii-e, iv-a, v-b

58. Limbless reptile is

1) Chameleon 2) Crocodile

3) Chelone 4) Snake

59. Read the following and identify the incorrect statements regarding class reptilia

i) Body is covered by dry, cornified skin

ii) Heart is three chambered in all reptiles

iii) Fertilisation is external and development is indirect

1) i alone is incorrect

2) ii alone is incorrect

3) i and ii are incorrect

4) ii and iii are incorrect

60. Dry cornified skin covered by epidermal scales or scutes are the features related to

1) Hyla 2) Corvus

3) Chameleon 4) Pteropus

CLASS - AVES

61. Pick out the odd one from the following

1) Testudo 2) Chelone

3) Chameleon 4) Aptenodytes

62. How many of the following characters are related to Aves?

Feathers, beak, pneumatic bones, crop, gizzard, homeothermal, oviparity, external fertilization

1) 4 2) 5

3) 7 4) 6

63. Aves are:

1) Ammonotelic 2) Uricotelic

3) Ureotelic 4) Both 1 and 2

64. Which one of the following characters in birds indicates their reptilian ancestry?

1) Two special chambers - crop and gizzard in their digestive tract

2) Eggs with a calcareous shell

3) Scales on their hind limbs

4) Four chambered heart

65. How many of the following have pneumatic bones?

Naja, Corvus, Psittacula, Pavo, Calotes, Bufo, Hyla, Felis, Balenoptera, Neophron

1) 5 2) 6

3) 4 4) 9

66. "Skin is dry without glands except the oil glands at the base of the tail." This statement is associated with

1) Columba 2) Testudo

3) Delphinus 4) Bufo

67. Find the mismatch

	Column I	Column II
1)	Psittacula	Parrot
2)	Struthio	Vulture
3)	Pavo	Peacock
4)	Aptenodytes	Penguin

68. Find the incorrect statement about aves

1) The hind limbs generally have scales and are modified for walking, swimming or clasping the tree branches.

2) Skin is moist with glands

3) Endoskeleton is fully ossified (bony)

4) The long bones are hollow with air cavities (pneumatic)

69. Find out the class from the given information

Air sacs connected to lungs supplement respiration. Sexes are separate. Fertilisation is internal. They are oviparous and development is direct

1) Mammalia

2) Aves

3) Reptiles

4) Amphibians

70. Which of the following is a member of Aves?

1) *Neophron*, *Hemidactylus*, *Naja*

2) Pteropus, Camelus, Macaca

3) *Struthio*, *Pavo*, *Aptenodytes*, *Neophron*

4) *Clarias*, *Betta*, *Pterophyllum*

71. In Columba and Pavo, their hindlimbs are adapted for:

1) Walking 2) Flying

3) Swimming 4) Creeping

CLASS : MAMMALIA

72. Which characters found only in Mammals?

1) Pinna, teeth

2) Hairs, oviparous

3) Mammary glands, teeth

4) Mammary glands, Hairs

73. Find the correct match

	Column I	Column II
i)	Panthera leo	Lion
ii)	Panthera tigris	Tiger
iii)	Panthera pardus	Leopard
iv)	Aptenodyte	A mammal
v)	Balaenoptera	An amphibian

1) i and ii only 2) iv and v only

3) i, ii and iii 4) iii, iv and v

74. Find out the mismatched pair

	Column I	Column II
1)	Ornithorhynchus	Egg laying mammal
2)	Pteropus	Flying fox
3)	Balaenoptera	Blue whale
4)	Delphinus	Penguin

75. Which one of the following characters is not typical of the Class Mammalia?

1) Seven cervical vertebrae

2) Thecodont dentition

3) Ten pairs of cranial nerves only

4) Alveolar lungs

76. Which of the following is a subclass of mammals characterized by the presence of pouches?

1) Prototheria 2) Marsupials

3) Eutheria 4) Both 1 and 2

77. Read the following statements:

i) Duck billed platypus is a connecting link between reptiles and mammals.

ii) Presence of muscular diaphragm is an important feature of mammals

iii) The unique features of mammals are the presence of mammary glands

iv) Skin of most mammals possess sudoriferous and sebaceous glands

How many of the above statements are correct?

1) None 2) Two

3) Three 4) All

78. How many of the following characetristics are present in humans?

Muscular diaphragm, Seven cervical vertebrae, Mammary glands, Body hair, Oviparity, Four chambered heart, Direct development, Thecodont dentition, Paired limbs

1) Seven 2) Eight

3) Nine 4) Ten

79. Which among the following has some mammalian characters?

1) Chelone 2) Crocodile

3) Chameleon 4) Calotes

80. Pteropus has

1) pneumatic skeleton

2) air sacs connected to lungs to supplement respiration

3) different types of teeth (heterodont dentition)

4) dry skin without glands

81. Which is not an exclusive mammalian characteristics?

i) Presence of mammary glands

ii) Presence of pinnae

iii) Presence of epidermal hair

iv) Tetralocular heart

1) i and ii 2) ii and iii

3) i only 4) iv only

82. Marsupials and placental mammals include

1) Macropus (Kangaroo) and Canis (dog)

2) Camelus (Camel), Macaca (Monkey)

3) Delphinus (Common dolphin), Balaenoptera (Blue whale)

4) *Panthera tigris* (Tiger), *Panthera leo* (Lion)

83. Prototherian are considered as a connecting link between:

1) Reptiles and mammals

2) Fishes and amphibians

3) Amphibians and reptiles

4) Reptiles and birds

84. Select the incorrect matching

	Column I	Column II
1)	Kangaroo	Macropus
2)	Blue whale	Balaenoptera
3)	Monkey	Macaca
4)	Elephas	Camel

85. Which of the following is an aquatic mammal?

1) *Panthera tigris* 2) *Balaenoptera*

3) *Pteropus* 4) *Macropus*

86. The following features belongs to

i) Exoskeleton include hairs on body, horns and nail

ii) Pinnae is present

iii) Heart is four-chambered

iv) Warm-blooded (Homeothermous)

v) Thecodont and heterodont teeth

1) Reptilia

2) Aves

3) Mammals

4) Amphibians

87. What is true for Mammalia?

1) Platypus is oviparous

2) Bats have feather

3) Elephant is an ovoviviparous

4) Diaphragm is absent in them

88. In which one of the following sets of animals do all the four give birth to young ones:

1) Kangaroo, Equus, Dolphin

2) Lion, Bat, Ostrich

3) Platypus, Penguin, Bat

4) Bat, Cat, Kiwi

89. What is common between parrot, platypus and Kangaroo?

1) Oviparity

2) Homeothermy

3) Toothless jaws

4) Functional post anal tail

90. Pick the incorrect match

Column I		Column II
1)	Felis	cat
2)	Canis	tiger
3)	Rattus	rat
4)	Pteropus	flying fox

91. Which of the following group of animals is correctly matched with its one charfacteristic feature without even a single exception?

Column I		Column II
1)	Platyhelminthes	parasitic forms
2)	Amphibia	cutaneous respiration
3)	Mammalia	viviparous
4)	Aves	ability to fly

92. Identify the mismatch among the following

Column I		Column II
1)	Reptiles	Cleidoic eggs
2)	Amphibians	Epidermal scales
3)	Eutherian mammals	Hairy body
4)	Aves	Pneumatic bones

93. Which of the following statements is true?

1) All living members of class Cyclostomata are parasities on some fishes

2) Fishes are the most abundant among all vertebrates

3) Salpa belongs to the sub-phylum Cephalochordata

4) Protochordates are diploblastic animals

94. Which of the following is a matching set of the class and some of its main distinguishing features, classification and example?

1) Cyclostomata - Division Agnatha, 6-15 pairs of gill slits, endoskeleton bony.

Example : Myxine

2) Reptilia - Division Gnathostomata, Epidermal scales, Endoskeleton bony.

Example : Hemidactylus

3) Amphibia - Superclass Tetrapoda, Cloaca as a common opening for the alimentary canal, urinary tract and reproductive tract, exoskeleton bony.

Example : Hyla

4) Chondrichthyes - Superclass Pisces, gill slits without operculum, exoskeleton cartilaginous.

Example : Carcharodon

95. Match Column I with Column II and choose the right option.

Column I		Column II	
A)	Macropus	i)	Dog
B)	Canis	ii)	Flying fox
C)	Hyla	iii)	Kangaroo
D)	Pteropus	iv)	Tree frog
		v)	Toad

1) A-iv, B-i, C-v, D-ii
2) A-iii, B-i, C-iv, D-ii
3) A-ii, B-iv, C-v, D-iii
4) A-v, B-ii, C-i, D-iv

96. Which of the following groups has no members having gliding or flying appendages?

1) Arthropoda 2) Cyclostomata
3) Mammals 4) Fishes

97. Which of the following animals show viviparity?

1) Whales 2) Bony fishes
3) Turtles 4) Running birds

Assertion - Reason Type questions

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

98. **Assertion** : Sting ray is a member of Chondrichthyes.

Reason : They have three pairs of gills which are covered by an operculum on each side.

99. **Assertion** : *Psittacula* and *Struthio* are member of Aves.

Reason : The forelimbs are modified into wings and both of them can fly.

100. **Assertion** : Amphibia, Reptilia, Aves and Mammals included in super class tetrapoda.

Reason : They have two pairs of limbs, adapted for walking, running, climbing, burrowing, swimming or flying.

SAMPLE QUESTIONS

1. Homeothermy is exhibited by

1) All amniotes

2) Birds and mammals

3) All deuterostomes

4) Reptiles and Mammals

2. Consider the following characters

I) Air bladder

II) Operculum

III) Viviparity

The characters present in bony fishes include

1) I, II and III 2) I and III only

3) I and II only 4) II and III only

3. Consider the following features

I) Persistant notochord

II) Operculum or gill cover

III) Ureotelism

IV) Viviparity

V) Swim bladder

VI) Homocercal tail fin

The features that can be attributed to cartilaginous fishes are

1) I, III and IV only 2) II, V and VI only

3) I, II, III and IV 4) All

4. Key features that appeared for the first time in amphibians do not include

1) Legs

2) Kidneys

3) Lungs

4) Pulmonary veins

5. Consider the following characters

I) Air sacs associated with lungs

II) Pneumatic bones

III) Feathers

IV) Endothermy

V) Left aortic arch

VI) Four chambered heart.

Which of these are unique to birds?

1) I, II and III only

2) I, II, III and IV only

3) I, II, III, IV and V only

4) All

6. Notochord is present in larval stages but retrogressive metamorphosis results in the absence in its adult in

1) Hemichordata 2) Urochordata

3) Cephalochordata 4) Euchordata

7. Respiration in amphibian tadpole occurs through

1) lungs

2) pharyngeal wall

3) spiracles

4) gills

8. Which of the following group of protochordates have tunic ?

1) Urochordata 2) Cephalochordata

3) Hemichordata 4) Cyclostomata

9. Striking difference between urochordata and cephalochordata is:

1) Position of stomochord

2) Length of notochord

3) Perforated pharynx

4) Position of gills

10. 6-15 pairs of gills slits found in

1) Protochordates 2) Pisces

3) Frog 4) Lamprey

11. Identify the incorrectly matched pair

	Column I	Column II
1)	Ornithorhynchus	Oviparous mammal
2)	Macropus	Marsupial mammal
3)	Balaenoptera	Largest land mammal
4)	Pteropus	Flying mammal

12. Match each item in column I with one item in column II and choose your answer from the codes given below

Column I (Feature)		Column II (Phylum)	
a)	Lateral line system	i)	Ctenophora
b)	Water vascular system	ii)	Mollusca
c)	Radula	iii)	Echinodermata
d)	Comb plates	iv)	Osteichthyes
e)	Parapodia	v)	Annelids

1) a-i, b-ii, c-iii, d-iv, e-v

2) a-iv, b-iii, c-ii, d-i, e-v

3) a-iv, b-iii, c-i, d-v, e-ii

4) a-iii, b-ii, c-i, d-v, e-iv

13. Reptiles were very successful on land while amphibians were not what evolutionary development was primarily responsible for the success of reptiles on land?

1) Scales over skin 2) Thoracic breathing

3) Amniotic egg 4) Strong jaws

14. Consider the following sets of some animals. The set that consists of all animals belonging to the same phylum is

1) Pinctada, Aplysia, Chaetopleura

2) Dentallium, Pila, Echinus

3) Asterias, Antedon, Ascidia

4) Adamsia, Gorgonia, Pleurobrachia

15. Birds are not characterised by

1) Forelimbs modified into wings.

2) Fully ossified endoskeleton

3) Skin dry without glands except for oil gland

4) Oviparous and external fertilization

16. Operculum and an air bladder are present in:

1) Clarias 2) Pristis

3) Trygon 4) Carcharodon

17. Pteropus is a

1) Limbless amphibian

2) Extinct reptile that evolved into mammals

3) Bony fishes that migrates from sea to freshwater for breeding

4) Mammal with flight adaptation

18. Choose the correct statements

1) All mammals are viviparous

2) All cyclostomes do not possess jaws and paired fins

3) All reptiles have a three chambered heart

4) All pisces have gills covered by an operculum

19. Which of the following characteristic features always holds true for the corresponding group of animals ?

	Column I	Column II
1)	Viviparous	Mammalia
2)	Possess a mouth with an upper and a lower jaw	Chordata
3)	3- chambered heart with one incompletely divided ventricle	Reptilia
4)	Cartilagenous endoskeleton	Chondrichthyes

20. Which one of the following characteristics is not shared by birds and mammals?

1) Breathing using lungs

2) Viviparity

3) Warm blooded nature

4) Ossified endoskeleton

21. In birds:

a) the characteristics feature is the presence of feathers

b) forelimbs are modified into wings

c) all members can fly

d) hindlimbs do not have scales

1) only (a) and (d) are incorrect

2) only (c) and (d) are correct

3) (a), (b) and (c) are correct

4) only (a) and (b) are correct

22. A lizard -like member of reptilia is sitting on a tree with its tail coiled around a twig. The animal could be

1) Hemidactylus showing sexual dimorphism

2) Varanus showing mimicry

3) Calotes showing camouflage

4) Chamaleon showing protective colouration

23. Limbs are present in

1) Osteichthyes

2) Chondrichthyes

3) Reptiles

4) Urochordates

24. What is the number of animals amongst the animals given below, that have both a four-chambered heart and endothermy?

Crocodilus, Aptenodytes, Canis, Calotes, Struthio, Delphinus, Testudo, Ichthyophis

1) 3 2) 4

3) 5 4) 6

25. Match items in column -I with those in column -II and choose the correct option

Column I		Column II	
a)	Exocoetus	i)	Tympanum represents the ear
b)	Trygon	ii)	Marine bony fish
c)	Salamandra	iii)	Air sacs connected to lungs
d)	Aptenodytes	iv)	Cartilaginous marine fish

1) a-i, b-ii, c-iii, d-iv

2) a-iv, b-iii, c-ii, d-i

3) a-ii, b-iv, c-i, d-iii

4) a-i, b-iii, c-ii, d-iv

26. Consider the following characters

I) Body is covered by scales in all tetrapods

II) Jaw is present in all vertebrates

III) All terrestrial vertebrates have atleast a three chambered muscular heart

1) All are incorrect

2) All are correct

3) Only III is correct

4) Only II is correct

27. Given below are two statements

I) Amphibians and reptiles have a 3-chambered heart with two atria and a single ventricle and are viviparous in nature.

II) Crocodiles possess a 4 chambered heart with two ventricles and two atria and are viviparous in nature

Select the most appropriate option

1) I is correct but II is incorrect

2) I is incorrect but II is correct

3) Both I and II are correct

4) Both I and II are incorrect

28. Which of the following group of animals have three chambered heart?

1) Bufo, Alligator, Struthio

2) Chameleon, Hyla, Calotes

3) Crocodilus, Pavo, Clarias

4) Exocoetus, Hemidactylus, Rana

29. Which of the following animals has three chambered heart?

1) Scoliodon 2) Hippocampus

3) Chelone 4) Pteropus

30. Given are four animals namely- Gorgonia, Hirudinaria, Balaenoptera and Aptenodytes

Which of the following statements is correct regarding all the four animals

1) All are bilaterally symmetrical

2) Aptenodytes are homoeothermic while the remaining are poikilothermic

3) Hirudinaria is a freshwater form while all others are marine

4) Among the four only Balaenoptera has mammary glands

31. Mammal without placenta

1) Balaenoptera 2) Elephas

3) Camelus 4) Ornithorhyncus

32. Alimentary canal, urinary and reproductive tracts opens into a common chamber called cloaca. It is the character found in all the following group of animals except

1) Rana, Hyla, Salamandra

2) Toad, Frog, Tree frog

3) Bufo, Hyla, Ichthyophis

4) Macropus, Pteropus, Camelus

33. Tetralocular heart, homoiothermy, internal fertilization, oviparity and direct development are the features related to

1) Pavo, Psittacula, Corvus, Crocodile

2) Calotes, Aptenodytes, Corvus, Ornythorhynchus

3) Neophron, Ornythorhynchus, Spiny ant eater, Pavo

4) Bufo, Crocodile, Alligator, Naja

34. Which of the following are true regarded with class aves but not true about class mammalia?

a) Skin is dry without glands

b) Different types of teeth are present in the jaw

c) Presence of scales in hindlimbs and oil gland at the tail base

d) Internal fertilization and direct development

e) Homoeothermy and bony endoskeleton

1) a,b,c 2) a,c

3) d,e 4) a,d,e

In the following questions a statement of assertion (A) is followed by a statement of Reason (R)

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

35. **Assertion** : Reptiles are similar to Aves in the term of development

Reason : Both are strictly oviparous and lay cleiodic eggs.

36. Which of the following pairs of animals is cold - blooded, has a four chambered heart and lays shelled eggs?

1) Chelone and Ichthyophis

2) Alligator and Crocodile

3) Ornithorhynchus and Crocodile

4) Hemidactylus and Echidna

37. Which of the following is not a similarity between crocodile and humans?

1) Four chambered heart

2) Thecodont dentition

3) Sweat glands

4) 2 pairs of limb

38. Match column I (Animals) with column II (characteristics) and column III (class)

Column I	Column II	Column III
a) Exocoetus	i) Tympanum represents ear	p) Aves
b) Ichthyophis	ii) crop and gizzard	q) Reptilia
c) Bangarus	iii) Hairs on body and ear pinna	r) Mammalia
d) Pavo	iv) Cycloid/ Ctenoid scales	s) Amphibia
e) Equus	v) Epidermal Scales	t) Osteichthyes

1) a-v-t, b-iv-q, c-ii-r, d-i-p, e-iii-s

2) a-iv-t, b-i-s, c-v-q, d-ii-p, e-iii-r

3) a-iv-t, b-i-s, c-v-p, d-ii-q, e-iii-r

4) a-iv-t, b-v-s, c-i-q, d-ii-p, e-iii-r

39. Match the items in column I with those in column II

Column I		Column II	
i)	Ornithorhynchus	A	Flying mammal
ii)	Macropus	B	Egg laying mammal
iii)	Balaenoptera	C	True placental mammal
iv)	Equus	D	Aquatic mammal
v)	Pteropus	E	Pouched mammal

1) i-B, ii-E, iii-A, iv-C, v-D

2) i-C, ii-D, iii-B, iv-A, v-E

3) i-B, ii-E, iii-D, iv-C, v-A

4) i-B, ii-A, iii-D, iv-C, v-A

40. Turtle and Parrot are similar to Dolphin and Trygon in which one of the following features?

1) Possess a solid single stranded central nervous system

2) Possess bony skeleton

3) Have gill slits at some stage

4) Lay eggs and guard them till they hatch

41. Which of the following group of animals represents poikilotherms

1) Pristis, Pterophyllum, Psittacula

2) Aptenodytes, Alligator, Ichthyophis

3) Salamandra, Catla, Bangarus

4) Balaenoptera, Macropus, Chameleon

42. Which among these is the correct combination of aquatic mammals

1) Seals, Dolphins, Sharks

2) Dolphins, Seals, Trygon

3) Whales, Dolphins, Seals

4) Trygon, Whales, Seals

Assertion - Reason Type Questions

In the following questions a statement of Assertion (A) is followed by a statement of Reason (R)

1) Assertion is correct but Reason is not correct

2) Both Assertion and Reason are false

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

43. **Assertion** : Birds exhibit pulmonary respiration and they are able to maintain a constant body temperature

Reason : In birds air sacs connected to lungs which supplement respiration.

44. **Assertion** : Amphioxus has a simple organisation when compared to vertebrates.

Reason : Amphioxus is an aquatic cephalochordate

45. **Assertion** : The scales of reptiles and fishes are similar in origin

Reason : All the chordates lack kidneys.

ANSWER KEY

1.	3	21.	4	41.	1	61.	4	81.	4
2.	1	22.	3	42.	1	62.	3	82.	1
3.	3	23.	3	43.	4	63.	2	83.	1
4.	4	24.	2	44.	3	64.	3	84.	4
5.	3	25.	3	45.	3	65.	3	85.	2
6.	2	26.	1	46.	4	66.	1	86.	3
7.	2	27.	3	47.	4	67.	2	87.	1
8.	4	28.	4	48.	3	68.	2	88.	1
9.	2	29.	4	49.	4	69.	2	89.	2
10.	4	30.	1	50.	4	70.	3	90.	2
11.	4	31.	3	51.	3	71.	1	91.	2
12.	3	32.	1	52.	3	72.	4	92.	2
13.	3	33.	4	53.	4	73.	3	93.	2
14.	1	34.	3	54.	1	74.	4	94.	2
15.	3	35.	1	55.	3	75.	3	95.	2
16.	1	36.	3	56.	2	76.	2	96.	2
17.	4	37.	4	57.	4	77.	4	97.	1
18.	1	38.	1	58.	4	78.	2	98.	1
19.	1	39.	3	59.	4	79.	2	99.	1
20.	2	40.	1	60.	3	80.	3	100.	3

SAMPLE QUESTIONS

1.	2	10.	4	19.	4	28.	2	37.	3
2.	3	11.	3	20.	2	29.	3	38.	2
3.	1	12.	2	21.	4	30.	4	39.	3
4.	2	13.	3	22.	4	31.	4	40.	3
5.	1	14.	1	23.	3	32.	4	41.	3
6.	2	15.	4	24.	2	33.	3	42.	3
7.	4	16.	1	25.	3	34.	2	43.	4
8.	1	17.	4	26.	3	35.	1	44.	4
9.	2	18.	2	27.	4	36.	2	45.	2

WORK BOOK

Chapter 04

STRUCTURAL ORGANISATION IN ANIMALS

ANIMAL TISSUES,

MORPHOLOGY OF ANIMALS (COCKROACH, FROG)

ANIMAL TISSUES

1. Study of tissues is called

1) histology

2) cytology

3) anatomy

4) pathology

2. Study of the morphology of internal organs in animals is called

1) anatomy

2) cytology

3) haematology

4) microbiology

3. The study of cells, including their structure, function and chemistry is called

1) cytology

2) biochemistry

3) physiology

4) molecular biology

4. How many of the following statements are true

i) All four basic types of tissues arise from primary germ layers

ii) The primary germ layers are ectoderm, endoderm and mesoderm

iii) Neural tissue arises from ectoderm

iv) Muscular tissue and connective tissue arise from mesoderm

v) Epithelial tissue arises from ectoderm, endoderm and mesoderm

1) Only three are true

2) only four are true

3) only two are true

4) all are true

EPITHELIAL TISSUE

5. Select the incorrect statement

1) Formation of tissue is called histogenesis

2) Epithelial tissue is characterised by a non cellular basement membrane

3) Epithelial tissue shows large intercellular space and matrix

4) Epithelial tissue is avascular

6. All glands are the modification of

1) neural tissue

2) connective tissue

3) muscular tissue

4) epithelial tissue

7. Protection, secretion, absorption, diffusion etc are the different functions of

1) epithelial tissue

2) connective tissue

3) muscular tissue

4) neural tissue

8. Match the columns suitably

Column I		Column II	
a)	Cuboidal epithelium	i)	proximal convoluted tubule of nephron
b)	brush bordered columnar epithelium	ii)	lining of brondhioles
c)	ciliated epithelium	iii)	endothelium of blood vessels
d)	squamous epithelium	iv)	Lining of intestine

1) a - ii, b - iii, c- iv, d- i

2) a- i, b - iv, c- ii, d- iii

3) a - iii, b - ii, c - i, d - iv

4) a - iv, b - i, c - iii, d - ii

9. Gametes develop from germinal epithelium. It is the modification of

1) Simple cuboidal epithelium

2) Simple squamous epithelium

3) Simple columnar epithelium

4) Ciliated epithelium

10. The interior surface of blood vessel shows a single layer of squamous epithelium. It is also found in

1) lining of oviduct

2) lining of alveoli of lungs

3) distal convoluted tubules of nephrons

4) lining of the ducts of exocrine glands

11. The epithelium that lines the coelom is called

1) mesothelium 2) endotherlium

3) pericardium 4) pleura

12. The inner lining of blood vessels is called

1) endothelium 2) mesothelium

3) coelom 4) syncytium

13. Which of the following epithelium is characterised by tall and slender cells having nuclei located at the base?

1) cuboidal epithelium

2) squamous epithelium

3) columnar epithelium

4) all

14. Which of the following epithelium is present in air sacs of lungs and act as a diffusion boundary?

1) simple cuboidal epithelium

2) simple squamous epithelium

3) simple columnar epithelium

4) ciliated epithelium

15. Which of the following is a mixocrine gland?

1) salivary gland 2) pancreas

3) thyroid 4) pituitary

16. Compound epithelium is made up of more than one layer of cells and thus has a limited role in secretion and absorption. It is located in

1) epidermis

2) moist surface of buccal cavity

3) pharynx, lining of the ducts of salivary glands, panceratic duct etc

4) all

17. Which of the following cell junctions primarily prevents the leakage of molecules across epithelial cells?

1) gap junctions 2) tight junctions

3) adhering junctions 4) All

18. Which type of cell junction allows the direct passage of ions and small molecules between adjacent cells?

1) Gap junctions
2) Adhering junctions
3) Tight junctions
4) Intercalated discs

19. Mammary glands are the modification of

1) Sweat glands
2) Sebaceous glands
3) Mast cells
4) Macrophages

CONNECTIVE TISSUE

20. How many of the following statements are applicable for intercellular matrix?

i) Matrix refers to the entire extracellular material, including both ground substance and fibres

ii) Ground substance is the gel like non-cellular component of the intercellular matrix.

iii) Ground substance contains water, organic molecules such as glycosaminoglycans, proteoglycans, glycoproteins etc.

iv) Fibres include collagen/ white fibres, elastin/yellow fibres etc.

1) only two are applicable
2) only three are applicable
3) only four are applicable
4) all are applicable

21. Which of the following is the most abundant and widely distributed tissue in the body of complex animals?

1) epithelial tissue 2) connective tissue
3) muscular tissue 4) neural tissue

22. Fibroblasts, mast cells, macrophages etc are seen abundantly in

1) epithelial tissue 2) muscular tissue
3) neural tissue 4) connective tissue

23. Connective tissue, which is specialised to store fat is called

1) areolar tissue 2) adipose tissue
3) tendon 4) lymph

24. Which of the following secretes anticoagulant heparin and vasodilator histamine?

1) mast cells 2) fibroblasts
3) tendon 4) ligament

25. Select the incorrect statement

1) The outer protective layer-skin or shell can be called integument

2) Areolar tissue connects the integument with underlying muscles

3) Fibroblast secretes white fibres (collagen fibres) and yellow fibres (elastin fibres)

4) Connective tissue shows little extracellular matrix only

26. **Assertion** : Ligaments are more elastic than tendons

Reason : Ligaments contain more elastin fibres

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

27. **Assertion** : Tendons are stronger than ligaments

Reason : Tendons contain more collagen fibres arranged in parallel bundles, providing high tensile strength.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

28. Ligaments are used for connecting

1) bones to bones 2) organs to organs

3) organs to body wall 4) all

29. Which connective tissue acts as transporting agent for nutrients and oxygen in the body?

1) ligaments 2) bone

3) cartilage 4) blood

30. Which of the following connective tissue has liquid matrix?

1) blood 2) cartilage

3) bone 4) ligament

31. Which of the following connective tissue secrets no fibres of structural proteins?

1) areolar tissue 2) blood

3) bone 4) cartilage

MUSCLE TISSUE

32. Smooth muscle fibres are

1) cylindrical and voluntary

2) cylindrical and syncytial/multinucleated

3) spindle shaped, uninucleated and involunatry

4) spindle shaped and striated

33. Smooth muscles are also known as

1) visceral muscles

2) non-striated muscles

3) involuntary muscles

4) All

34. Specialised cell junctions, known as communication junctions/ intercalated discs present in heart, help

1) in the contraction of heart as a unit.

2) in the contraction of heart as separate units

3) in blocking the spreading of electrical impulses

4) to develop hypotension

35. Muscle fatigue occurs due to the accumulation of

1) lactic acid 2) pyruvic acid

3) fumaric acid 4) glycogen

36. Select the incorrect statement

1) Bone is the hardest tissue in the body

2) Cells of cartilage is called chondrocytes

3) Neuroglia make up more than one fourth the volume of neural tissue

4) In adults, bone marrow of some bones acts as the site of production of blood cells

MORPHOLOGY OF COCKROACH

37. Select the incorrect statement

1) Body of cockroach consists of head, thorax and abdomen

2) Thorax consists of prothorax, mesothorax and metathorax

3) Thorax shows three pairs of walking legs

4) The forewings/ wing cover arise from metathorax and hindwings/ flight wings from mesothorax

38. The abdomen of both male and female cockroaches contains

1) 10 segments 2) 6 segments

3) 8 segments 4) 11 segments

39. Which of the following is not a sensory structure in cockroach?

1) Anal cerci 2) Maxillary palp

3) Antennae 4) Proventriculus

40. The function of ocellus in cockroach is

1) to act as a light intensity sensor

2) olfaction

3) pressure detection

4) to act as touch receptor

41. The mesothoracic wings are also called as

1) wing cover 2) forewings

3) tegmina 4) all

42. The function of tegmina

1) is to cover and protect the flight wings when at rest

2) is olfaction

3) is for flight

4) is for defence

43. The function of anal styles/ caudal styles of male cockroach is/are

1) mating role and sensory perception

2) defence and detection of vibrations

3) excretion

4) locomotion

44. Which of the following structures help in grinding of food in cockroaches?

1) mandibles

2) gizzard/proventriculus

3) gastric caeca

4) both 1 and 2

45. Which of the following mouth parts of cockroach exhibit grinding and incising role?

1) labrum 2) labium

3) maxilla 4) mandibles

ANATOMY OF COCKROACH

46. Which of the following shows the correct location of the parts of alimentary canal of cockroach?

1) Crop - Located between proventriculus and hepatic caeca

2) Malpighian tubules - Located at the junction of midgut and hindgut

3) Ileum - Located between colon and rectum

4) Mesenteron - Located between ileum and anus

47. Select the incorrect statement

1) The entire foregut is lined by cuticle

2) Gizzard shows outer layer thick circular muscles and thick inner cuticle

3) Malpighian tubules remove excretory products from hindgut

4) The hindgut is broader than the midgut

48. Select the incorrect statement

1) Cockroach shows open circulation

2) Visceral organs are located in haemocoel

3) Heart of cockroach consists of elonagated muscular tube lying along midventral line of thorax and abdomen

4) Blood vessels in cockroach are poorly developed and open into haemocoel

49. How many of the following statements are true about the respiratory system of cockroach

i) A network of trachea opens to the exterior through 10 pairs of spiracles present on the lateral sides of the body

ii) Trachea is subdivided into tracheoles

iii) Opening of spiracles are regulated by sphincter muscles

iv) Exchange of gases takes place at the tracheoles by simple diffusion

v) Tracheoles of cockroach end within the tissues of the body

1) only three are true

2) only two are true

3) only four are true

4) all are true

50. Total number of ommatidia present in a cockroach is

1) 2000 2) 20000

3) 4000 4) 40000

51. Which of the following is/are true about mosaic vision of cockroach?

1) With the help of several ommatidia, a cockroach can receive several images of an object

ii) Mosaic vision shows more sensitivity but less resolution

iii) Nocturnal vision

iv) Compound eyes generally provide better vision than simple eyes in terms of image resolution and details.

1) Only one is true

2) only three are true

3) only two are true

4) all

52. Match the columns suitably

Column I Organs of cockroach		Column II Location	
i)	A pair of testes	a)	2nd - 6th abdominal segments
ii)	Mushroom shaped gland	b)	4-6 segments of abdomen
iii)	A pair of ovaries	c)	6th abdominal segment of female
iv)	A pair of spermatheca	d)	6-7 abdominal segments

1) i - b, ii - d, iii - a, iv - c

2) i - b, ii - d, iii - c, iv - a

3) i - d, ii - a, iii - b, iv - c

4) i - c, ii - b, iii - a, iv - d

53. Select the incorrect statement

1) The reproductive system of male cockroach shows a phallic gland

2) The secretion of phallic gland helps in the formation of sperm storing capsule or packet and together with sperms known as spermatophore

3) Male external genitalia is called gonapophysis or phallomeres

4) Titillator and pseudopenis are associated with the external genitalia of female cockroach

54. **Assertion** : The development of Periplanata is paurometabolous

Reason : The nymph resembles the adult in many aspects but differs in some features, but gradually through moulting the differences will be vanished.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

55. **Statement I** : The yougone of a cockroach is called nymph and it grows by moulting about 13 times to reach adult form.

Statement II : The next to last nymphal stage has wing pads but only adult cockroaches have wings.

1) Both the statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both the statements A and B are incorrect

56. Select the incorrect statement

1) Moulting is a sign of growth

2) Cockroach is a pest because they contaminate food and help in the transmission of diseases

3) An ootheca contains about 14 - 16 eggs

4) A female cockroach shows eight ovarioles

57. Haemolymph of cockroach is composed of

1) Colourless plasma and haemocytes

2) Only haemocytes

3) Only plasma

4) Erythrocytes, leucocytes and thrombocytes

58. Gastric caeca of cockroach is similar to that of

1) kidney of humans

2) liver of humans

3) womb of humans

4) intestine of humans

59. Which of the following is the primary function of alary muscles?

1) enhancement of gaseous exchange

2) pumping of haemolymph

3) grinding of food

4) ootheca formation

60. How many of fhe following features are applicable for male Periplaneta?

i) presence of collaterial gland

ii) presence of spermatheca

iii) spematophore formation

iv) phallic gland

v) titillator

1) only two 2) only one

3) only three 4) only four

61. In addition to Malpighian tubules, which of the following in cockroach is helpful in excretion?

1) nephridia 2) green glands

3) proboscis gland 4) fat bodies

62. The type of vision exhibiting by cockroaches is

1) binocular vision 2) mosaic vision

3) monocular vision 4) simple vision

63. Label the parts correctly

1) p- ovary, q- oviduct, r- spermatheca, s- collaterial gland, t- gonapophyses

2) p- testes, q- vas efferens, r - spermatheca, s- collaterial gland, t- gonapophyses

3) p- ovary, q- common oviduct, r - spermatheca, s- collaterial gland, t - gonapophyses

4) p - testes, q- vas efferens, r - spematheca, s - collaterial gland, t - caudal styles

STRUCTURAL ORGANISATION IN ANIMALS - MORPHOLOGY OF FROG

64. Select the incorrect statement about Indian bullfrog?

1) Body is divisible into head and trunk

2) Neck and tail are absent

3) Frog never drinks water but absorbs it through skin

4) Both forelimbs and hind limbs end in five digits and are webbed.

65. Sound producing organ in male frog is called

1) larynx 2) syrinx

3) vocal sacs 4) pharynx

66. The main function of nictitating membrane is

1) protection of eyes while in water

2) mucus production

3) olfaction

4) detection of pressure

67. Which of the following is not applicable for frog?

1) protruding eyes

2) webbed hind legs

3) slippery and scaly skin

4) short and weak forelimbs

68. Select the incorrect statement about frog

1) Webbed feet help in swimming

2) It shows leaping locomotion

3) Pinna absent and tympanum receives the sound signals

4) It is a herbivore and shows long alimentary canal

69. The forelimbs and hindlimbs of frog end in

1) four digits

2) four and five digits respectively

3) five and four digits respectively

4) five digits

70. A male frog can be distinguished from female, based on the presence of

1) vocal sacs and copulatory pad on the first digit of forelimbs

2) belly and long hind limbs

3) bulged eyes and thick nictitating membrane

4) uniformly olive green colour, present on ventral side

71. In frog, digestion of food takes place in stomach by the action of

1) HCl and gastric juices

2) succus entericus and goblet cells

3) nucleases and carbohydrases

4) sucrase, maltase and lipases

72. Final digestion of food in frog takes place in intestine with the help of

1) bile 2) pancreatic juice

3) gastric juice 4) both 1 and 2

73. Main absorptive site of digested food in frog is

1) villi and microvilli present in stomach

2) villi and microvilli present in intestine

3) villi present in rectum

4) brush bordered epithelium present in cloaca

74. Select the incorrect statement

1) Tadpole of frog is a herbivore

2) Adult frog is a carnivore

3) Tadpole of frog is ammonotelic

4) Adult frog is uricotelic

75. Which of the following statement is not applicable for frog?

1) Blood vascular system of frog is closed type and involves myogenic heart, blood vessels and blood.

2) Lymphatic system consists of lymph, lymph channels and lymph nodes

3) Heart of frog shows two atria and are ventricle

4) Sinus venous receives deoxygenated blood through vena cava and opens to left atrium

76. The arterial system of frog starts from

1) Conus arteriosus

2) Sinus venosus

3) Renal portal system

4) Hepatic portal system

77. Select the incorrect statement

1) Conus arteriosus is present on the ventral side of the heart of frog.

2) Frog shows incomplete double circulation / mixed double circulation

3) In frogs ventricle is technically single chambered but it has partial separation due to folds and ridges

4) Major veins arise from conus arteriosis

78. Select the incorrect statement about frog

1) Frog shows both hepatic portal system and renal portal system

2) Erythrocytes of frog are nucleated and biconvex

3) Lymph contains few proteins and RBCs

4) RBCs contain haemoglobin

79. A list of endocrine glands are given below. How many of them are present in Indian bull frog?

i) Pituitary

ii) Pineal body

iii) Thymus

iv) Parathyroid

vi) pancreatic islets

vii) adrenal glands

viii) gonads

1) five only 2) six only

3) seven only 4) all

80. Number of cranial nerves and spinal nerves present in frog are

1) 10 pairs and 9 pairs respectively

2) 10 pairs and 8 pairs respectively

3) 12 pairs and 10 pairs respectively

4) 8 pairs and 10 pairs respectively

81. Forebrain of frog includes

1) Olfactory lobes and paired cerebral hemispheres only

2) Unpaired diencephalon and optic lobes

3) Medulla and cerebral hemispheres

4) Olfactory lobes, paired cerebral hemispheres and unpaired diencephalon

82. In frog, which of the following passes out through the foramen of magnum?

1) Medulla oblongate 2) Optic lobes

3) Diencephalon 4) Olfactory lobe

83. Match the following columns suitably

Column I (Sensory perceptors)		Column II (Sensory organs)	
a)	Sensory papillae	i)	Simple eyes
b)	Olfaction	ii)	Tympanum with internal ears
c)	Vision	iii)	Nasal epithelium
d)	Hearing	iv)	Touch receptors
e)	Taste	v)	Taste buds

1) a-iv, b-iii, c-i, d-ii, e-v

2) a-v, b-iv, c-ii, d-i, e-iii

3) a-ii, b-iii, c-i, d-iv, e-v

4) a-iv, b-ii, c-iii, d-i, e-v

84. Which of the following sense organs of frog are considered as cellular aggregations around nerve endings?

1) eyes and internal ears

2) touch receptors and internal ears

3) internal ears and nasal epithelium

4) touch receptors, olfactory receptors and taste buds

85. Number of vasa efferentia that arise from the testes of frog is

1) 8 2) 10-12

3) 2 4) 6

86. Which of the following shows the correct route of the passage of sperms in the reproductive tract of male frogs?

1) testis →vasa efferentia→kidney→

Bidder's canal →Urinogenital duct → cloaca

2) testes → vasa efferentia →

kidney→ureter→Bidder's canal→cloaca

3) testes→Bidder's canal→ureter→vasa efferentia→cloaca

4) testes→vasa efferentia→Bidder's canal →urethra→ kidney→cloaca

88. Which of the following structures in the male frog's urinogenital system is responsible for carrying both urine and sperm from kidneys and testes?

1) Bidder's canal

2) Seminal vesicle

3) Ureter

4) Cloaca

89. **Statement I** : Mesorchium is a fold of peritoneum that attaches testes to the kidneys.

Statement II : Peritoneum is a membrane that surrounds the innermost surface of the abdominal cavity and visceral organs.

1) Both the statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both the statements A and B are incorrect

90. Cloaca is a small median chamber that is used to pass

1) faeces

2) urine

3) gametes

4) all

91. **Assertion** : Frogs hibernate during extreme winter.

Reason : Frogs can survive in cold conditions by lowering their metabolic activity.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

92. Frogs are beneficial to mankind because

1) frogs are considered as biological pest controllers

2) They maintain ecological balance by serving as an important link of food chain and food web in the ecosystem.

3) muscular legs of frog are used as food by man

4) all of these

93. Number of eggs laid by a female frog at a time is

1) 1000 - 1500 ova

2) 2500 - 3000

3) 3000 - 4000

4) 500 - 1000

94. Match the columns suitably

Column I Characters of frog		Column II Location / Function	
i)	Bidder's canal	a)	forebrain
ii)	Olfactory lobes	b)	medulla oblongata
iii)	Foramen magnum	c)	peritoneum
iv)	Mesorchium	d)	kidney of male frog
v)	Smell	e)	nasal epithelium

1) i-d, ii-a, iii-b, iv-c, v-e

2) i-d, ii-b, iii-a, iv-e, v-c

3) i-c, ii-d, iii-e, iv-b, v-a

4) i-e, ii-c, iii-a, iv-d, v-b

95. Tadpole larva of frog shows

1) pulmonary respiration

2) branchial respiration

3) tracheal respiration

4) all

96. **Assertion** : Frogs lay their eggs in water

Reason : Frogs exhibit external fertilization.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

97. Match the columns suitably

Column I		Column II	
i)	buccopharyngeal lining	a)	arterial system
ii)	tympanum	b)	gaseous exchange
iii)	conus arteriosus	c)	lacks few proteins and RBCs
iv)	lymph	d)	external eardrum
v)	testes	e)	yellowish and oval

1) i-e, ii-b, iii-d, iv-a, v-c

2) i-b, ii-d, iii-a, iv-c, v-e

3) i-d, ii-a, iii-e, iv-b, v-c

4) i-e, ii-c, iii-a, iv-b, v-d

98. **Assertion** : Nutritionally frog is a carnivore

Reason : Teeth of frog help in mastication.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

99. **Statement I** : Frogs show external fertilization

Statement II : Frogs have no copulatory organs

1) Both the statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both the statements A and B are incorrect

100. Which of the following is not applicable for frog?

1) external fertilization

2) oviparity

3) direct development

4) a pair of nostrils above the mouth.

SAMPLE QUESTIONS

1. Select the incorrect statement

1) The term epithelium means epithelial tissue

2) Epithelial tissue has a free surface, which faces either a body fluid or the outside environment

3) Epithelium provides a covering or a lining for some part of the body

4) In epithelial tissue, the cells are loosely packed with plenty intercellular matrix

2. Which of the following epithelium is present in air sacs of lungs and act as a diffusion membrane?

1) Squamous epithelium

2) Cuboidal epithelium

3) Columnar epithelium

4) Ciliated epithelium

3. The inner lining of stomach and intestine is characterised by the presence of

1) Cuboidal epithelium

2) Columanar epithelium

3) Squamous epithelium

4) Ciliated epithelium

4. Exocrine glands release their secretion through

1) blood

2) lymph

3) ducts

4) hormone receptors

5. Cell junctions are most abundant in

1) epithelial tissue

2) neural tissue

3) connective tissue

4) muscular tissue

6. Select the correctly matched option.

Column I Epithelium		Column II Functions		Column III Site	
a	Columnar	i	Secretion, absorption and protection	p	walls of blood vessels and air sacs
b	Cuboidal	ii	diffusion and protection	q	bronhioles, fallopian tubes
c	Ciliated	iii	move particles or mucus in a specific direction	r	lining of stomach and intestine
d	Squamous	iv	secretion and absorption	s	tubular parts of nephron like PCT and DCT

1) a→iii→r
2) b→i→p
3) c→iii→q
4) d→iv→s

7. **Statement A**: Malpighian tubule is lined by glandular and ciliated cells.

Statement B: Malpighian tubules absorb nitrogenous waste products and convert them into uric acid, which is excreted out through the hindgut.

1) Both the statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both the statements A and B are incorrect

8. Which of the following is an example for dense regular connective tissue?

1) bone 2) cartilage

3) fibroblasts 4) tendon

9. Select the incorrect statement

1) Collagen fibres, elastin fibres and fibroblasts are compactly packed in the dense connective tissue

2) In dense irregular connective tissue, the fibroblasts and many fibres are arranged differently

3) Tendons connect skeletal muscles to bones

4) Collagen fibres show less tensile strength

10. How many of the following are considered as sense organs in cockroach?

i) antennae

ii) compound eyes

iii) anal cerci

iv) labial palps

v) maxillary palps

vi) pronotum

vii) ocellus

1) four only 2) three only

3) six only 4) all

11. The most abundant protein fibre present in tendon is

1) elastin

2) collagen

3) smooth muscle fibres

4) yellow fibres

12. The function of adipose tissue is

1) gas transport

2) absorption of nutrients

3) storage, protection and insulation

4) gas transport

13. Which of the following connective tissue has fluid matrix?

1) bone 2) ligament

3) tendon 4) blood

14. Smooth muscles are also known as

1) fusiform muscles 2) visceral muscles

3) involuntary muscles 4) all

15. Mast cells secrete

1) histamine & heparin

2) myoglobin & haemoglobin

3) insulin & glucagon

4) yellow fibre & white fibre

16. Identify the types of cell junctions that help to stop the leakage of the substances across a tissue and facilitates the communication with neighbouring cells via rapid transfer of ions and molecules.

1) gap junctions and adhering junctions respectively

2) tight junctions and gap junction respectively

3) adhering junction and tight junction respectively

4) gap junctions and adhering junction respectively

17. Tegmina in cockroach arise from

1) Mesothorax 2) Prothorax

3) Metathorax 4) Pronotum

18. Which of the following statement is not applicable for cockroach?

1) Hypopharynx is present within the cavity covered by biting and chewing mouth parts

2) Anal cerci is used for detecting vibrations, air currents etc

3) Anal styles of male cockroach serve as a distinguishing characteristic for sex identification in cockroaches

4) A ring of 6-8 blind tubules called hepatic caeca is present at the junction between midgut and hindgut.

19. Malpighian tubules absorb nitrogenous waste products and convert them into

1) urea 2) uric acid

3) ammonia 4) calcium carbonite

20. In cockroach, the sclerites are joined by

1) arthrodial membrane

2) cartilage

3) adhesive glue

4) all

21. Select the correct statement

1) A pair of spermatheca is present in the 6th abdominal segment of female cockroach and used for storing sperms

2) A pair of spermathecae is present in the 6th abdominal segment of male cockroach and used for storing sperms

3) A pair of spermatheca is present in the 8th abdominal segment of female cockroach and used for keeping spermatophores.

4) A pair of spermatheca is present in the 9th - 10th abdominal segment of male cockroach and used for storing spermatophores

22. Select the incorrect statement

1) Female cockroach possesses sixteen ovarioles in both ovaries

2) Cockroaches exhibit mosaic vision with less sensitivity and more resolution

3) A mushroom shaped gland is present in the 6th - 7th abdominal segments which functions as an accessory reproductive gland

4) Each compound eye shows 2000 hexagonal ommatidia

23. Which of the following is not a part of the digestive system of cockroaches?

1) Proventriculus

2) Hepatic caeca

3) Crop

4) Malpighian tubules

24. Open circulatory system is present in

1) Pheretima 2) Periplaneta

3) Rana 4) All

25. The sclerite seen on prothorax is known as

1) pronotum 2) sternum

3) pleurite 4) metanotum

26. Which of the following is absent in cockroach

1) prothorax 2) mesothorax

3) metathorax 4) cephalothorax

27. Among the nervous mouth parts of cockroach, which of the following are paired?

1) mandible only

2) labrum only

3) mandible and maxilla

4) labium and mandible

28. Number of salivary glands present in cockroach is

1) 2 pairs 2) one pair

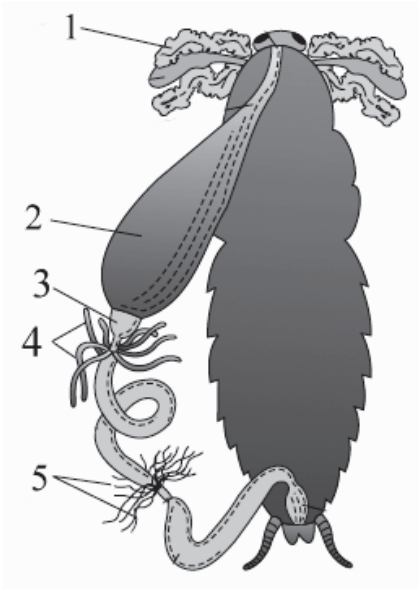
3) 4 pairs 4) 3 pairs

29. Chitinous plates called teeth are present in

1) proventriculus 2) crop

3) hepatic caeca 4) colon

30. The major parts of alimentary canal of cockroach is depicted below. Identify the parts marked 1,2,3,4 and 5.



1) 1- salivaty gland, 2- crop, 3-gizzard, 4-garstric caeca, 5 - Malpighian tubules

2) 1- salivary gland, 2- gizzard, 3- crop, 4-gastric caeca, 5- Malpighian tubules

3) 1-salivary gland, 2-oesophagus, 3- crop, 4-gizzard, 5- gastric caeca

4) 1- salivary gland, 2- crop, 3- gizzard, 4-Malpighian tubules, 5- gastric caeca

31. Among the different mouth parts of cockroach, which of the following is considered as lower lip?

1) labrum

2) labium

3) mandible

4) manxilla

32. Select the correct order of classification of Rana tigrina upto genus

1) Chordata→ Craniata→ Amphibia → Gnathostomata →Rana

2) Chordata→Gnathostomata→Craniata →Amphibia →Rana

3) Chordata→Craniata→Gnathostomata →Tetrapoda→Amphibia →Rana

4) Chordata →Tetrapoda→Gnathostomata →Craniata→Amphibia→Rana

33. Which of the following is not applicable for frog?

1) presence of kidneys

2) Dorsal tubular nerve cord

3) persistent notochord in adult

4) ventral heart

34. During hibernation frog shows

1) branchial respiration

2) cutaneous respiration

3) buccopharyngeal respiration

4) all

35. Nutritionally frog is a

1) herbivore 2) carnivore

3) omnivore 4) detritivore

36. Which of the following is present in man but absent in frog?

1) salivary glands 2) pancreas

3) throid 4) gall bladder

37. When a frog is fully immersed in water

1) it respires through skin

2) it respires through lungs

3) it shows branchial respiration

4) it shows pulmonary and branchial respiration

38. The forelimbs and hindlimbs of frog helps in

1) swimming

2) walking

3) leaping and burrowing

4) all

39. Bidder's canal is seen in the

1) endocrine system of female frog
2) urinogenital system of male frog
3) respiratory system of cockroach
4) digestive system of male frog

40. Tadpole larva of frog shows

1) branchial respiration
2) pulmonary respiration
3) tracheal respiration
4) all

41. **Assertion** : During summer and winter frogs take shelter in deep burrows

Reason : It protects them from extreme heat and cold.

1) Assertion is correct but Reason is not correct
2) Assertion is not correct but Reason is correct
3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion
4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

42. Match the columns suitably

Column I		Column II	
i)	Vocal sacs	a)	sexual embrace
ii)	Webbed feet	b)	swimming
iii)	tympanum	c)	hearing
iv)	copulatory pad	d)	sound production

1) i-c, ii-a, iii-d, iv-b
2) i-d, ii-b, iii-c, iv-a
3) i-b, ii-a, iii-c, iv-d
4) i-c, ii-d, iii-a, iv-b

43. Match the columns suitably

Column I		Column II	
a)	mesorchium	i)	protection of eyes
b)	nictitating membrane	ii)	shared opening for digestive, urinary and reproductive systems
c)	Bidder's canal	iii)	attaches testes to kidneys
d)	cloaca	iv)	Facilitates sperm passage from testes to cloaca

1) a-iii, b-i, c-iv, d-ii
2) a-iv, b-i, c-iii, d-ii
3) a-ii, b-iii, c-i, d-iv
4) a-iii, b-i, c-ii, d-iv

44. **Assertion** : Frogs lay their eggs in water

Reason : Frogs show external fertilization.

1) Assertion is correct but Reason is not correct
2) Assertion is not correct but Reason is correct
3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion
4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

45. Match the columns suitably

Column I Sense organs		Column II Functions	
i)	sensory papillae	a)	taste
ii)	nasal epithelium	b)	smell
iii)	tympanum with internal ears	c)	touch
iv)	taste buds	d)	hearing

1) i-c, ii-b, iii-d, iv-a
2) i-d, ii-c, iii-a, iv-b
3) i-b, ii-a, iii-d, iv-c
4) i-c, ii - b, iii-a, iv-d

ANSWER KEY

1.	1	21.	2	41.	4	61.	4	81.	4
2.	1	22.	4	42.	1	62.	2	82.	1
3.	1	23.	2	43.	1	63.	1	83.	1
4.	4	24.	1	44.	4	64.	4	84.	1
5.	3	25.	4	45.	4	65.	3	85.	2
6.	4	26.	3	46.	2	66.	1	86.	1
7.	1	27.	3	47.	3	67.	3	87.	1
8.	2	28.	4	48.	3	68.	4	88.	3
9.	1	29.	4	49.	4	69.	2	89.	1
10.	2	30.	1	50.	3	70.	1	90.	4
11.	1	31.	2	51.	2	71.	1	91.	3
12.	1	32.	3	52.	1	72.	4	92.	4
13.	3	33.	4	53.	4	73.	2	93.	2
14.	2	34.	1	54.	3	74.	4	94.	1
15.	2	35.	1	55.	1	75.	4	95.	2
16.	4	36.	3	56.	4	76.	1	96.	3
17.	2	37.	4	57.	1	77.	4	97.	2
18.	1	38.	1	58.	2	78.	3	98.	1
19.	1	39.	4	59.	2	79.	4	99.	1
20.	4	40.	1	60.	3	80.	1	100.	3

SAMPLE QUESTIONS

1.	4	10.	3	19.	2	28.	2	37.	1
2.	1	11.	2	20.	1	29.	1	38.	4
3.	2	12.	3	21.	1	30.	1	39.	2
4.	3	13.	4	22.	2	31.	2	40.	1
5.	1	14.	4	23.	4	32.	3	41.	3
6.	3	15.	1	24.	2	33.	3	42.	2
7.	2	16.	2	25.	1	34.	2	43.	1
8.	4	17.	1	26.	4	35.	2	44.	3
9.	4	18.	4	27.	3	36.	1	45.	1

WORK BOOK

Chapter 05

BIOMOLECULES

INTRODUCTION AND ELEMENTAL ANALYSIS

1. Biomolecules are

1) Inorganic molecules

2) Only carbohydrates

3) All the carbon compounds obtained from the living tissue

4) Both organic and inorganic molecules

2. Most abundant mineral in living system is

1) Sodium 2) Potassium
3) Calcium 4) Magnesium

3. Match column I with column II and find out the correct option

Column I (Element)		Column II (% weight in human body)	
A)	Nitrogen	1)	3.3
B)	Sodium	2)	0.2
C)	Calcium	3)	1.5
D)	Oxygen	4)	65

1) A-1, B-2, C-3, D-4

2) A-2, B-1, C-3, D-4

3) A-4, B-3,C-1, D-2

4) A-1, B-3, C-4,D-2

4. The biomolecule which has molecular weight less than '.....' is a bio-micromolecule
1) 800 Da 2) 1000 Da

3) 18 Da 4) 10000 Da

5. Find out the number of micro biomolecules and macro biomolecules from the group and choose the correct option

[Amino acids, Lipids, DNA, Sugars, Enzymes, Starch, Glycerol, Nucleotides]

	Micro biomolecules	Macro biomolecules
1)	4	4
2)	5	3
3)	3	5
4)	6	2

6. **StatementA** : When a tissue is fully burnt, the organic compounds are oxidised into gaseous form

Statement B: In the acid solubility test the soluble fraction contains some inorganic compounds like phosphates and sulphates

1) Both the statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both the statements A and B are incorrect

7. After doing the chemical analysis of organic compound in a living organism, two fractions were observed namely.

1) Acid soluble pool and acid insoluble pool

2) Carbon pool and hydrogen pool

3) Inorganic pool and organic pool

4) Aqueous pool and non aqueous pool

8. **Statement A** : Those molecules which are found in acid soluble fraction are called biomacromolecules

Statement B : The molecules in the acid-insoluble fraction with the exception of lipids are polymeric substances

1) Both statements A and B are correct

2) Statement A is correct but B is incorrect

3) Statement A is incorrect but B is correct

4) Both statements A and B are incorrect

AVERAGE COMPOSITION OF CELLS METABOLITES OF LIVING SYSTEM

9. What is the percentage of Nucleic acids in the total cellular mass

1) 3% 2) 5-7%

3) 10-15% 4) 1%

10. Which of the following set contains only secondary metabolites?

1) Morphine, Glucose, Ribose, RNA

2) Abrin, Vinblastin, Galactose, Ribose

3) Rubber, Cellulose, Codeine, Anthocyanin

4) Ricin, Gum, Sucrose, Palmitic acid

11. Find out the option which correctly represents the ascending order of biomolecules in a cell (based on the percentage mass)

1) Proteins, carbohydrates, lipids, nucleic acids

2) Proteins, lipids, carbohydrates, nucleic acids

3) Lipids, nucleic acids, carbohydrates, proteins

4) Lipids, carbohydrates, nucleic acids, proteins

12. Which of the following is not correct about metabolites?

1) Primary metabolites are found in plants, animals and microbes

2) Primary metabolites have direct role in growth and reproduction

3) Secondary metabolies are absent in fungi and bacteria

4) Polymers like cellulose, rubber and gum are secondary metabolites

13. Find out the mis-matched pair from the following

1)	Toxin	Ricin
2)	Alkaloid	Curcumin
3)	Lectin	Concanavalin-A
4)	Drug	Vinblastin

CARBOHYDRATES

14. Which of the following carbohydrates are commonly known as sugar?

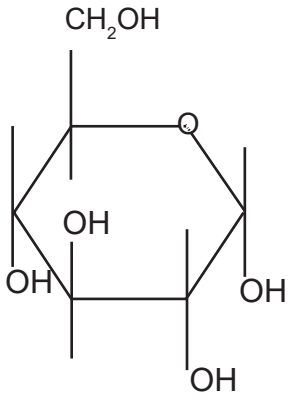
1) Monosaccharides

2) Disaccharides

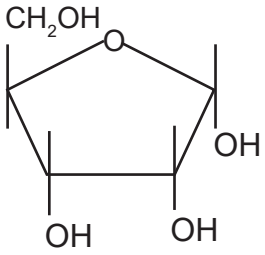
3) Polysaccharides

4) Both 1 & 2

15. Identify the given structure and name of the compound



A



B

1) Ribose, Glucose

2) Glucose, Deoxyribose

3) Galactose, Ribose

4) Glucose, Ribose

16. Number of carbon atoms in a deoxyribose sugar is

1) Three 2) Four

3) Five 4) Six

17. Translocation of sugar in flowering plants occur in the form of

1) Sucrose 2) Frucotse

3) Glucose 4) Maltose

18. A dehydration reaction links two glucose molecules to produce maltose. If the formula for glucose is $C_6H_{12}O_6$ then what is the formula of maltose?

1) $C_{12}H_{22}O_{11}$ 2) $C_{12}H_{24}O_{11}$

3) $C_{12}H_{20}O_{10}$ 4) $C_{12}H_{24}O_{12}$

19. In a polysaccharide, the individual monosaccharides are linked together by

1) Glycosidic bond

2) Phosphodiester bond

3) Ester bond

4) Peptide bond

20. Natural gums are made up of

1) Polysaccharides

2) Polypeptides

3) Polynucleotides

4) Triglycerides

21. **Assertion** : Starch is a homopolymer

Reason : Starch is made up of one type monomer (glucose)

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

22. Cotton fibre is a

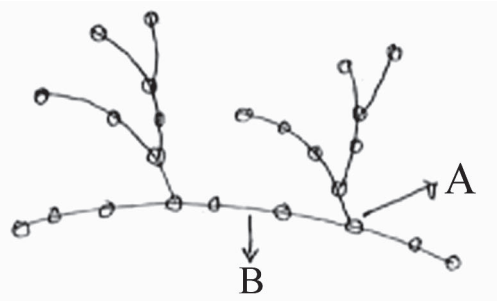
1) Heteropolysaccharides

2) Polymer of $\alpha-$glucose

3) Polymer of $\beta-$glucose

4) Both 1 and 2

23. Identify the polymer given below



The name of the polymer, the bonds A and B respectively

1) Amylase, (A) 1→ 4 glycosidic bond
(B) 1→6 glycosidic bond

2) Amylase, (A) 1→6 glycosidic bond
(B) 1→4 glycosidic bond

3) Glycogen(A) 1→4 glycosidic bond
(B) 1→6 glycosidic bond

4) Glycogen (A) 1→6 glycosidic bond
(B) 1→4 glycosidic bond

24. Amylose and amylopectin are

1) Polymers of glucose
2) Components of starch
3) Components of cellulose
4) Both 1 and 2

25. The conversion of sugar (glucose) in to the polysaccharide glycogen is

1) Glycolysis
2) Glycogenolysis
3) Glycogenesis
4) Gluconeogenesis

26. Match the following and choose the correct option

Column I		Column II	
a)	Lactose	i)	Hexose
b)	Chitin	ii)	Storage polysaccharide
c)	Fructose	iii)	Disaccharide
d)	Inulin	iv)	Structural polysaccharide

1) $\frac{\text{abcd}}{\text{i ii iii iv}}$ 2) $\frac{\text{a b c d}}{\text{ii i iv iii}}$

3) $\frac{\text{a b c d}}{\text{iii iv i ii}}$ 4) $\frac{\text{a b c d}}{\text{iv iii ii i}}$

27. Read the following statements

I) Starch contains complex helices which can hold I_2

II) Cellulose does not have complex helices and hence can't hold I_2

III) Starch is a store house of energy in plant tissues

IV) Cellulose is a homopolymer

How many of the above statements are true?

1) One
2) Three
3) Two
4) Four

28. The number of "ends" in a glycogen molecule would be

1) Equal to the number of branches plus one

2) Equal to the α -1-6 Glycosidic bonds

3) Equal to the number of branching points minus one

4) One at right side and one at left side

29. Inulin is a complex carbohydrate formed from the monosaccharide

1) Glucose 2) Fructose

3) Galactose 4) Ribose

30. Select the correct option, which represents the homopolysaccharides made up of Glucose monomers

1) Sucrose, Lactose, Maltose

2) Chitin, Glycogen, Starch

3) Starch, Inulin, Peptidoglycan

4) Starch, Glycogen, Cellulose

31. Which of the following is not correct about polysaccharides?

1) Chitin is a homopolymer of N-acetyl glucosamine

2) N- acetyl glucosamine is a modified form of monosaccharide

3) Cellulose shows blue colour when treated with iodine

4) Glycogen shows violet red colour when treated with iodine

AMINO ACIDS AND PROTEINS

32. Which of the following element is not present in proteins?

1) C 2) N

3) S 4) P

33. Match the following and choose the correct option

Column I		Column II	
a)	Cysteine	i)	Sulphur containing aminoacids
b)	Tyrosine	ii)	Acidic aminoacid
c)	Glutamic acid	iii)	Basic amino acid
d)	Lysine	iv)	Aromatic amino acid

1) $\frac{a\ b\ c\ d}{i\ iv\ ii\ iii}$ 2) $\frac{a\ b\ c\ d}{ii\ iv\ iii\ i}$

3) $\frac{a\ b\ c\ d}{iii\ iv\ i\ ii}$ 4) $\frac{a\ b\ c\ d}{iv\ iii\ i\ ii}$

34. Zwitter ion of an aminoacid possesses

1) Ionised R- group

2) $-NH_3^+$ group

3) $-COO^-$ group

4) Both $-NH_3^+$ and $-COO^-$ groups

35. How many different types of amino acids are required to produce all the proteins of human body?

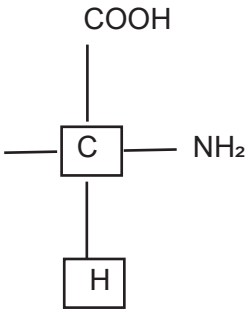
1) 20

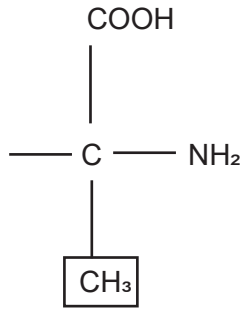
2) 19

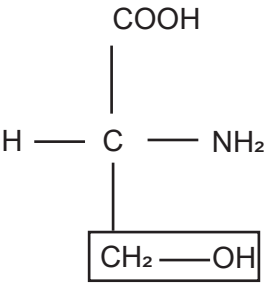
3) 21

4) 23

36. The variable group in an amino acid is R-group. Based on the R-group there are many amino acids. Name the amino acids A, B and C according to their R-groups given in the structure

A) 

B) 

C) 

1) A - Glycine, B - Serine, C-Alanine

2) A- Glycine, B-Alanine, C-Serine

3) A-Serine, B - Alanine, C- Glycine

4) A - Serine, B - Glycine, C- Alanine

37. Which of the following aminoacids can stabilise the protein structure by forming disulphide bonds?

1) Arginine and Methionine

2) Lysine and Cysteine

3) Cysteine and Methionine

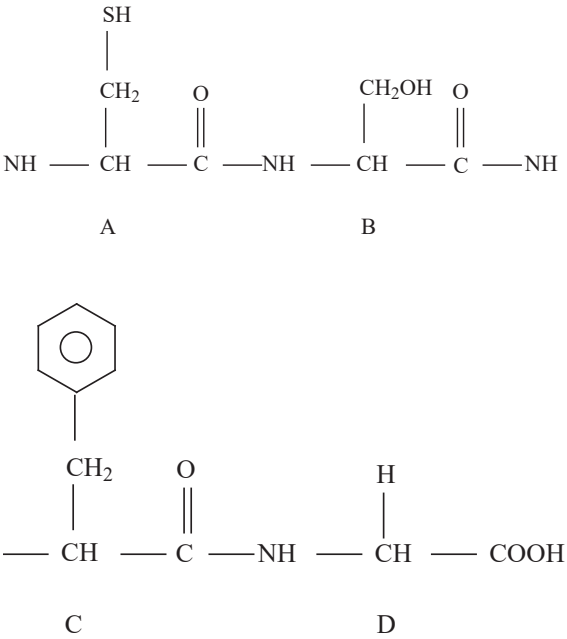
4) Arginine and Cysteine

38. The charged amino acid which is electrically neutral is

1) Anion 2) Cation

3) Zwitter ion 4) Amide

39. The figure shows a hypothetical tetrapeptide with parts labelled A-D. Which one of the following option is correct?



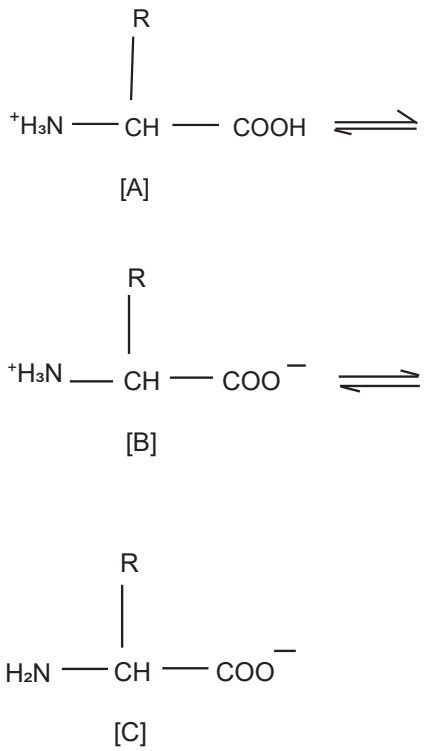
1) A is the sulphur containing aminoacid serine

2) B is the neutral amino acid glycine

3) C is the aromatic amino acid phenyl alanine

4) D is the simplest amino acid alanine

40. Observe the following reversible reaction



Where the ions [A] and [C] are formed in which pH levels?

1) A is in neutral pH and C is in acidic pH
2) A is in acidic pH and C is in basic pH
3) A is in basic pH and C is in acidic pH
4) A is in basic pH and C is in neutral pH

41. **Assertion** : A protein is a heteropolymer

Reason : A protein is made up of different types of aminoacid monomers

1) Assertion is correct but Reason is not correct
2) Assertion is not correct but Reason is correct
3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion
4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

42. **Statement A** : In inorganic chemistry, the structure invariably refers to the molecular formula

Statement B : A biologist describes the protein structure at four different levels

1) Statements A and B are correct
2) Statement A is correct but B is incorrect
3) Statement A is incorrect but B is correct
4) Both the statement A and B are incorrect

43. Fine structure of fibrous proteins is

1) Primary
2) Secondary
3) Tertiary
4) Quarternary

44. Common biomolecule present in hair, feather and silk is

1) Protein
2) Lipid
3) VItamins
4) Polysaccharides

45. Which is essential for the activity of proteinaceous enzyme?

1) Primary structure
2) Secondary structure
3) Tertiary structure
4) Quarternary structure

46. In which structural level protein looks like linear string of spheres or spheres arranged one up on each other?

1) Primary
2) Secondary
3) Tertiary
4) Quarternary

47. **Assertion** : Haemoglobin is a quarternary protein.

Reason : Haemoglobin is made up of four different type polypeptides.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

48. Find out the correct statement from the following

1) Natural silk is a polysaccharide

2) Collagen is the most abundant protein in biosphere and act as inter cellular ground substance

3) Insulin is a hormone which is a homopolymer of amino acids

4) Myoglobin present in muscle is a tertiary protein

49. The most abundant human protein is

1) Collagen 2) RuBisco

3) Keratin 4) Elastin

50. Which of the following is not a reducing sugar ?

1) Lactose 2) Sucrose

3) Maltose 4) Galactose

51. Which of the following monosaccharide is not formed during hydrolysis of hemicellulose ?

1) Mannose 2) Arabinose

3) Galactose 4) Glucose

52. Match column I with column II and find out the correct answer form the options given below:

Column I		Column II	
A)	Collagen	i)	enables glucose transport
B)	Trypsin	ii)	smell, taste
C)	Receptor	iii)	enzyme
D)	GLUT-4	iv)	inter cellular ground substance

1) A-iv, B-iii, C-i, D-ii 2) A-iii, B-i, C-ii, D-iv

3) A-iv, B-iii, C-ii, D-i 4) A-i, B-ii, C-iii, D-iv

LIPIDS

53. Following are the statements with reference to "Lipids"

a) Only single bonds are present in unsaturated fatty acids

b) Lecithin is a phospholipid

c) Trihydroxy propane is glycerol

d) Palmitic acid has 20 carbon atoms including carboxyl carbon

Find out the correct statements and choose the correct option

1) (b) and (d) only

2) (a) and (b) only

3) (c) and (d) only

4) (b) and (c) only

54. 'R' group of fatty acid could be

1) CH_3 2) C_2H_5

3) CH_2-OH 4) Both 1 & 2

55. Oils remain as oils in winter. This is because of

1) their lower melting point

2) their higher melting point

3) they contain glycerol only

4) they have saturated hydrocarbon chain

56. $CH_3-(CH_2)_{14}-COOH$ is a biomolecule which is known as

1) Arachidonic acid 2) Palmitic acid

3) Aspartic acid 4) Glutamic acid`

57.` Find out mis-matched pair from the following

1)	Stearic acid	Saturated fatty acid
2)	Lecithin	Compound lipid
3)	Sterol	Simple lipid
4)	Arachidonic acid	Unsaturated fatty acid

58. Which of the following is correct about lipids?

1) Lipids are generally water soluble

2) Glycerol is a simple lipid

3) Triglycerides are compound lipids

4) Neural tissue have lipids with complex structure

59. **Assertion** : Phospholipids form bio-molecular layer in plasma membrane

Reason : Phospholipid molecules are amphoteric in nature.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

60. The lipid having tetracyclic structure is

1) Wax 2) Oil

3) Cholesterol 4) Lecithin

61. Match column I with column II and choose the correct option

Column I		Column II	
A)	Glycogen	i)	Hormone
B)	Globulin	ii)	Biocatalyst
C)	Steroids	iii)	Antibody
D)	Thrombin	iv)	Storage product

1) A-ii, B-iv, C-iii, D-i 2) A-iv, B-iii, C-i, D-ii

3) A-iii, B-ii, C-iv, D-i 4) A-iv, B-ii, C-i, D-iii

62. Which of the following is not a plant product?

1) Triglycerides 2) Cholesterol

3) Phospholipids 4) Polypeptides

NUCLEIC ACIDS

63. Phosphate group esterified to a sugar with a nitrogen base is called as

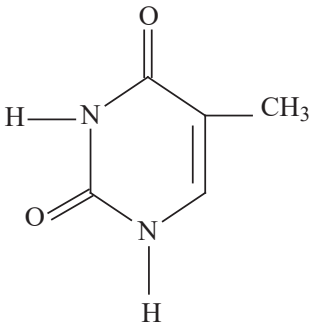
1) Phospholipid

2) Nucleoside

3) Nucleotide

4) Phosphoglyceride

64. Identify the given nitrogen base



1) Uracil 2) Thymine

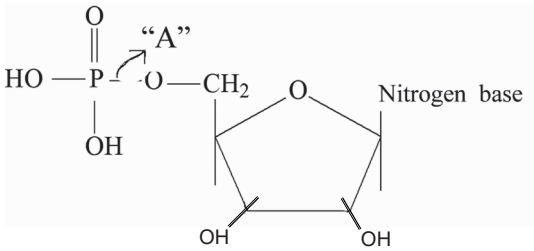
3) Cytosine 4) Guanine

65. Which of the following nucleotide sequence contains five pyrimidine bases?

1) AGCTACGT 2) AGCTAGGT

3) GATCATCT 4) GUAUCCAG

66. In the given structure 'A' represents



1) Ionic bond 2) Glucosidic bond

3) Peptide bond 4) Ester bond

67. Find out the mismatched pair from the following

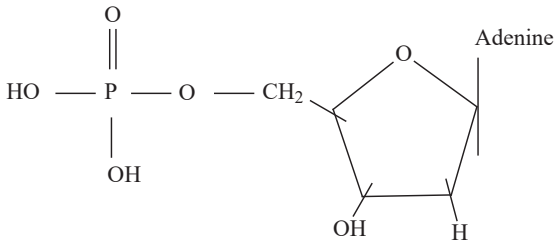
1)	Adenosine monophosphate	Nucleotide
2)	Guanylic acid	Nucleotide
3)	Uridine	Nucleoside
4)	Cytosine	Nucleoside

68. How many different nucleotides are present in a cell

1) 2 2) 3

3) 4 4) 5

69. Identify the given biomolecules and choose the correct option



1) AMP

2) dAMP

3) Adenylic acid

4) Both 1 and 3

70. Find out the incorrect statement about nucleic acids?

1) Nucleic acids exhibit a wide variety of secondary structures

2) Watson and Crick model is a secondary structure of DNA

3) DNA exist as a double helix

4) Strands of DNA are parallel but run in opposite directions.

71. Nucleic acid contains condensation linkages, except

1) Hydrogen bond

2) Phospho ester bond

3) Phosphodiester bond

4) N- glycosidic bond

72. Which of the following statement concerning a nucleic acid is true?

1) Synthesised from one type monomer by condensation bonding

2) Polymer synthesised from different type monomers by the addition of water

3) Heteropolymer consists of four type monomers

4) Heteropolymer consists of three type ionic bonds

73. Three dsDNA samples with their base composition are given below

I) DNA X→2% A

II) DNA Y→10% G

III) DNA Z→15% T

A temperature of 98ºC is applying simultaneously on the three DNA samples, then which one will denatures first?

1) DNA X

2) DNA Y

3) DNA Z

4) Both DNA X and Z

74. Which one of the following statements is correct about the 2D structure of DNA?

1) One strand appears like a helical staircase

2) At each step of ascent, the strand turns 36^0

3) Length of one full turn or pitch is 34nm

4) One pitch has ten base pairs and the rise per base pair would be 3.4nm

75. The monosaccharide present in ATP molecule is

1) Ribose 2) Deoxyribose

3) Galactose 4) Ribulose

76. If Adenine is 10% in a dsDNA, then what would be the percentage of cytosine in it?

1) 10% 2) 20%

3) 40% 4) 80%

77. What would be the length of a DNA if it has 1Kbp?

1) 3.4 nm 2) 34nm

3) 340 nm 4) 3400 nm

ENZYMES

78. The rate of a reaction is depicted as

1) $\delta p / \delta t$ 2) $\delta t / \delta p$

3) $\delta p + \delta t$ 4) $\delta p - \delta t$

79. Turn over number of the fastest enzyme carbonic anhydrase is

1) 6 lakh/sec 2) 6 lakh/min

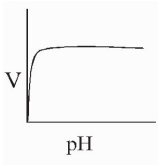
3) 360 lakh/min 4) Both 1& 3

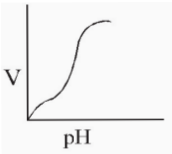
80. In living system all metabolic reactions are?

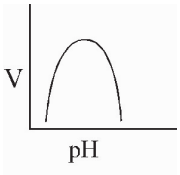
1) Exothermic 2) Endothermic

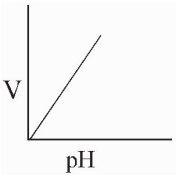
3) Isothermic 4) Catalysed

81. Choose the correct graph showing the effect of pH on the velocity (V) of a typical enzyme action

1) 

2) 

3) 

4) 

82. **Assertion** : Enzymes lower down the activation energy of the reactant molecule to make its transition into product easier

Reason : Enzymes are highly substrate specific catalysts.

1) Assertion is correct but Reason is not correct

2) Assertion is not correct but Reason is correct

3) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion

4) Both Assertion and Reason are correct but Reason is not the correct explanation of Assertion

83. **Statement A** : There are thousands of different types of enzymes, each catalysing a unique biochemical or metabolic reaction.

Statement B : A multistep chemical reaction, when each of the steps is catalysed by the same enzyme complex or different enzymes is called a metabolic pathway.

1) Both the statements A and B are correct

2) Statement A is correct and B is incorrect

3) Statement A is incorrect and B is correct

4) Both the statements A and B are incorrect

84. Arrange the steps of catalytic action of an enzyme in order and choose the correct option

I) The enzyme releases the product of the reaction and gets free for another substrate

II) The active site of the enzyme is in close proximity of the substrate and breaks chemical bonds of the substrate

III) The binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate.

IV) The substrate binds to the active site of enzyme, fitting into the active sites

1) IV→III→II→I 2) III→II→I→IV

3) IV→II→I→III 4) II→I→IV→III

85. Consider the following statements

I) Most of the enzymes are proteins, which catalyse biochemical reactions

II) The enzyme itself remains unchanged at the end of reaction. Its presence alter the rate of reaction

1) I is true but II is false

2) I is false but II is true

3) Both I and II are true

4) Both I and II are false

86. Read the following statements

I) When glucose is degraded into lactic acid in our skeletal muscle, energy is liberated

II) Living organisms have learnt to trap this energy liberated during degradation and stored it in the form of chemical bonds.

III) When needed, the bond energy is utilised for biosynthetic and mechanical work that we perform

IV) The most important energy currency is ATP in living systems.

How many of the above statements are true?

1) One 2) Two

3) Three 4) Four

87. The enzyme isolated from thermoacidophiles are stable and retain their catalytic power upto

1) 25º -40ºC 2) 50º-60ºC

3) 80º - 90ºC 4) 0º - 25ºC

88. Which of the following is correct about the structure of enzyme?

1) Protein part of an enzyme is called as the co-enzyme

2) Most of the apo-enzymes are the derivatives of vitamins

3) Prosthetic group is a non-protein tightly bound to the apoenzyme

4) Non- functional form of an enzyme is called as holoenzyme

89. Michaelis-Menten constant (K_m) is equal to

1) The rate of enzyme activity

2) The rate of reaction

3) Substrate concentration at which the rate of reaction attains half of its maximum velocity

4) Substrate concentration at which rate of reaction is at maximum velocity (V_{max})

90. Activation energy is

1) High in presence of enzyme

2) Required to change substrate in to stable transition state

3) The difference in the energy content of substrate and the transition state

4) The energy released as heat at the end of reaction

91. Co-enzymes FAD and FMN contain the vitamin

1) Niacin 2) Riboflavin

3) Thiamine 4) Biotin

92. Select the option which is not correct with respect to enzyme action

1) Substrate bind with enzymes at its active site

2) Addition of more succinate does not reverse the inhibition of succinic dehydrogenase by malonate

3) Presence of malonate increases K_m value of succinic dehydrogenase.

4) Malonate is the competative inhibitor of succinic dehydrogenase.

93. Bacterial pathogens can be controlled by the

1) Addition of enzymes

2) Addition of substrate

3) Competitive inhibition

4) Non- competitive inhibition

94. Which of the following is correct with respect to competitive inhibitor?

1) decrease in V_{max} and K_m remains unaffected

2) no change in V_{max} and K_m increases

3) decrease in both V_{max} and K_m

4) increase in both V_{max} and K_m

95. In Peroxidase and Catalyse enzymes, the prosthetic group should be

1) Zinc

2) NADP

3) FAD

4) Haem

96. Find out the incorrect statement about enzymes

1) Enzymes are divided into 6 classes,each with 4 to 13 sub classes

2) Enzymes are coded by four digit number

3) Transferase can transfer a group including hydrogen between two substrates

4) Dehydrogenase can catalyse oxidation reactions

97. Match the following and choose the correct option

Column I		Column II	
a)	Hydrolase	i)	Hydrolytic breakdown
b)	Isomerase	ii)	Inter conversion of molecular structure
c)	Ligase	iii)	Removal of a group into free state
d)	Lyase	iv)	Linking of two compounds

1) $\frac{a\ b\ c\ d}{i\ \ ii\ iii\ iv}$ 2) $\frac{a\ b\ c\ d}{i\ ii\ iv\ iii}$

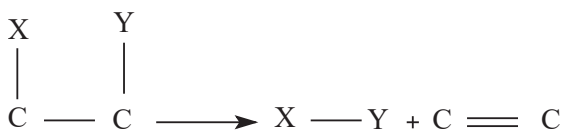
3) $\frac{a\ b\ c\ d}{ii\ i\ iii\ iv}$ 4) $\frac{a\ b\ c\ d}{ii\ \ i\ \ iv\ iii}$

98. The enzyme hexokinase in glycolysis belongs to

1) Hydrolase 2) Transferase

3) Lyase 4) Isomerase

99. The class of enzyme which can catalyse the following type of reaction is



1) Transferase 2) Isomerase

3) Hydrolase 4) Lyase

100. The enzymes which catalyses joining of C-O, C-S, C-N, P-O etc bonds belong to which class

1) class - I 2) class - IV

3) class - V 4) class - VI

SAMPLE QUESTIONS

1. Which of the following will yield only glucose on hydrolysis?

1) Sucrose 2) Maltose

3) Lactose 4) None of these

2. Which one is a carbohydrate?

1) Insulin 2) Inulin

3) Glycine 4) Trypsin

3. In yeast during fermentation the anaerobic pathway leads to the production of

1) water 2) lactic acid

3) ethanol 4) none of these

4. The right end of polypeptide (posses the last aminoacid) is called as the

1) N- terminal

2) C-terminal

3) reducing end

4) non-reducing end

5. Cotton fibre and paper made from plant pulp, which is made up of

1) Cellulose

2) Chitin

3) Glycogen

4) Collagen

6. **Statement I** : Primary metabolites are present only in plant cells and fungal cells

Statement II : Secondary metabolites are present only in plant cells and animal cells

1) Both the statements I and II are correct

2) Statement I is correct and II is incorrect

3) Statement I is incorrect and II is correct

4) Both the statements I and II are incorrect

7. Chemical and physical properties of aminoacids are essentially of

1) Amino group 2) Carboxyl group

3) R-group 4) All of the above

8. α-helix and β - pleated secondary structure of protein are stabilised by :

1) Glycosidic bond

2) Hydrogen bond

3) Phosphodiester bond

4) Di-sulphide bond

9. The structural polysaccharide in plants is :

1) Cellulose 2) Starch

3) Glycogen 4) Chitin

10. Chitin forming exoskeleton in arthropods is second most abundant carbohydrate on this earth. It is a :

1) storage sulphur containing polysaccharide

2) nitrogen containing structural homopoly-saccharide

3) homopolysaccharide

4) structural oligosaccharide

11. Sulpha drugs act on the principle of :

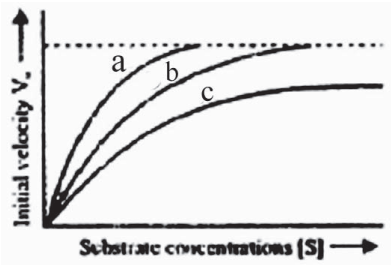
1) competitive inhibition

2) allosteric inhibition

3) non-competitive inhibition

4) feed-back inhibition

12. The figure given below shows three velocity substrate concentration curves for an enzyme reaction. What do the curves, a, b and c depict respectively?



1) **a**-normal enzyme reaction, **b**-competitive inhibition, **c**-non-competitive inhibition

2) a non competitive inhibition, **b**-normal enzyme activity, **c**-competitive inhibition

3) a non-competiitve inhibition, **b**-competitive inhibition added, **c**-normal enzyme reaction

4) **a**-normal enzyme reaction, **b**-non-competitive inhibition, **c** - competitive inhibition

13. Three of the following statements about enzymes are correct, except

1) Enzymes require optimum pH for maximal activity

2) Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at temperatures 80° - 90°C

3) Enzymes are highly specific to pH but not specific to a substrate

4) Most enzymes are proteins but some are nucleic acids

14. Read the given statements and select the correct option.

(i) Right end of a polysaccharide chain is called reducing end while left end is called non reducing end.

(ii) Starch can hold iodine molecules in its helical secondary structure but cellulose being non helical, cannot hold iodine.

(iii) Starch and glycogen are branched molecules

(iv) Starch and glycogen are the reserve food materials of plants and animals respectively.

1) (i) and (ii) are correct

2) (ii) and (iii) are correct

3) (iv) is correct

4) All statements are correct

15. Which of the following is a non-proteogenic aminoacid :

1) Glycine 2) Ornithine

3) Alanine 4) Serine

16. Fibroin of silk has :

1) Secondary structure

2) α - helix

3) β-pleated structure

4) Both 1 and 3

17. The part of enzyme which bind with substrate during catalysis is :

1) Active site 2) Prosthetic group

3) Cofactor 4) Coenzyme

18. Which of the following is not a primary metabolite :

1) Sugars 2) Nucleotides

3) Aminoacid 4) Alkaloids

19. Refer the given reaction.

$$\underset{\text{maltose}}{C_{12}H_{22}O_{11}} + H_2O \xrightarrow{\text{Enzyme A}} \underset{\text{Glucose}}{2C_6H_{12}O_6}$$

Enzyme A used in the reaction, belongs to which class of enzymes?

1) Dehydrogenases 2) Transferases

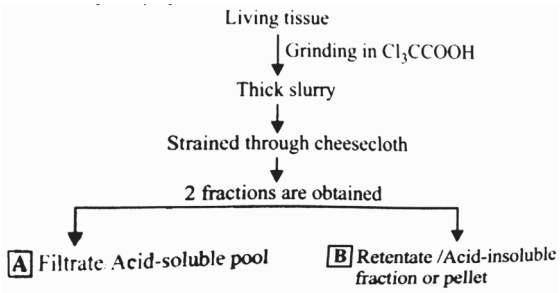
3) Hydrolases 4) Lyases

20. The sum total composition of acid soluble and acid insoluble fraction represents the entire composition of

1) dead cells 2) gene pool

3) cellular pool 4) gene library

21. Read the given statements and select the option that correctly sorts these with respect to A and B in the given flow chart.



(i) Molecular weight ranging from 18 to 800 daltons (Da) approximately

(ii) Proteins, nucleic acids, polysaccharides and lipids

(iii) Contain chemicals that have molecular weight more than 800 Da

(iv) Mainly monomers

(v) Generally has polymers

	A	B
1)	(i), (ii), (iii)	(iv), (v)
2)	(ii), (iv)	(i), (iii), (v)
3)	(i), (iv)	(ii), (iii), (v)
4)	(i), (iii), (v)	(ii), (iv)

22. Biomolecules occur in the cellular pool as

1) Solutes in true solution

2) Colloids in colloidal solution

3) Insoluble in cellular structure

4) All the above

23. Glycogen is stored inside the cells of:

1) Kidneys and liver

2) Liver and muscles

3) Spleen and liver

4) Pancreas and storage connective tissue

24. On boiling, Benedict reagent is not reduced by

1) Sucrose 2) Lactose

3) Maltose 4) Fructose

25. Which protein enables glucose transport into cell

1) Collagen 2) Trypsin

3) Globulin 4) GLUT-4

26. Lipids are not strictly macromolecules. Why?

1) They are acid soluble fraction

2) They are acid insoluble fraction

3) Molecular weight exceeds 800

4) Molecular weight below 800 D

27. Match the following

Column I		Column II	
1)	Monoamino monocarboxylic acid	a)	serine
2)	Monoamino dicarboxylic acid	b)	Methionine
3)	Sulphur containing aminoacid	c)	Aspartic acid
4)	Hydroxyl containing aminoacid	d)	valine

1) $\frac{1234}{dabc}$ 2) $\frac{1234}{bcda}$

3) $\frac{1234}{dcba}$ 4) $\frac{1234}{cadb}$

28. Enzymes, vitamins and hormones can be classified into a single category of biomolecules because all of these;

1) Help in regulating metabolism

2) Are exclusively synthesized in the body

3) Are conjugated proteins

4) Enhance oxidative metabolism

29. The melting point of unsaturated fatty acids

1) increases with increase in double bonds

2) decreases with increase in double bonds

3) rises in some and fall in others

4) there is no relationship between unsaturation and melting point

30. Read the given statements.

(i) Fructose is the sweetest sugar

(ii) Glycine is the simplest amino acid

(iii) Lactose is a disaccharide composed of one molecule each of glucose and galactose

(iv) Cellulose is an unbranched chain of glucose molecules linked by 1, 4 - glycosidic bond.

Which of the given statements are correct?

1) (i) and (ii)

2) (iii) and (iv)

3) (i), (ii) and (iii)

4) (i), (ii), (iii) and (iv)

31. Pentoses and hexoses are the most common :

1) Disaccharides

2) Monosaccharides

3) Oligosaccharides

4) Polysaccharides

32. Bile salts and steroid hormones like Testosterone, Aldosterone etc..... are synthesized from :

1) Cholesterol 2) Proteins

3) Monosaccharides 4) Nucleotides

33. Which of the following bond remains till the end in the denaturation of proteins?

1) Peptide bond

2) H - bond

3) Disulphide bond

4) Electrostatic bonds

34.

Average composition of cell	
Component	% of total cellular mass
water	70-90
a	10-15
Carbohydrates	b
Lipids	2
c	5 - 7

Identify a, b and c

1) Amino acids, 20 - 30, Nucleic Acids

2) Proteins, 3, Nucleic Acids

3) Nucleic acids, 8 – 10, Mineral ions

4) Mineral ions, 3, fatty acids

35. Which of the following phospholipid acts as surfactant in Alveoli of lungs?

1) Lecithine

2) Cephalin

3) Cardiolipin

4) Posphotidyl Inositol

36. The component present in both nucleotides and nucleosides is

1) sugar

2) phosphate

3) nitrogenous base

4) both (1) & (3)

37. Refer the given reactions.

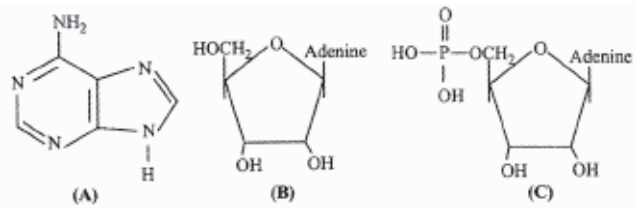
(i) Adenine + X → Adenosine

(ii) Adenosine + Y → Adenylic acid

What does X and Y represent here?

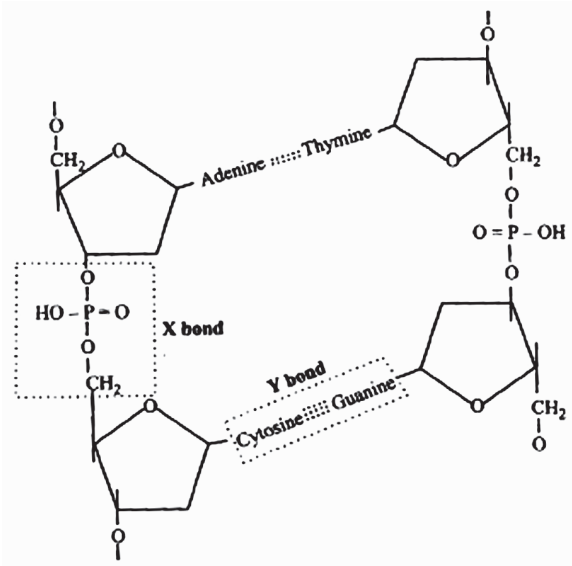
	X	Y
1)	Phosphate group	Sugar molecule
2)	Sugar molecule	Phosphate group
3)	Sugar molecule	Nitrogenous base
4)	Nitrogenous base	Phosphate group

38. The three structural formulae A, B and C are given here. Identify them and select the correct option.



	A	B	C
1)	Adenine (N-base)	Adenosine (Nucleotide)	Adenylic acid (Nucleoside)
2)	Adenine (N- base)	Adenosine (Nucleoside)	Adenylic acid (Nucleotide)
3)	Adenosine (Nucleoside)	Adenylic acid (Nucelotide)	Adenine (N-base)
4)	Adenosine (Nucleoside)	Adenylic acid (Nucleotide)	Deoxyadenylic acid

39. Which bonds are indicated by X and Y in the given diagram?



	X	Y
1)	Glycosidic bond	Hydrogen bond
2)	Phosphodiester bond	Hydrogen bond
3)	Glycosidic bond	Phosphodiester bond
4)	Phosphodiester bond	Glycosidic bond

40. Mark the incorrect statement

1) NAD & NADP are coenzymes that are derivative of vitamin B

2) Catalytic activity is lost when the co-factor is removed from enzyme

3) In carboxypeptidases the metallic ion is zinc

4) Co-enzyme + Co-factor = Apoenzyme

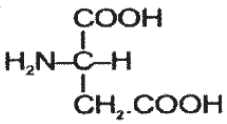
41. Match the following;

Column I		Column II	
1)	Tetrose	a)	Ketose Sugar
2)	Pentose	b)	Homopolysaccharide
3)	Lactose	c)	Galactose + Glucose (1-4)
4)	Glycogen	d)	Ribose
5)	Fructose	e)	Erythrose
6)	Maltose	f)	Glucose + Glucose (1-4)

1) $\frac{123456}{edcabf}$ 2) $\frac{123456}{edcbaf}$

3) $\frac{123456}{edbcaf}$ 4) $\frac{123456}{edacbf}$

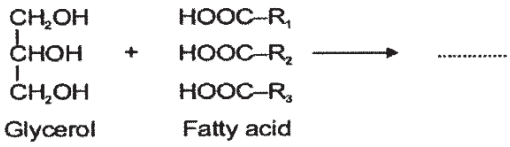
42. The given amino acid is _____ in nature



1) Acidic 2) Basic

3) Neutral 4) Aromatic

43. The product of the given reaction would be a



1) Monoglyceride 2) Diglyceride

3) Triglyceride 4) Both (1) and (3)

44. The given fatty acid is known as

$CH_3 - (CH_2)_7 - CH = CH - (CH_2)_7 - COOH$

1) Palmitic acid 2) Oleic acid

3) Stearic acid 4) Arachidonic acid

Assertion Reason Type

1) If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

2) If both Assertion & reason are true but the reason is not the correct explanation of the assertion

3) If assertion is true but reason is false

4) If both assertion and reason are false statements

45. **Assertion** : Haem is the prosthetic group in enzymes catalase and peroxidase

Reason : Haem has a transient bonding with the enzymes.

ANSWER KEY

1.	3	21.	3	41.	3	61.	2	81.	3
2.	3	22.	3	42.	1	62.	2	82.	4
3.	1	23.	4	43.	2	63.	3	83.	1
4.	2	24.	4	44.	1	64.	2	84.	1
5.	2	25.	3	45.	3	65.	3	85.	3
6.	1	26.	3	46.	4	66.	4	86.	4
7.	1	27.	4	47.	1	67.	4	87.	3
8.	3	28.	1	48.	4	68.	4	88.	3
9.	2	29.	2	49.	1	69.	2	89.	3
10.	3	30.	4	50.	2	70.	4	90.	3
11.	4	31.	3	51.	4	71.	1	91.	2
12.	3	32.	4	52.	3	72.	3	92.	2
13.	2	33.	1	53.	4	73.	2	93.	3
14.	4	34.	4	54.	4	74.	2	94.	2
15.	4	35.	1	55.	1	75.	1	95.	4
16.	3	36.	2	56.	2	76.	3	96.	3
17.	1	37.	3	57.	3	77.	3	97.	2
18.	1	38.	3	58.	4	78.	1	98.	2
19.	1	39.	3	59.	1	79.	4	99.	4
20.	1	40.	2	60.	3	80.	4	100.	4

SAMPLE QUESTIONS

1.	2	10.	2	19.	3	28.	1	37.	2
2.	2	11.	1	20.	3	29.	2	38.	2
3.	3	12.	1	21.	3	30.	4	39.	2
4.	2	13.	3	22.	4	31.	2	40.	4
5.	1	14.	4	23.	2	32.	1	41.	2
6.	4	15.	2	24.	1	33.	1	42.	1
7.	4	16.	4	25.	4	34.	2	43.	3
8.	2	17.	1	26.	4	35.	1	44.	2
9.	1	18.	4	27.	3	36.	4	45.	3

WORK BOOK

Chapter 06

BREATHING AND EXCHANGE OF GASES

I. RESPIRATORY ORGAN

1. Respiration in aquatic mammals is called

1) Tracheal respiration

2) Branchial respiration

3) Pulmonary respiration

4) Cutaneous respiration

2. Anaerobic respiration is seen in

1) Scoliodon 2) Hydra

3) Cuttlefish 4) Tapeworm

3. Match the column I with column II and choose the correct option

Column I		Column II	
a)	Cutaneous respiration	1)	Prawn
b)	Branchial respiration	2)	Cockroach
c)	Tracheal respiration	3)	Rabbit
d)	Pulmonary respiration	4)	Earthworm

1) a-4, b-1, c-2, d-3 2) a-4, b-1, c-3, d-2

3) a-4, b-2, c-3, d-1 4) a-1, b-2, c-3, d-4

4. Match column I and column II and choose the correct option from the given choices

Column I		Column II	
A)	Pulmonary respiration	I)	Labeo
B)	Cutaneous respiration	II)	Balaenoptera
C)	Branchial respiration	III)	Bufo
D)	Buccopharyn-geal respiration	IV)	Pheretima

1) A-III, B-IV, C-II, D-I

2) A-III, B-IV, C-I, D-II

3) A-II, B-IV, C-I, D-III

4) A-II, B-I, C-IV, D-III

5. The process of exchange of oxygen from the atmosphere with CO_2 produced by the cell is called

1) Ventillation 2) Breathing

3) Metabolism 4) Both 1 and 2

6. Match column I and column II and choose the correct option from the given choices

Column I		Column II	
i)	Molluscs	a)	Moist cuticle
ii)	Pheretima	b)	Lungs
iii)	Locust	c)	Feathery gills
iv)	Rana	d)	Tracheal tubes

1) i-c, ii-a, iii -d, iv -b 2) i-b, ii-c, iii-a, iv-b

3) i-c, ii-d, iii-b, iv-a 4) i-c, ii-a, iii-b, iv-d

II. HUMAN RESPIRATORY SYSTEM

7. Conducting part of respiratory system in humans extend from the

1) External nostril upto alveolar sac
2) External nostrils upto terminal bronchioles
3) Primary bronchi upto respiratory bronchioles
4) Trachea upto respiratory bronchiole

8. Match the columns

Column I		Column II	
a)	Larynx	p)	Lid of glottis
b)	Trachea	q)	Air sacs
c)	Alveoli	r)	Voice box
d)	Epiglottis	s)	Wind pipe

1) a-r, b-s, c-q, d-p 2) a-r, b-q, c-s, d-p
3) a-r, b-s, c-q, d-t 4) a-r, b-t, c-q, d-p

9. In mammals the body cavity is partitioned into thoracic and abdominal parts by

1) Liver 2) Lungs
3) Ribs 4) Diaphragm

10. Match the columns

Column I		Column II	
a)	Larynx	p)	Elastic cartilage
b)	Trachea	q)	Squamous epithelium
c)	Alveoli	r)	Vocal cords
d)	Epiglottis	s)	Cartilaginous rings

1) a-r, b-s, c-q, d-p 2) a-r, b-q, c-s, d-p
3) a-r, b-s, c-p, d-q 4) a-s, b-r, c-q, d-p

11. Choose the correct option from the given statements

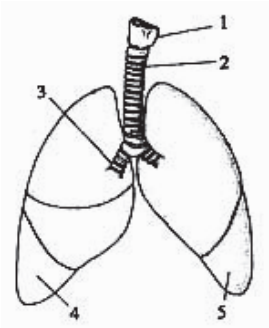
1) Diaphragm pulls the lungs down during expiration

2) Trachea is a long tube supported by complete cartilaginous rings for conducting air

3) Epiglottis is a bony flap that seals off the wind pipe during eating

4) Alveoli are thin-walled vascular bag like structure for exchange of gases

12. Identify the parts numbered in the diagram of human respiratory system.



1) 1 = Epiglottis, 2 = Larynx, 3 = Trachea, 4 = Left lung, 5 = Right lung

2) 1 = Larynx, 2 = Trachea, 3 = Right bronchus, 4 = Right lung, 5 = Left lung

3) 1 = Trachea, 2 = Larynx, 3 = Bronchus, 4 = Bronchiole, 5 = Bronchiole

4) 1 = Larynx, 2 = Primary bronchus, 3 = wind pipe, 4 = Thyroid cartilage, 5 = Pleura

13. Which of the following prevents collapsing of trachea?.

1) Intercostal muscles

2) Diaphragm

3) Complete cartilaginous rings

4) Incomplete cartilaginous rings

14. Larynx or voice box is seen between

1) Epiglottis and glottis

2) Trachea and bronchioles

3) Pharynx and trachea

4) Bronchus and epiglottis

15. The trachea and bronchi are provided with C- shaped cartilaginous rings which

1) Are responsible for sound production

2) Give them support and prevent their collapse

3) Divide trachea and bronchi

4) Give support to lungs

16. Number of lobes in right and left lungs of human are:

1) 1 and 4 2) 3 and 2

3) 4 and 2 4) 6 and 3

17. The structure which does not contribute to the breathing movements in mammals is

1) Ribs

2) Larynx

3) Diaphragm

4) Intercostal muscles

18. Alveoli of the lungs are lined by

1) Ciliated epithelium

2) Columnar epithelium

3) Cuboidal epithelium

4) Squamous epithelium

19. Human lungs are covered by double layered membraned called:

1) Pericardium 2) Endothelium

3) Alveolar membrane 4) Pleura

20. Which is not a function of the 'conducting part' of the respiratory system?

1) Transports air to the alveoli

2) Clears the air from the foreign particles

3) Brings the air to body temperature

4) It is the site of diffusion of oxygen and carbon dioxide

III. MECHANISM OF BREATHING

21. The respiratory rate is lowest while

1) playing tennis

2) running

3) snoring and sleeping

4) swimming

22. Read the following statements carefully and find out the correct order of respiration :

1. Pulmonary ventilation by which atmospheric air is drawn in

2. Transport of gases by the blood

3. Diffusion of O_2 and CO_2 between blood and tissues

4. Diffusion of gases across alveolar membrane

5. Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2

1) 1, 2, 3, 4, 5 2) 1, 4, 3, 2, 5

3) 1, 3, 2, 4, 5 4) 1, 4, 2, 3, 5

23. Which of the following statements is / are incorrect?

A) On an average a healthy human breathes 12 to 16 times per minute

B) The volume of air involved in breathing can be estimated by spirometer

C) Diaphragm is useful only in inspiration process

1) A and B

2) B only

3) C only

4) B and C

24. Contraction of diaphragm, increases the volume of thoracic chamber in the

1) Anterio-posterior axis

2) Dorso-ventral axis

3) Ventro-lateral axis

4) Dorso-lateral axis

25. The volume of air involved in breathing movements can be estimated by using,

1) Electrocardiograph

2) Stethescope

3) Spirometer

4) Sphygmomanometer

26. When diaphragm of a man is completely flat, it indicates

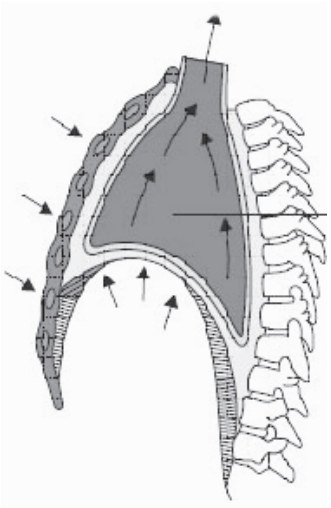
1) End of expiration

2) End of inspiration

3) Begining of inspiration

4) Increased rate of breathing

27. Observe the following picture and find out the correct statements regarding breathing



1) Diaphragm relaxed and arched upwards

2) Volume of thorax increased

3) Diaphragm contracted

4) Air entering lungs

5) Volume of thorax decreased

1) 2 and 3 2) 3 and 4

3) 1 and 5 4) 3 and 5

28. Thoracic chamber is formed ventrally by:

1) sternum 2) Ribs

3) Diaphragm 4) Vertebral column

29. During forceful breathing, contraction of abdominal muscles will lead to a/an;

1) decrease in intrapulmonary pressure and causes exhalation

2) increase in intrapulmonary pressure and causes exhalation

3) decrease in intrapulmonary volume and causes inhalation

4) increase in intrapulmonary volume and causes inhalation

30. Contraction of which muscle causes the volume of thoracic chamber increases anterio-posterior axis?

1) External Intercostal muscle
2) Internal Intercostal muscle
3) Muscles of Diaphragm
4) Muscles of Abdomen

31. Inspiration can occur

1) If the intra-pulmonary pressure is less than the atmospheric pressure
2) If the pulmonary pressure is higher than the atmospheric pressure
3) If the pulmonary pressure is equal to that of atmospheric pressure
4) If there is positive pressure in the lungs with respect to atmospheric pressure

32. Read the following statements and choose the correct option

Statement 1 : During inspiration, the volume of thorax increases

Statement 2 : Relaxation of diaphragm and external intercostal muscles causes the increase in thoracic volume

1) Statement 1 is correct and statement 2 is wrong
2) Both statement 1 and 2 are correct
3) Statement 1 is wrong and statement 2 correct
4) Both statement 1 and 2 are wrong

33. Breathing rate is lowered during eating because

1) Our lungs donot get enough supply of blood
2) Swallowing and breathing cannot go together at the same time
3) Lungs are compressed as stomach enlarges
4) More energy is required during eating

34. Which of the following is the primary inspiratory muscle?

1) External intercostal muscles
2) Internal intercostal muscles
3) Diaphragm/ phrenic muscles
4) Abdominal muscles

35. The contraction of abdominal and internal intercostal muscles in man causes

1) Forcible expiration
2) Inspiration
3) Normal expiration
4) Forcible inspiration

36. Contraction of which muscle causes the volume of thoracic chamber increases dorso-ventrally?

1) Muscles of Diaphragm
2) Muscle of Abdomen
3) External intercostal muscle
4) All except 3

IV. RESPIRATORY VOLUME AND CAPACITIES

37. Functional residual capacity (FR C) includes

a) TV b) IRV
c) RV d) ERV

1) a + c 2) b + d
3) c + d 4) a + b+d

38. The volume of air that remains in the lungs after a normal expiration can be represented as

1) TV + IRV 2) IRV + ERV
3) IRV + RV 4) ERV + RV

39. Lungs are made up of air filled sacs called the alveoli. They do not collapse even after forceful expiration, because of:

1) inspiratory reserve volume
2) tidal volume
3) expiratory reserve volume
4) residual volume

40. Match column I with column II and identify correctly matched from the following

Column I		Column II	
a)	4000-4600ml	P)	TV+ ERV
b)	5100-5800ml	Q)	TV + IRV
c)	1500 -1600ml	R)	ERV + RV
d)	3000-3500ml	S)	TLC - RV
e)	2100-2300ml	T)	VC + RV

1) a-R, b-T, c-Q, d-P, e-S
2) a-S, b-T, c-P, d-Q, e-R
3) a-T, b-S, c-P, d-Q, e-R
4) a-S, b-T, c-Q, d-P, e-R

41. Arrange the following in the order of increasing volume?

a) Residual volume

b) Functional residual volume

c) Expiratory reserve volume

d) Vital capacity

1) a < b < c < d 2) a < c < d < b
3) c < a < b < d 4) b < c < a < d

42. Identify the mismatched pair

1) TV - 500 ml

2) IRV - 2500 ml to 3000 ml

3) RV - 1100 ml to 1200 ml

4) IC - 5000 ml

43. Match column-I with column - II and select the correct option from the codes given below

Column I		Column II	
a)	TV+ERV	i)	Total lung capacity
b)	ERV+RV	ii)	Functional residual capacity
c)	RV+ERV+TV+IRV	iii)	Vital capacity
d)	ERV+TV+IRV	iv)	Expiratory capacity-

1) a-i, b-iii, c-ii, d-iv 2) a-iv, b-ii, c-i, d-iii
3) a-i, b-ii, c-iii, d-iv 4) a-iv, b-iii, c-i, d-ii

44. A person breathing normally at rest, takes in or expels approximately half a litre of air during each respiratory cycle. It is called :

1) Expiratory reserve volume
2) Tidal volume
3) Inspiratory reserve volume
4) Vital capacity

45. Oxyhaemoglobin dissociation curve shifts to the right when:

1) pCO_2 deceases
2) Body temperature decreases
3) pH decreases
4) Concentration of 2-3 DPG decreases

46. Total volume of air a person can expire after a normal inspiration-

1) TV + IRV

2) RV + ERV + TV + IRV

3) ERV + RV

4) TV + ERV

47. The air which is taken in or given out during a single breath is known as

1) Residual air 2) Vital air

3) Tidal air 4) both 1 and 2

48. The volume of dead air that remains in bronchi where no gas exchange takes place is

1) 500ml 2) 1500ml

3) 150ml 4) 1000ml

49. If the expiratory reserve volume is 1100ml, residual volume is 1200ml and tidal volume is 500ml, what shall be the functional residual capacity?

1) 1600ml 2) 2800ml

3) 2300ml 4) 1200ml

50. Which one shows least value?

1) Vital capacity

2) residual volume

3) tidal volume

4) functional residual capacity

51. Expiratory Reserve volume is

1) Greater than IRV

2) Greater than FRC

3) Less than TV

4) Less than IC

52. Which one shows highest value?

1)Tidal volume

2) Expiratory reserve volume

3) Residual volume

4) Inspiratory reserve volume

53. If the inspiratory reserve volume is 3000ml,expiratory reserve volume is 1000ml and tidal volume is 500ml. What shall be the inspiratory capacity?

1)1500ml

2) 4000ml

3) 3500ml

4) 4500ml

V. EXCHANGE OF GASES

54. Which of the following factors are essential for oxyhaemoglobin formation?

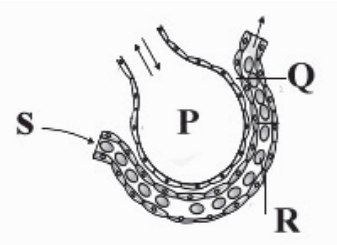
1) Low pO_2 , high pCO_2 , high H^+ con, Low temperature

2) High pO_2 , Low pCO_2 , Lesser H^+ con, Low temperature

3) High pO_2 , high pCO_2 , high H^+ con, high temperature

4) Low pO_2 , Low pCO_2 , Low H^+ con, Low temperature

55. The figure given here shows a small part of human lung where exchange of gases takes place. In which one of the options given below, the one part P, Q, R or S is correctly identified along with its function.



1) S - arterial capillary - passes O_2 to tissues

2) P - alveolar cavity - main site of exchange of respiratory gases

3) Q - capillary wall - exchange of O_2 and CO_2 takes place here

4) R - RBC - mainly transport of CO_2

56. The partial pressures (in mmHg) of oxygen (O_2) and carbon dioxide (CO_2) at alveoli (the site of diffusion) are:

1) pO_2=104 and pCO_2=40

2) pO_2=40 and pO_2=45

3) pO_2=95 and pCO_2=40

4) pO_2=159 and pCO_2=0.3

57. The toxic effect of carbon monoxide is due to its greater affinity for haemoglobin as compared to oxygen, approximately by

1) 1- 2 times 2) 10-20 times

3) 200-300 times 4) 500-1000 times

58. Which of the following statements is not true?

1) The partial pressure of O_2 in deoxygenated blood is 40mm Hg

2) The partial pressure of O_2 in oxygenated blood is 95mm Hg

3) The partial pressure of CO_2 in alveolar air is 40mm Hg

4) The partial pressure of CO_2 in deoxygenated blood is 95mm Hg

59. Major factor responsible for the dissociation of H_2CO_3 within the alveolar capillary and release of CO_2 to alveolar cavity is;

1) High pCO_2 in alveoli

2) Low pO_2 in alveoli

3) Low pCO_2 in alveolar cavity

4) High H^+ concentration in alveolar blood

60. In human beings, partial pressure of O_2 in the oxygenated and deoxygenated blood is respectively:

1) 95 mm Hg and 40 mm Hg

2) 40 mm Hg and 95 mm Hg

3) 45 mm Hg and 40 mm Hg

4) 90 mm Hg and 45 mm Hg

61. pO_2 104mmHg and 95mmHg in humans are found respectively in:

1) Alveoli and tissues

2) Oxygenated blood and deoxygenated blood

3) Alveoli and oxygenated blood

4) Alveoli and deoxygenated bloods

62. What is the pO_2 and pCO_2 in the systemic arteries ?

1) pO_2 40 mmHg; pCO_2 45 mmHg

2) pO_2 95 mmHg; pCO_2 104 mmHg

3) pO_2 95 mmHg; pCO_2 40 mmHg

4) pO_2 45mmHg; pCO_2 40 mmHg

63. When the temperature increases, what is the fate of Hb saturation with O_2?

1) It decreases

2) Increases

3) No change occurs

4) Increases, then decreases

64. What will be the pO_2 and pCO_2 in the atmospheric air compared to that in the alveolar air?

1) pO_2 lesser ; pCO_2 higher

2) pO_2 higher ; pCO_2 lesser

3) pO_2 higher ; pCO_2 higher

4) pO_2 lesser ; pCO_2 lesser

65. Maximum amount of oxygen is exchanged from the blood in the:

1) Arteries of the body

2) Capillaries surroundings tissue cells

3) Left atrium of the heart

4) Capillaries surrounding the alveoli

66. pO_2 - 95 mmHg and 40 mmHg in humans are found respectively in:

1) Atmospheric air and tissue

2) Alveoli and oxygenated blood

3) oxygenated blood and tissue

4) Tissue and alveoli

67. Diffusion membrane is formed of all the following except

1) Endothelial lining

2) Basement membrane

3) Ciliated epithelium

4) Squamous epithelium

VI. EXCHANGE OF GASES

68. Which among the following statements is true about RBCs in humans ?

1) They carry about 20-25 percent of CO_2 as carbaminohaemoglobin

2) They transport 99.5 percent of O_2

3) They transport 87 percent oxygen only and the rest 13 per cent of it is transported in dissolved state in blood plasma

4) They do not carry CO_2 at all

69. Match the column suitably given column 1 with mode of CO_2 transport in column 2.

Column I		Column 2	
A)	20% - 25%	I)	As bicarbonates
B)	70%	II)	Dissolved in plas-ma
C)	7%	III)	In combination with Haemoglobin

1) A-I, B-III, C-II
2) A-I, B-II, C-III
3) A-III, B-I, C-II
4) A-III, B-II, C-I

70. In a resting person the saturation of haemoglobin with oxygen seen in the blood that leaves the tissue capillaries is approximately:

1) 25 %
2) 1.34 %
3) 46%
4) 75%

71. Select the incorrect statement

1) Inhalation of carbon monoxide result in the formation of a stable compound called carboxyhaemoglobin

2) 100 ml of oxygenated blood can transport about 20 ml oxygen

3) 1gram of haemoglobin combines with 1.34 ml oxygen

4) Under normal physiological condition 100 ml of oxygenated blood delivers about 15 ml oxygen to the tissue

72. Identify the wrong statement with reference to transport of oxygen

1) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2

2) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

3) Higher H+ concentration in tissues favours the formation of oxyhaemoglobin.

4) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin

73. Carbon monoxide prevents transport of oxygen by

1) Forming stable compound with haemo-globin

2) Destroying haemoglobin

3) Forming carbondioxide with oxygen

4) Destroying RBCs

74. Amount of oxygen delivered by every 100 ml of oxygenated blood to the tissue under normal physiological condition is around

1) 5 ml
2) 20 ml
3) 10 ml
4) 100 ml

75. While at rest, in one circulation, the blood from lungs to the tissues and back through circulatory system, the percentage of haemoglobin giving up its oxygen to the tissue is

1) 50 %
2) 25 %
3) 75%
4) 80%

76. Bulk of carbon dioxide (CO_2) released from body tissues into the blood is mainly present as

1) bicarbonate in blood plasma

2) free CO_2 in blood plasma

3) 70% carbamino-haemoglobin and 30% as bicarbonate

4) carbamino-haemoglobin in RBCs

77. Carbonic anhydrase is present in

1) Plasma of blood 2) RBC

3) WBC 4) Both (1) and (2)

78. Find out the correct statements with regards to transport of gases :

a) About 97% of O_2 is transported by RBCs in the blood

b) 40% of the CO_2 is carried as bicarbonate

c) Only 1% of O_2 is carried in a dissolved state through the plasma

d) About 20-25% of CO_2 is transported by RBCs

1) a and c are correct

2) a and d are correct

3) b and d are correct

4) All are correct

79. Enzyme essential for the transport of CO_2 as bicarbonate ions in blood is

1) Lactase

2) Carbonic anhydrase

3) Carboxy peptidase

4) Thrombokinase

80. Carbon dioxide combines with haemoglobin to form:-

1) Carboxyhaemoglobin

2) Oxyhaemoglobin

3) Carbaminohaemoglobin

4) Carbonic anhydrase

81. Which of the following statements about blood constituents and transport of respiratory gases in man is correct?

1) RBCs transport O_2 whereas plasma transport only CO_2

2) RBCs as well as WBCs transport both O_2 and CO_2

3) RBCs transport O_2 whereas WBCs transport CO_2

4) RBCs as well as plasma transport both O_2 and CO_2

82. Amount of carbonic acid formation greater in RBC compared blood plasma because:

1) Carbonic anhydrase Concentration lower in RBC

2) RBC contain high concentration of carbonic anhydrase

3) Haemoglobin content more in blood plasma than RBC

4) Carbonic anhydrase absent in RBC

83. CO_2 dissociates from carbaminohaemoglobin in alveoli, when

1) pCO_2 is high and pO_2 is low

2) pO_2 is high and pCO_2 is low

3) Both pCO_2 and pO_2 is high

4) pCO_2 and pO_2 are same

84. The average amount of oxygen carried by 100ml of arterial blood is

1) 18ml 2) 20 ml

3) 16.9 ml 4) 14.9 ml

85. Which of the following gases makes most stable combination with haemoglobin of RBC?

1) Oxygen

2) Carbon monoxide

3) Both 1 and 2

4) Carbon dioxide

86. Select the favourable condition for the dissociation of oxyhaemoglobin

1) High pCO_2 and low pO_2, more H^+ concentration, higher temperature

2) Low pO_2 and high pCO_2, less H^+ concentration, higher temperature

3) High pO_2 and high pCO_2, less H^+ concentration, higher temperature

4) Low pO_2 and low pCO_2, more H^+ concentration, higher temperature

87. Carbon dioxide released from body tissues is transported mainly as

1) Carbamino-haemoglobin in RBCs

2) Carboxyhaemoglobin

3) Dissolved CO_2 in blood plasma

4) Bicarbonate in blood plasma

VII. REGULATION OF RESPIRATION

88. Which of the following acts as the switch off point of inspiration?

1) Signals from dorsal respiratory group

2) Signals from ventral respiratory group

3) Signals from pneumotaxic centre

4) Signals from carotid body and ventral respiratory group

89. Which of the following conditions can reduce the inspiratory duration and alter respiratory rate?

1) Neural signals from chemosensitive area

2) Neural signals from pneumotaxic centre

3) Decreased concentration of CO_2 and H^+ in blood

4) All except 3

90. Read the following statements carefully and choose the wrong statement

1) Respiratory rhythm is maintained by the respiratory centre in the medulla

2) Shifting of oxyhaemoglobin dissociation curve to the right by increase of pCO_2 is called Bohr effect

3) Penumotaxic centre controls the switch off point of inspiratory ramp

4) Oxyhaemoglobin is alkaline

91. Which of the following centre acts as the switch off point for inspiration?

1) Medullary centre

2) Apneustic centre

3) Pneumotaxic centre

4) Ventral respiratory group

VIII. DISORDER OF RESPIRATORY SYSTEM

92. **Assertion** : A person goes to high altitude and experiences 'altitude sickness' with symptoms like breathing difficulty and heart palpitations.

Reason : Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

93. People who have migrated from the planes to an area adjoining Rohtang pass about 6 months back

1) are not physically fit to play games like football

2) have more RBCs and their haemoglobin has a lower binding affinity to O_2

3) have the usual RBC count, but their haemoglobin has very high binding affinity to O_2

4) have more WBCs and their haemoglobin has a high binding affinity to O_2

94. Pneumotaxic centre is located in

1) Upper pons 2) Lower pons

3) Medulla 4) Bronchi

95. Which of the following parts of the brain regulates the respiratory process?

1) The vagus nerve

2) thalamus

3) Medulla oblongata

4) Cerebellum

96. Chemosensitive area of respiratory centre in medulla is affected by

1) less CO_2 and O_2

2) less O_2 and H^+ ions

3) excess CO_2 and H^+ ions

4) excess O_2 and H^+ ions

97. Ascent of high mountains may cause altitude sickness in men due to

1) Excess of CO_2 in blood

2) Decreased efficiency of haemoglobin

3) Decreased partial pressure of oxygen

4) Decreased proportion of oxygen in air

98. Inflammation of the covering of the lungs causing severe pain in the chest region is termed as –

1) Emphysema 2) Pleurisy

3) Bronchitis 4) Hypoxia

99. Which of the following is a chronic respiratory disorder caused by smoking?

1) Asthma

2) Emphysema

3) Silicosis

4) Pulmonary fibrosis

100. Match the diseases in column I with their symptoms in column 2 and choose the correct option

Column I		Column II	
A)	Asthma	i)	Running nose
B)	Bronchitis	ii)	Spasm of smooth muscle around bronchi-oles
C)	Rhinitis	iii)	Damaged alveo-lar wall
D)	Emphysema	iv)	Inflammation of bronchi

1) A-iv, B-ii, C-iii, D-i 2) A-iv, B-iii, C-ii, D-i

3) A-iii, B-i, C-ii, D-iv 4) A-ii, B-iv, C-i, D-iii

SAMPLE QUESTIONS

1. Under given oxygen concentration in blood, dissociation of oxyhaemoglobin will increase if

1) pH of blood falls

2) pH of blood raises

3) CO_2 concentration in blood falls

4) Temperature decreases

2. The partial pressure (in mmHg) of oxygen and CO_2 at alveoli are

1) pO_2 = 159 and pCO_2 = 40 respectively

2) pO_2 = 104 and pCO_2 = 40 respectively

3) pO_2 = 40 and pCO_2 = 45 respectively

4) pO_2 = 95 and pCO_2 = 40 respectively

3. Select the incorrect one from the following

1) IRV is higher than ERV but lesser than VC

2) FRC is the sum of ERV and RV

3) The sum of VC and FRC is TLC

4) TLC is the sum of IC and FRC

4. Find the mismatch regarding respiratory structures

1)	Hydra	body surface
2)	Pheretima	moist cuticle
3)	Spider	feathery gills
4)	Crocodile	lungs

5. Ventral and lateral sides of thoracic chamber is formed by

1) Sternum and diaphragm respectively

2) Sternum and ribs respectively

3) Ribs and sternum respectively

4) Vertebral column and diaphragm

6. What is the percentage of O2 transported in dissolved form through the plasma?

1) About 5-7% 2) 3%

3) About 20-25% 4) 15%

7. How much CO_2 is delivered to the alveoli by every 100mL of deoxygenated blood?

1) 2 mL 2) 4 mL

3) 5 mL 4) 6 mL

8. Match the columns

Column I		Column II	
A)	Larynx	I)	Lid of larynx
B)	Trachea	II)	Air sacs
C)	Alveoli	III)	Voice box
D)	Epiglottis	IV)	Wind pipe

1) A-III, B - IV, C- II, D-I

2) A-III, B-II, C-IV, D-I

3) A-IV, B-III, C-II, D-I

4) A-III, B-I, C-II, D-IV

9. A specialised centre known as respiratory rhythm centre regulates respiration. It is located in

1) Cerebrum

2) Cerebellum

3) Medulla oblongata

4) Pons

10. The volume of air inspired by a healthy person during normal breathing is approximately

1) 2000 - 3000 mL/min

2) 2500 - 3000 mL/min

3) 6000 - 8000 mL/min

4) 1000 - 1100 mL/min

11. Respiration by means of gills is called

1) Tracheal respiration

2) Buccopharyngeal respiration

3) Cutaneous respiration

4) Branchial respiration

12. The volume of air that remains in the lungs after a normal expiration can be represented as

1) TV + IRV 2) IRV + ERV

3) IRV + RV 4) ERV + RV

13. Mechanism of breathing vary among different groups of animals depending mainly on their

1) Habitats

2) Level of organisation

3) Both 1 and 2

4) Body symmetry

14. Identify the wrong statement and reference to transport of oxygen

1) Binding of oxygen with haemoglobin is mainly related to partial pressure of oxygen

2) Higher H^+ concentration in alveoli favours the formation of oxyhaemoglobin

3) pCO_2 can interfere with oxygen binding

4) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin

15. Match the column I and Column II

Column I		Column II	
A)	Cutaneous respiration	I)	Prawns
B)	Branchial respiration	II)	Cockroach
C)	Tracheal respiration	III)	Rabbit
D)	Pulmonary respiration	IV)	Earthworm

1) A-IV, B-I, C-II, D-III

2) A-IV, B-II, C-I, D-III

3) A-III, B-II, C-IV, D-I

4) A-II, B-IV, C-III, D-I

16. **Assertion** : In the alveolar side, oxyhaemoglobin dissociates to oxygen and haemoglobin

Reason : Oxyhaemoglobin formation depends on temperature only

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

17. Which type of respiratory organs are present in spider and scorpion?

1) Gills 2) Skin

3) Book gills 4) Book lungs

18. Even when there is no air in it, trachea does not collapse due to the presence of

1) Bony rings

2) Turgid pressure

3) Chitinous rings

4) Incomplete cartilaginous rings

19. How much air can be inspired or expired during a normal breathing

1) 0.5L 2) 2.5 L

3) 1.5 L 4) 5.5 L

20. Residual volume is:

1) Lesser than TV 2) Greater than TV

3) Greater than VC 4) Greater than IRV

21. Carbonic anhydrase is found in high concentration in:

1) Erythrocytes

2) Lymphocytes

3) Leucocytes

4) Blood plasma

22. What would happen if human blood becomes acidic?

1) RBC count increases

2) RBC count decreases

3) Oxygen carrying capacity of Hb increases

4) Oxygen carrying capacity of Hb decreases

23. Read the following statements and select the correct one

1) In tissues, carbondioxide binds with haemoglobin forming carboxyhaemoglobin

2) In a healthy person the Hb content is more than 25g per 100mL

3) In lungs the oxygen from alveoli enters the blood through active transport

4) RBCs as well as plasma transport both oxygen and carbondioxide

24. Chronic respiratory disorder caused mainly by cigarette smoking

1) Asthma 2) Emphysema

3) Silicosis 4) Pneumonia

25. IRV + TV + ERV is same as:

1) IC + RV 2) IC + ERV

3) IC + FRC 4) TLC + FRC

26. **Assertion** : O_2 can bind with haemoglobin in an irreversible manner forming oxyhaemoglobin

Reason : Binding of O_2 with haemoglobin is primarily related to body temperature

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

27. Choose the correct options from the following

Statement 1 : The volume of thoracic cavity increases during inspiration

Statement 2 : Inspiration is due to relaxation of diaphragm and contraction of inspiratory muscle

1) Statement 1 is correct and statement 2 is wrong

2) Both statement 1 and 2 are correct

3) Statement 1 is wrong and statement 2 correct

4) Both statement 1 and 2 are wrong

28. The three main layers that forms the diffusion membrane is

1) Thin squamous epithelium of alveoli, basement membrane of bronchioles and basement substances

2) Thin squamous epithelium of alveoli, cuboidal epithelium of alveolar capillaries and basement substance

3) Basement substance, cuboidal epithelium of alveoli and stratified epithelium of bronchiole

4) Thin squamous epithelium of alveoli, endothelium of alveolar capillaries and the basement substance.

29. Which of the following can activate the chemosensitive area situated adjacent to the rhythm centre?

1) High CO_2 concentration and low H^+ concentration

2) Low CO_2 and high H^+ concentration

3) Low CO_2 and H^+ concentration

4) High CO_2 and H^+ concentration

30. Pneumotaxic centre can moderate the functions of respiratory rhythm centre by

1) Increasing the duration of inspiration

2) First increasing and then reducing the duration of expiration

3) Reducing the duration of inspiration

4) Increasing the duration of both inspiration and expiration

31. Which portions of the human respiratory system is called sound box?

1) Larynx 2) Trachea

3) Nasopharynx 4) Glottis

32. Pleura is double membrane sac which envelope

1) Kidneys 2) Brain

3) Lungs 4) Nasal passage

33. Which of the following statements is not correct?

1) Volume of air that will remain in the lungs after a normal expiration is about 2200ml

2) Partial pressure of O_2 and CO_2 in alveoli is 40 mm Hg and 104 mm Hg respectively.

3) Alveoli of lungs are lined by thin squamous epithelium

4) High amount of carbonic anhydrase is found in RBCs

34. Consider the two statements

Statement 1 : Expiratory Capacity is the total volume of air a person can expire after a normal inspiration.

Statement 2 : Functional Residual Capacity is the volume of air that will remain in the lungs after a forceful expiration.

1) Statement 1 is correct and statement 2 is wrong

2) Both statement 1 and 2 are correct

3) Statement 1 is wrong and statement 2 correct

4) Both statement 1 and 2 are wrong

35. Contraction of diaphragm

1) Increases the volume of the thoracic chamber in the anterio posterior axis

2) Increases the volume of the thoracic chamber in the dorsoventral axis

3) Decreases the volume of the thoracic chamber in the anterioposterior axis

4) Decreases the volume of the thoracic chamber in the dorsoventral axis

36. **Assertion** : During inspiration, the volume of thorax decreases

Reason : This happens due to the relaxation of diaphragm and Abdominal muscles

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

37. The maximum volume of air expired after forceful inspiration

1) TV + IRV

2) TV + ERV + IRV

3) TV + ERV + IRV + RV

4) TV + ERV

38. Which of the following conditions is/ are favourable for the formation of oxyhaemoglobin?

1) High pO_2

2) Low pCO_2

3) Less H^+ concentration

4) All of these

39. Carbon dioxide that enter RBCs reacts with water to form carbonic acid with the help of an enzyme called

1) Carboxy hydrolase

2) Carboxy anhydrase

3) Carbonic anhydrase

4) Carbonic hydrolase

40. Body tissue obtain oxygen from oxyhaemoglobin because of its dissociation caused by

1) Low CO_2 concentration

2) Low H^+ concentration

3) High O_2 concentration

4) High CO_2 concentration

41. Match the following and mark the correct options

Animal		Respiratory organ	
A)	Earthworm	i)	Moist cuticle
B)	Insects	ii)	Gills
C)	Fishes	iii)	Lungs
D)	Birds/ reptiles	iv)	Trachea

1) A-ii, B-i, C-iv, D-iii 2) A-i, B-iv, C-ii, D-iii

3) A-i, B-iii, C-ii, D-iv 4) A-i, B-ii, C-iv, D-iii

42. Identify the wrong statement with reference to transport of oxygen?

1) Higher H^+ concentration in tissue favour the dissociation of oxyhaemoglobin

2) Low temperature in alveoli favour the formation of oxyhaemoglobin

3) About 97% O_2 transport through RBC in the form of oxyhaemoglobin

4) High pco_2 and Low pH in blood favour the formation of oxyhaemoglobin

43. Correctly represents the lung conditions in asthma and emphysema respectively?

1) Inflammation of bronchioles, Decreased respiratory surface

2) Decreased respiratory surface, Inflammation of bronchioles

3) Increased number of bronchioles, increased respiratory surface

4) Increased respiratory surface, Inflammation of bronchioles

44. Vital capacity of lungs is equal to

1) IRV + ERV + TV

2) IRV + ERV + TV - RV

3) IRV + ERV + TV + RV

4) IRV + ERV

45. Which of the following statements is not true?

1) The partial pressure of oxygen in deoxygenated blood is 40mm Hg

2) The partial pressure of oxygen in oxygenated blood is 95 mm Hg

3) The partial pressure of oxygen in the alveolar air is 104 mm Hg

4) The partial pressure of carbon dioxide in deoxygenated blood is 95 mm Hg

46. A person breathe in maximum volume of air by forced inspiration after a forced expiration. This quantity of air taken in is:

1) Total lung capacity

2) Tidal volume

3) Vital capacity

4) Inspiratory capacity

47. Approximately 70% of carbondioxide is transported to the lungs

1) As bicarbonate ions

2) In the form of dissolved gas molecules

3) by binding with RBC

4) as carbamino-haemoglobin

48. Read the given statements and select the correct options

Statement I : CO_2 passess from the tissue to the alveoli through blood

Statement II : PCO_2 is higher in deoxygenated blood than in alveoli.

1) Both statement 1 and 2 are correct

2) Both statement 1 and 2 are incorrect

3) Statement 1 is correct but statement 2 is incorrect

4) Statement 2 is correct but Statement 1 is incorrect

49. What is the partial pressure of O_2 when blood is entering and leaving the alveolar capillaries respectively:

1) 40 mmHg, 95 mmHg

2) 80 mmHg, 45 mmHg

3) 75 mmHg, 40 mmHg

4) 86 mmHg, 35 mmHg

50. Which of the following is not supported by cartilaginous rings

1) Primary bronchioles

2) Tertiary bronchioles

3) Tracheae

4) Alveoli

ANSWER KEY

1.	3	21.	3	41.	3	61.	3	81.	4
2.	4	22.	4	42.	4	62.	3	82.	2
3.	1	23.	3	43.	2	63.	1	83.	2
4.	3	24.	1	44.	2	64.	2	84.	2
5.	4	25.	3	45.	3	65.	4	85.	2
6.	1	26.	2	46.	4	66.	3	86.	1
7.	2	27.	3	47.	3	67.	3	87.	4
8.	1	28.	1	48.	3	68.	1	88.	3
9.	4	29.	2	49.	3	69.	3	89.	4
10.	1	30.	3	50.	3	70.	4	90.	4
11.	4	31.	1	51.	4	71.	4	91.	3
12.	2	32.	1	52.	4	72.	3	92.	1
13.	4	33.	2	53.	3	73.	1	93.	2
14.	3	34.	3	54.	2	74.	1	94.	1
15.	2	35.	1	55.	2	75.	2	95.	3
16.	2	36.	3	56.	1	76.	1	96.	3
17.	2	37.	3	57.	3	77.	4	97.	3
18.	4	38.	4	58.	4	78.	2	98.	2
19.	4	39.	4	59.	3	79.	2	99.	2
20.	4	40.	2	60.	1	80.	3	100.	4

SAMPLE QUESTIONS

1.	1	11.	4	21.	1	31.	1	41.	2
2.	2	12.	4	22.	4	32.	3	42.	4
3.	3	13.	3	23.	4	33.	2	43.	1
4.	3	14.	2	24.	2	34.	1	44.	1
5.	2	15.	1	25.	2	35.	1	45.	4
6.	2	16.	4	26.	4	36.	4	46.	3
7.	2	17.	4	27.	1	37.	2	47.	1
8.	1	18.	4	28.	4	38.	4	48.	1
9.	3	19.	1	29.	4	39.	2	49.	1
10.	3	20.	2	30.	3	40.	4	50.	4

WORK BOOK

Chapter 07

BODY FLUIDS AND CIRCULATION

BLOOD :- PLASMA & FORMED ELEMENTS

1. How many statements are true about blood plasma?

a) Plasma is a straw coloured viscous fluid with PH of 7.4

b) Plasma forms about 90% of total volume of blood

c) 55% of plasma is formed of water

d) Globulins in plasma are involved in body defence

e) Nutrients present in the plasma are always in transit in the body

1) 4 2) 3

3) 2 4) 5

2. Which of the following is present in both plasma and serum in humans?

1) WBCs 2) Fibrinogen

3) RBCs 4) Albumin

3. Match the plasma proteins and their functions

Column I		Column II	
a)	Fibrinogen	i)	Osmotic balance
b)	Globulin	ii)	Blood clotting
c)	Albumin	iii)	Defence

1) a - iii, b - ii, c - i 2) a - ii, b - iii, c - i

3) a - ii, b - i, c- iii 4) a - i, b - ii, c - iii

4. Which one of the following is correct?

1) Blood = Plasma + Formed elements

2) Plasma = Blood – Lymphocytes

3) Lymph = Plasma + RBC + WBC

4) Serum = Blood + Fibrinogen

5. Choose the correct sequence of abundance in blood with respect to formed elements

1) RBC < WBC < platelets

2) RBC > WBC > platelets

3) WBC < RBC < platelets

4) RBC > platelets > WBC

6. Select the incorrect match about formed elements and respiratory pigments of human blood

Column I		Column II
1)	Erythrocytes	average life span is about 4 months
2)	Haemoglobin	12-16 mg/100ml of blood
3)	Leucocytes	6000 - 8000/ mm^3 of blood
4)	Platelets	cell fragments produced from megakaryocytes

7. Which component gives erythrocytes their characteristic color?

1) Plasma 2) Bilirubin

3) Haemoglobin. 4) Albumin

8. Mature erythrocytes in humans are:

i) enucleated and biconcave

ii) the most abundant blood cells

iii) non-nucleated and biconvex

iv) non-nucleated and non-pigmented

1) ii and iii are correct

2) i and ii are correct

3) only i is correct

4) i and iv are correct

9. What is the average lifespan of erythrocytes ?

1) 30 days. 2) 60 days.

3) 90 days. 4) 120 days

10. Find out the incorrect match about the relative percentage of different types of leucocytes

	Column I	Column II
1)	Lymphocytes	25%
2)	Neutrophils	65%
3)	Monocytes	3%
4)	Basophils	1%

11. Which of the following cell/cells play a role in phagocytosis?

1) Monocytes 2) Neutrophils

3) Lymphocyte 4) both (1) and (2)

12. The type of blood cells that secrete heparin, serotonin and histamine are:

1) eosinophils 2) neutrophils

3) basophils 4) monocytes

13. Which type of leucocytes are involved in allergic reactions?

1) Neutrophils 2) Monocytes

3) Eosinophils 4) Lymphocytes

14. Which of the following cells are involved in inflammatory reaction?

1) Basophils 2) Monocytes

3) Lymphocytes 4) Neutrophils

15. Select the correctly matching option regarding formed elements and their characters.

	Formed elements	Characters
1)	Eosinophils and monocytes	Allergic reactions
2)	Lymphocytes and monocytes	Agranulocytes
3)	Neutrophils and thrombocytes	Phagocytic cells
4)	Erythrocytes and basophils	Blood cells without nucleus

BLOOD GROUPS AND COAGULATION OF BLOOD

16. Person with blood group AB is considered as universal recipient because he has

1) Both A & B antibodies in the plasma

2) No antigens on RBC and no antibodies in the plasma

3) Both A & B antigens in the plasma but no antibodies

4) Both A & B antigens on RBC but no antibodies in the plasma

17. Which blood group is compatible with all other blood groups for blood transfusion?

1) Blood group A 2) Blood group B

3) Blood group AB. 4) Blood group O

18. Select the false statement regarding ABO blood grouping

1) Blood grouping is based on the presence or absence of antigens on erythrocytes, called agglutinogen.

2) Blood group antibodies are found in plasma, called agglutinins

3) Blood group without agglutinins is O group

4) AB blood contains both agglutinogens

19. In ABO blood grouping, which of the following blood transfusion is not possible?

1)A→AB. 2) O→A.

3) AB→A. 4) AB→AB

20. An individual who has just met with an accident has lost a lot of blood. He needs immediate blood donation and there is no sufficient time to analyse his blood group. Which among the following blood would be safest for blood transfusion to such a person?

1) AB+ve 2) AB-ve

3) O+ve 4) O-ve

21. In a marriage, the male belongs to A blood group and the female AB group. They cannot have a progeny of

1) A group 2) AB group

3) B group. 4) O group

22. If a sample of blood is agglutinated with anti-A, anti-B, and anti-Rh in a blood group testing using antiserum. Then the sample containing blood group is

1) A positive 2) B negative

3) AB negative 4) AB positive

23. In blood transfusion, the life threatening incompatibility reaction occurs mainly by the action of

1) recipient's antibody on donor's antigen

2) recipient's antibody on donor's antibody

3) recipient's antigen on donor's antibody

4) recipient's antigen on donor's antigen

24. Which of the following individuals is at risk of developing erythroblastosis foetalis?

1) Rh+ve mother carrying an Rh+ve foetus

2) Rh-ve mother carrying an Rh+ve foetus

3) Rh+ve mother carrying an Rh+ve foetus

4) Rh-ve mother carrying an Rh-ve foetus

25. How can be prevent erythroblastosis foetalis in subsequent pregnancies?

1) Administering anti-Rh to the mother after delivery

2) Administering anti-Rh to the foetus during pregnancy

3) Administering Rh antibodies to the mother before conception

4) Administering anti-Rh antibodies to the baby after birth

26. In erythroblastosis foetalis, which one of these moves from mother to the embryo through the placenta?

1) Rh antigen 2) Rh antibody

3) O antigen 4) ABO antibody

27. Name the blood cells whose reduction in number can cause clotting disorders leading to excessive loss of blood from the body

1) Erythrocytes 2) Leucocytes

3) Haemocytes 4) Thrombocytes

28. Identify the correct statement

1) Thrombocytes are cell fragments produced from megakaryocytes

2) Normal platelet count is 1.5 - 3.5 million/mm^3

3) Fibrin converts inactive prothrombin into acive thrombin

4) A coagulum is formed mainly of a network thrombin in which dead and damaged blood cells are trapped

29. An enzyme complex required for blood clotting is:

1) thrombokinase 2) thrombin

3) fibrinogen 4) prothrombin

30. The scum or coagulam is formed of

1) prothrombin and fibrinogen

2) thromboplastin and thrombokinase

3) thrombokinase and ca^{2+}

4) fibrin threads and damaged formed elements

LYMPH AND CIRCULATORY PATHWAYS

31. Which of the following are correct about lymph?

I) Tissue fluid found in lymphatic system is called lymph

ii) Plasma and WBCs are found in it

iii) Lymphocytes are responsible for the immune response

iv) RBCs and some blood proteins are absent in lymph.

v) Lymph helps in the transport of hormones, nutrients etc.

1) i only 2) i and ii

3) i, iv, v 4) All of these

32. Fats absorbed from the digestive system

1) through blood vessels.

2) through lacteals

3) through the liver

4) through the pancreas

33. Lymphatic system helps to

1) return the erythrocytes to blood vascular system

2) transport larger proteins to blood vascular system

3) drains excess interstitial fluid back to the major veins

4) collect tissue fluid and drains it back to the arterial system

34. What is the advantage of a closed circulatory system over an open circulatory system?

1) More precisely regulated fluid flow

2) Greater efficiency in oxygenation

3) Enhanced immune response

4) Increased blood volume

35. Which type of circulatory system is present in arthropods and molluscs?

1) Closed circulatory system

2) Single circulatory system

3) Double circulatory system

4) Open circulatory system

36. What is false about circulatory pathways?

1) Fishes have single circulation

2) Amphibians have incomplete double circulation

3) Reptiles have closed circulation with dorsal heart

4) Birds have complete double circulation

ASSERTION(A) - REASON(R) QUESTION

37. **Assertion** : Heart of fish contains only deoxygenated blood

Reason : Oxygenated blood do not return back to the heart in fishes

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

38. Which one of the following animal has two separate circulatory pathways?

1) Calotes. 2) Delphinus.

3) Salamander 4) Scoliodon

39. Open circulatory system is present in

A. Annelids

B. Arthropods

C. Molluscs

D. Hemichordata

1) B and C only 2) D only

3) A only 4) All except A

40. More precisely regulated blood flow through network of blood vessels are found in :

1) Annelids and chordates

2) Arthropods and molluscs

3) Molluscs except cephalopods

4) Hemichordates and urochordates

HUMAN HEART

41. Which of the following terms are applicable to human heart?

a. Neurogenic heart

b. Myogenic heart

c. Venous heart

d. Arterio-venous heart

e. Tetralocular heart

1) a, b, d & e 2) b, c & d

3) b, d & e 4) a & b only

42. Read the statements about heart and choose the right option

a. It is a mesodermally derived organ

b. It lies in the mid-thoracic cavity, slightly tilted to the left

c. It is protected by a double walled pericardium

d. Inter-atrial septum is thin and fibrous

e. Atrio-ventricular septum is thick and muscular

1) a, c and d are true

2) a, b and d are true

3) a, b and c are true

4) All are true

43. What is the function of the valves in the heart?

1) To separate the atria from the ventricles

2) To prevent the backward flow of blood

3) To control the rhythmic contractile activity

4) To regulate the number of action potentials

44. What is the main function of the semilunar valves in the heart?

1) Prevent backflow of blood into the ventricles

2) Control blood flow between the atria and ventricles

3) Regulate blood flow into the coronary arteries

4) Aid in the exchange of gases during respiration

45. Tricuspid valve is present between the:

1) left atrium and left ventricle
2) right atrium and right ventricle
3) right ventricle and pulmonary artery
4) left ventricle and aorta

46. The thread like tendons of papillary muscles inserted upon the flaps of tricuspid and bicuspid valves are

1) chordae tendinae
2) yellow elastin fibres
3) reticular fibres
4) collagen fibres

47. Heart of heart is

1) SA node 2) AV node
3) Bundle of His 4) Purkinje fibres

48. Blood vessel which brings oxygenated blood to left atrium is

1) Pre caval vein 2) Post caval vein
3) Pulmonary veins. 4) Pulmonary artery

49. Find the correct match about heart chambers and blood vessels attached

Column I		Column II	
1)	Right atrium	a)	Pulmonary veins
2)	Right ventricle	b)	Aorta
3)	Left atrium	c)	Superior and inferior vena cava
4)	Left ventricle	d)	Pulmonary artery

1) 1- c, 2 - d, 3 - a, 4 - b
2) 1 - c, 2 - d, 3 - b, 4 - a
3) 1 - d, 2 - c, 3 - a, 4 - b
4) 1 - d, 2 - c, 3 - b, 4 - a

50. The inter-ventricular septum in the human heart can be best described as

1) a thin muscular wall.
2) a thin fibrous wall
3) a thick muscular wall
4) a thick fibrous wall

51. Identify the correct statement with respect to the nodal tissue of the human heart.

1) Normal activities of the heart are regulated intrinsically by nodal tissues
2) SAN is located on the left upper corner of the right atrium
3) AVN is situated in the right atrium near superior venacava
4) AV bundle along with its branches is called Purkinje fibres

52. In which one of the following pairs the two items mean one and the same ?

1)	Bundle of His	Purkinje fibres
2)	SA node	pacemaker
3)	Tricuspid valve	mitral valve
4)	Papillary muscles	chordae tendinae

53. Which of the following valves prevent the backflow of blood from the ventricles into the atria during the cardiac cycle?

1) Tricuspid and aortic valves
2) Semilunar valves
3) Aortic and pulmonary valves
4) Atrio-ventricular valves

54. Pulmonary artery carries

1) deoxygenated blood from the heart to the lungs
2) deoxygenated blood from the lungs to the heart
3) oxygenated blood from the heart to the lungs
4) oxygenated blood from the lungs to the heart

55. Heart murmur is heard due to the

1) closure of bicuspid and tricuspid valves
2) closure of semilunar valves
3) leaking of blood through valves
4) opening of AV valves

CARDIAC CYCLE & ECG

56. Which is incorrect regarding cardiac cycle?

1) It consists of systole and diastole of both the atria and ventricles

2) During a cardiac cycle, each ventricle pumps out approximately 70 ml of blood

3) The AV valves open during ventricular systole

4) Cardiac output is the volume of blood pumped out by each ventricle per minute

57. Ventricular systole coincides with

1) Atrial systole

2) Dup sound

3) Atrial diastole

4) Closure of semilunar valves

58. During ventricular diastole, ventricular pressure falls and

1) the AV valves close and semilunar valves open

2) both AV valves and semilunar valves open

3) the semilunar valves close and AV valves open

4) both semilunar valves and AV valves close

59. The volume of blood ejected by each ventricle during a ventricular contraction is called:

1) Cardiac output 2) Stroke volume

3) Heart rate volume 4) Pulse volume

60. Blood pressure in the mammalian aorta is maximum during the

1) diastole of the right ventricle

2) systole of the left ventricle

3) diastole of the right atrium

4) systole of the left atrium

61. Which of the following statement is true about ventricular systole?

1) Oxygenated blood is pumped into the aorta and deoxygenated blood is pumped into the venacavae

2) Oxygenated blood is pumped into the pulmonary artery and deoxygenated blood is pumped into the pulmonary vein

3) Closure of semilunar valves occurs, which prevents the backflow of blood into the ventricles.

4) Closure of AV valves due to attempted back flow of blood into the atria

62. Cardiac output is

1) the stroke volume multiplied by the heart rate

2) the product of systolic and diastolic volume

3) the blood pumped out by each ventricle per minute

4) Both 1 and 3

63. During atrial systole

1) Tricuspid and bicuspid valves are closed

2) Semilunar valves are open

3) AV valves are closed

4) Blood flow to the ventricles is increased by 30%

64. Which of the following does not occur in ventricular systole?

1) Cardiac impulses spread through ventricular myocardium

2) Closing of atrio ventricular valves

3) Opening of semilunar valves

4) Flow of blood from great arteries to ventricles

65. Choose the correct pathway of the transmission of impulses in the heart beat.

1) AV node - SA node - Bundle of His -Purkinje fibres

2) SA node - AV node - Bundle of His - Purkinje fibres

3) SA node - Bundle of His - AV node - Purkinje fibres

4) AV node - Bundle of His - SA node - Purjkinje fibres

66. To obtain a standard ECG, a patient is connected to the machine with three electrodes,

1) one to each wrist and to the left ankle

2) one to each ankle and to the left wrist

3) one to each wrist and to the left chest region

4) one to each ankle and to the left chest region

67. Which of the following alphabets correctly represents the respective human heart's activity in a standard ECG?

1) S – excitation of atria

2) T – return of ventricles from excited to normal state

3) P – repolarisation of the atria

4) R – repolarisation of ventricle

68. What does the T-wave in the ECG represent?

1) Repolarization of the ventricles

2) Depolarization of the atria

3) Contraction of the atria

4) Contraction of the ventricles

69. The depolarisation of the ventricles can be represented in the electrocardiogram as:

1) P wave 2) QRS complex

3) ST segment 4) T wave

70. Which part of the ECG represents the electrical excitation of the atria?

1) P-wave 2) QRS complex

3) T-wave 4) R-wave

BLOOD VESSELS & DOUBLE CIRCULATION

71. Which of the following order is correct about blood vessels?

1) Arteries – arterioles – venules – veins – capillaries

2) Arteries – arterioles – capillaries – venules – veins

3) Arterioles – Arteries – capillaries – venules – veins

4) Arteries – arterioles – venules – capillaries – veins

72. Which layer of a blood vessel is thinner in veins compared to arteries?

1) Tunica intima 2) Tunica media

3) Tunica interna 4) Tunica adventitia

73. The pulmonary artery differs from the pulmonary vein in that it has

1) no endothelium

2) valves

3) narrow lumen

4) thin muscular walls

74. Arteries are best defined as the vessels which

1) supply oxygenated blood to the different organs

2) carry blood away from the heart to different organs

3) break up into capillaries which reunite to form a vein

4) carry blood from one visceral organ to another

75. What is the function of valves in veins?

1) Prevent backflow of blood

2) Control blood pressure

3) Filter toxins

4) Trap pathogens

76. Systemic circulation

1) provides food materials to liver

2) supplies nutrients, O_2 and essential substances to tissues

3) brings releasing hormones to adenohypophysis

4) takes deoxygenated blood to lungs

77. A portion of the cardiovascular system that transports oxygen-depleted blood from the heart to the lungs,and brings oxygenated blood back to the heart is referred as

1) Coronary circulation

2) Pulmonary circulation

3) Systemic circulation

4) Single circulatory system

78. Systemic heart refers to

1) heart that contracts under stimulation from nervous system

2) heart that contracts under stimulation from nervous system

3) left auricle and left ventricle in higher vertebrates

4) the two ventricles together in humans

79. Which among the following is not a part of pulmonary circulation?

1) Pulmonary artery 2) Aorta

3) Lungs 4) Pulmonary veins

80. To and fro flow of blood between heart and organs is correctly represented as

1) Right ventricle – Pulmonary veins –Lungs - Pulmonary arteries_ Heart

2) Left ventricle – Arterial system - Capillaries - Venous system - Right atrium

3) Right ventricle – Pulmonary arteries - Lungs - Pulmonary veins_ heart

4) Left ventricle – Aorta - Capillary system - Venacavae - Left atrium

81. What is the function of capillaries in the circulatory system?

1) To transport oxygenated blood from the lungs to the heart

2) To transport deoxygenated blood from the body tissues to the lungs

3) To exchange gases, nutrients, and waste products between the blood and tissues

4) To regulate blood pressure and heart rate

82. The blood returning to the heart from lungs via pulmonary vein has more

1) RBC per ml of blood

2) haemoglobin per ml of blood

3) oxygen per ml of blood

4) nutrient per ml of blood

83. Which of the following represents pulmonary circulation?

1) Right ventricle (oxygenated blood) – lungs (deoxygenated blood) – Left auricle

2) Left auricle (deoxygenated blood) – lungs (oxygenated blood) – Right auricle

3) Left atrium (oxygenated blood) – lungs (deoxygenated blood) – Left auricle

4) Right ventricle (deoxygenated blood) – lungs (oxygenated blood) – Left atrium

84. What is the purpose of the hepatic portal system?

1) Carrying blood from the lungs to the heart
2) Carrying blood from the intestine to the liver
3) Carrying blood from the liver to the systemic circulation
4) Carrying blood from the heart to the digestive tract

85. The special system of blood vessels supply blood to heart wall is known as

1) systemic system 2) coronary system
3) pulmonary system 4) portal system

86. Which part of the brain moderates the cardiac function through the autonomic nervous system?

1) Pons Varolii
2) Medulla oblongata
3) Hypothalamus
4) Cerebellum

87. Increase in the activity of SA node to enhance the heart rate, is brought about by

1) vagus nerve of the parasympathetic nervous system
2) sympathetic stimulation and adrenaline hormone
3) acetyl choline neurotransmitter
4) pace setter of the heart

88. What is the effect of parasympathetic neural signals on cardiac activity?

1) decreases the speed of conduction of action potential
2) decreases the rate of heart beat
3) decreases the cardiac output
4) all of these

89. Heart beats accelerated by

1) acetylcholine release by sympathetic nerves
2) nor-adrenaline release by sympathetic nerves
3) adrenaline release by cranial nerves
4) acetylcholine release by cranial nerves

90. The sympathetic nerves give _____ neural signals to heart and increases the _____.

1) stimulatory, ventricular contraction
2) inhibitory, stroke volume
3) stimulatory, ventricular relaxation
4) inhibitory, ventricular relaxation

91. The hormonal regulation of cardiac output is

1) mediated by adrenal cortex
2) mediated by adrenal medulla
3) mediated by thymus
4) mediated by parathyroid

92. The instrument used for measuring blood pressure is known as

1) ECG
2) Stethoscope
3) Sphygmomanometer
4) Respirometer

93. The pumping pressure is known as _____ and the resting pressure is known as _____

1) hypertension and hypotension respectively
2) hypotension and hypertension respectively
3) systolic pressure and diastolic pressure respectively
4) diastolic pressure and systolic pressure respectively

94. Select the correct match

1)	Cardiac arrest	heart not pumping effectively
2)	Heart attack	stoppage of heart beat
3)	Heart failure	congestion of lungs
4)	Atherosclerosis	damage of cardiac muscle

95. The state of heart when it is not pumping blood effectively enough to meet the needs of the body, is;

1) Heart attack 2) Cardiac arrest

3) Angina pectoris 4) Heart failure

96. Thickening of coronary arteries due to cholesterol deposition is:

1) atherosclerosis 2) heart failure

3) hypertension 4) angina pectoris

97. Atherosclerosis affects

1) the vessel which supply blood to kidney

2) the vessel which supply blood to brain

3) the vessel which supply blood to heart muscle

4) the vessel which supply blood to lungs

98. Which one of the following statement is true regarding angina?

1) Heart stops beating

2) More common in children

3) Does not affect the blood flow

4) No enough oxygen is reaching to heart muscles

99. Angina is more common among

1) aged men

2) aged women

3) elderly men

4) middle aged and elderly men and women

100. What is correct about cardiac arrest?

1) Inadequate blood supply to the heart muscle

2) Complete cessation of heart function

3) Narrowing of the coronary arteries

4) Damage to the heart muscle

SAMPLE QUESTIONS

1. Find out the the incorrect one regarding circulation

1) Chordates and annelids have closed circulation

2) Arthropods and hemichordates have open circulation

3) Water vascular system found in sponges

4) Blood & lymph constitutes body fluids in higher animals

2. Which of the following is incorrect about plasma?

1) Plasma constitutes 55% of blood

2) It is straw coloured due to dissolved Hb

3) 90 - 92% of plasma is water

4) 6 - 8% of plasma is proteins

3. Which antibodies are naturally present in the plasma of individuals with blood group A?

1) Anti-A antibodies

2) Anti-B antibodies

3) Anti-A and Anti-B antibodies

4) No antibodies

4. Incorrect statement about erythroblastosis foetalis is

1) It occurs in Rh -ve females with Rh +ve foetus

2) First pregnancy is not affected

3) Rh-antibodies are formed in mother due to exposure of foetal blood during first delivery

4) It can be avoided by administration of anti - Rh antibody to the first child

5. Which component of blood prevents its coagulation inside the blood vessels ?

1) haemoglobin 2) plasma

3) thrombin 4) heparin

6. Mark the incorrect one regarding human erythrocytes

1) Erythropoesis takes place in the red bone marrow

2) RBCs are the most abundant cells among formed elements

3) They have a life span of 120 days

4) Normal Hb count is about 12 - 16 mg/100 ml

7. Thrombokinase is associated with

1) Transfusion reaction

2) Production of erythrocytes from the bone marrow

3) Agglutinogen - agglutinin reaction

4) Enzymatic reaction in coagulation of blood

8. The hepatic portal circulation occurs between

1) Hypothalamus and pituitary gland

2) Kidneys and hind limbs

3) Liver and Lungs

4) Digestive tract and Liver

9. Which is not essential for blood clotting? :

1) Calcium ions. 2) Haemoglobin

3) Thrombokinase 4) Fibrinogen

10. Which among the following statements regarding the lymph is incorrect?

1) Lymph is a colourless fluid containing lymphocytes which help in our immune response.

2) Lymph in special lymphatic capillaries called lacteals helps in fat absorption.

3) Lymph carries hormones and nutrients to be circulated around the body.

4) Lymph is devoid of WBCs and larger proteins

11. Identify the formed elements which are nucleated and are relatively lesser in number

1) erythrocytes 2) thrombocytes

3) platelets 4) leucocytes

12. Choose the correct representation of systemic circulation

1) Right ventricle - aorta - organs - left auricle

2) Left ventricle - aorta - organs - right auricle

3) Right auricle - aorta - organs - right ventricle

4) Left auricle - aorta - organs - right ventricle

13. Match the following

Column I		Column II	
A)	Monocytes	a)	2 - 3%
B)	Basophils	b)	20 - 25%
C)	Eosinophils	c)	60 - 65%
D)	Lymphocytes	d)	0.5 - 1%
		e)	6 - 8%

1) A - e, B - c, C - a, D - d

2) A - b, B - c, C - d, D - b

3) A - e, B - d, C - a, D - b

4) A - c, B - d, C - e, D - b

14. Auto excitability means :

1) Generation of action potentials with external stimuli

2) Generation of action potentials without any external stimuli

3) Regulation by sympathetic system

4) Regulation by parasympathetic system

15. Which is not correct about cardiac cycle?

1) It consists of systole and diastole of both the atria and ventricles

2) During a cardiac cycle, each ventricle pumps out approximately 70 ml of blood

3) Cardiac output is the volume of blood pumped out by each ventricle per minute

4) The AV valves open in ventricular systole

16. Blood vessels without muscular wall are

1) arteries 2) veins

3) capillaries 4) arterioles

17. Mixing of oxygenated and deoxygenated blood occurs in the ventricle of

1) Corvus 2) Rana

3) Pristis 4) Felis

18. Find out the incorrect statement about the regulation of cardiac activity

1) Neural signals through the sympathetic nerves decreases the strength of ventricular contraction

2) Adrenal medullary hormones increases cardiac output

3) Normal activities of the heart are regulated by specialised tissues called nodal tissues

4) Parasympathetic neural signals decreases the speed of conduction of action potential

19. Which of the following is not correctly matched?

1)	Globulin	Defence mechanism
2)	Neutrophils	Phagocytic
3)	Albumin	Osmotic balance
4)	Serum	Coagulation

20. Rh incompatibility between an Rh -ve mother and her Rh+ve foetus is called

1) Haemophilia

2) Anaemia

3) Jaundice

4) Erythroblastosis foetalis

21. Find out the correct statement about plasma

1) Plasma constitutes more than 90% of blood

2) Plasma proteins constitute most abundant part in plasma

3) Albumin constitutes most abundant plasma protein

4) Blood serum is the slightly alkaline matrix of plasma

22. Sino-atrial node is present in the :

1) right upper corner of the right atrium

2) right upper corner of the left atrium

3) Lower left corner of the right atrium

4) Lower left corner of the left atrium

23. Read the statements regarding the circulatory system and choose the right option

a) Human heart is an ectodermal derivative

b) SAN is located on the left upper corner of the right atrium

c) Stroke volume × Heart rate = Cardiac output

d) AV bundle is located in the interventricular septum

e) Left ventricle of the heart has a thickest wall

1) a, b & c 2) a, c & d

3) c, d & e 4) c & e

24. Correctly match column I with column-II

Column I		Column II	
a)	Cardiac arrest	i)	Heart not pumping blood effectively
b)	Heart failure	ii)	Heart muscle is suddenly damaged
c)	Heart attack	iii)	Acute chest pain
d)	Angina	iv)	Heart stops beating

1) a-i; b-ii; c-iii; d-iv 2) a-iv; b-i; c-ii; d-iii
3) a-iv; b-ii; c-i; d-iii 4) a-ii; b-iii; c-i; d-iv

25. The second heart sound heard during a heart beat is at the beginning of :
1) atrial systole and ventricular diastole
2) ventricular systole & diastole
3) ventricular systole & atrial diastole
4) ventricular diastole

26. In a healthy person, the normal arterial systolic and diastolic pressures are respectively :
1) 140 mm Hg and 90 mm Hg
2) 80 mm Hg and120 mm Hg
3) 90 mm Hg and 140 mm Hg
4) 120 mm Hg and 80 mm Hg

27. Valves which allow one way passage of blood from ventricles into arteries are.
1) Aortic valve and mitral valve
2) Semilunar valves and tricuspid valve
3) Aortic valve and pulmonary valve
4) Bicuspid and tricuspid valve

28. Name the disease caused by the deposits of calcium, fat, cholesterol and fibrous tissue which makes the lumen of arteries narrower
1) Angina 2) Atherosclerosis
3) Hypertension 4) High blood pressure

29. Mitral valve in mammals guards the opening between
1) right atrium and right ventricle
2) left atrium and left ventricle
3) right atrium and left ventricle
4) between two atria

30. Which among the following is not a part of pulmonary circulation?
1) Pulmonary artery 2) Lungs
3) Pulmonary veins 4) Aorta

31. The number of RBCs present in a healthy adult man averages
1) 5 - 5.5 millions/mm^3
2) 4 - 4.5 millions/mm^3
3) 5 - 5.5 billions /mm^3
4) 5 - 5.5 lakhs /mm^3

32. Cell fragments produced from megakaryocytes are
1) platelets. 2) neutrophils
3) leucocytes 4) mast cells

33. Find out the incorrect statement
1) Venacavae supply deoxygenated blood to the right atrium
2) Pulmonary veins supply deoxygenated blood to the lungs
3) Chordae tendinae connects AV-valves to papillary muscles
4) Ventricular muscles get impulse from purkinje fibres

34. The layer of blood vessel made up of circular smooth muscles is
1) Tunica externa 2) Tunica media
3) Tunica interna 4) Tunica adventitia

35. Inflammatroy chemicals released by basophil is
1) Serotonin 2) Heparin
3) Thromboplastin 4) Histamine

36. Find out the correct statement about blood
1) Formed elements constitutes 55% of blood
2) Albumins constitute most abundant part in plasma
3) Globulins constitutes most abundant plasma protein
4) Blood serum is the part of plasma without clotting factors

37. In which organisms, only deoxygenated blood passes through heart?

1) Fishes 2) Amphibians

3) Reptiles 4) Mammals

38. During joint diastole

1) Both semilunar valves and atrio-ventricular valves remain open

2) Blood flows into the atria and from atria to ventricles

3) Blood flows both into pulmonary artery and systemic aorta

4) Both semilunar and AV valves remain closed

39. Veins are blood vessels which carry

1) blood away from the heart

2) oxygenated blood without exception

3) blood towards the heart

4) only deoxygenated blood

40. Lymphatic system helps to

1) transport oxygen to the brain

2) transport carbon dioxide to the lungs

3) returns the interstitial fluid to the blood

4) returns the WBCs and RBCs to the lymph nodes

41. Find out the mismatch

1)	Lymphocytes	immunoglobulins
2)	Neutrophils	granulocytes
3)	Monocytes	phagocytes
4)	Eosinophils	least abundant WBC

42. Which of the following is correct about a standard ECG?

1) QRS complex indicates ventricular repolarisation

2) T wave indicates ventricular contraction

3) End of T wave denotes end of ventricular systole

4) P wave indicates beginning of ventricular depolarisation

43. Blood vessel which brings oxygenated blood to left atrium is

1) Pre caval vein 2) Post caval vein

3) Pulmonary veins 4) Pulmonary artery

44. Choose the wrong statement:-

1) Heart has the size of a clenched fist

2) Heart is protected by a double walled membraneous bag, pericardium

3) Human heart has two relatively smaller upper chambers called atria and two larger lower chambers called ventricles

4) The atrium and ventricle of the same side are separated by a thick and muscular atrioventricular septum

45. A symptom of acute chest pain that occurs when there is insufficient oxygen supply to the heart muscle is

1) Atherosclerosis

2) Angina pectoris

3) Heart failure

4) Myocardial infarction

ANSWER KEY

1.	2	21.	4	41.	3	61.	4	81.	3
2.	4	22.	4	42.	3	62.	4	82.	3
3.	2	23.	1	43.	2	63.	4	83.	4
4.	1	24.	2	44.	1	64.	4	84.	2
5.	4	25.	1	45.	2	65.	2	85.	2
6.	2	26.	2	46.	1	66.	1	86.	2
7.	3	27.	4	47.	1	67.	2	87.	2
8.	2	28.	1	48.	3	68.	1	88.	4
9.	4	29.	1	49.	1	69.	2	89.	2
10.	3	30.	4	50.	3	70.	1	90.	1
11.	4	31.	4	51.	1	71.	2	91.	2
12.	3	32.	2	52.	2	72.	2	92.	3
13.	3	33.	3	53.	4	73.	3	93.	3
14.	1	34.	1	54.	1	74.	2	94.	3
15.	2	35.	4	55.	3	75.	1	95.	4
16.	4	36.	3	56.	3	76.	2	96.	1
17.	4	37.	1	57.	3	77.	2	97.	3
18.	3	38.	2	58.	3	78.	3	98.	4
19.	3	39.	4	59.	2	79.	2	99.	4
20.	4	40.	1	60.	2	80.	2	100.	2

SAMPLE QUESTIONS

1.	3	10.	4	19.	4	28.	2	37.	1
2.	2	11.	4	20.	4	29.	2	38.	2
3.	2	12.	2	21.	3	30.	4	39.	3
4.	4	13.	3	22.	1	31.	1	40.	3
5.	4	14.	2	23.	3	32.	1	41.	4
6.	4	15.	4	24.	2	33.	2	42.	3
7.	4	16.	3	25.	4	34.	2	43.	3
8.	4	17.	2	26.	4	35.	4	44.	4
9.	2	18.	1	27.	3	36.	4	45.	2

WORK BOOK

Chapter 08

EXCRETORY PRODUCTS AND THEIR ELIMINATION

MODES OF EXCRETION AND EXCRETORY ORGANS IN ANIMALS

1. Select the correct option in the increasing order of toxicity of the given excretory products

1) Urea > Uric acid > Ammonia

2) Ammonia > Urea > Uric acid

3) Uric acid > Urea > Ammonia

4) Ammonia > Uric acid > Urea

2. Uricotelism is advantageous to

1) Bony Fishes

2) Cartilagenous Fishes

3) Terrestrial egg laying animals

4) Terrestrial mammals

3. The waste removed from blood during Ornithine cycle are

1) CO and ammonia

2) CO_2 and Urea

3) Uric acid and Urea

4) CO_2 and ammonia

4. Which of the following is least soluble in water

1) Urea 2) Ammonia

3) Uric acid 4) Both 2 and 3

5. The blood vessel containing highest amount of urea is

1) Renal Artery 2) Renal Vein

3) Hepatic Artery 4) Hepatic Vein

6. Ammonia produced by metabolism is converted into A in the B of these animals and released into the C which is filtered and excreted out by the D

Find A,B,C & D

A	B	C	D
1. Uric acid	Spleen	Blood	Kidney
2. Urea	Liver	Blood	Kidney
3. Urea	Kidney	Blood	Spleen
4. Uric acid	Spleen	Blood	Liver

7. Which of the following acts as both an osmolyte and a nitrogen waste

1) Ammonia 2) Urea

3) Uric acid 4) All of the above

8. Which of the following is not correct for ammonia

1) Ammonia is the most toxic form and requires large amount of water for its elimination

2) Ammonia is generally excreted by diffusion across body surfaces or through gill surfaces

3) Ammonia excreted as ammonium ions

4) Kidneys play a significant role in its removal

9. Find the mismatch

	Column I	Column II
1)	Bony fishes	Ammonotelic
2)	Mammals	Ureotelic
3)	Birds	Uricotelic
4)	Aquatic Insect	Uricotelic

10. Bony fishes, Aquatic amphibians, Aquatic insects, Mammals,Terrestrial amphibians, Reptiles ,Birds, Land snail, Insects, Amoeba

How many organisms are ammonotelic ?

1) 5 2) 2

3) 7 4) 4

11. Which of the following is an incorrect statement

1) Mammals, many terrestrial amphibians and marine fishes mainly excrete urea

2) Flame cells are the excretory structures in flatworms, rotifers, some annelids and the cephalochordate

3) Some amount of uric acid may be retained in the kidney matrix of some animals to maintain a desired osmolarity.

4) Protonephridia are primarily concerned with osmoregulation

12. Find the wrongly matched pair

	Animal	Excretory structure
1)	Amphioxus	Protonephridia
2)	Spider	Coxal gland
3)	Balanoglossus	Proboscis gland
4)	Starfish	Flame cell

13. Which of the following is a correct statement

1) Most of the invertebrates have complex tubular organs called kidneys

2) Most of the vertebrates have simple tubular form of excretory structures

3) Nephridia are the tubular excretory structures of earthworms and other annelids

4) Antennal glands perform the excretory function in flatworms

14. **Assertion** : Mostly aquatic animals are ammonotelic

Reason : Ammonia is the most toxic form and requires large amount of water for its elimination

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

15. Consider the two statements

Statement 1 : Reptiles, birds, land snails and aquatic insects excrete nitrogenous wastes as uric acid

Statement 2 : Uric acid excreted in the form of pellet or paste with a minimum loss of water

1) Statement 1 is correct and statement 2 is wrong

2) Both statement 1 and 2 are correct

3) Statement 1 is wrong and statement 2 is correct

4) Both statement 1 and 2 are wrong

HUMAN EXCRETORY SYSTEM

16. Which of the following statement are true

I) Human excretory system consists of a pair of kidneys, one pair of ureters, one pair urinary bladder and a urethra

II) Kidneys are the chief excretory organs in vertebrates

III) Ureters are responsible for carrying blood to the kidneys for filtration

IV) Urinary bladder store urine until it is eliminated from the body through urethra

1) I and II only 2) II and IV only

3) III and IV only 4) I and IV only

17. I. Ureter

II. Renal Pelvis

III. Calyx

IV . Urinary bladder

V . Urethra

Choose the correct sequence of transport of urine from kidneys to outer medium

1) I,II,III,IV,V 2) V,IV,III,II,I

3) V,III,IV,I,II 4) III,II,I,IV,V

18. Choose the incorrect statement

1) Kidneys are reddish brown, bean shaped structures situated between last thoracic and third lumbar vertebra

2) Each kidney weighs 120- 170 g.

3) Each kidney of an adult human measures 10-12 cm in length, 5-7 cm in width 2-3 cm in thickness

4) Kidneys are located close to the ventral wall of abdominal cavity

19. No.of nephron of kidney is equal to

1) Sum of Bowman's capsules and Glomeruli

2) Sum of Bowman's capsules and Malpighian corpuscle

3) Double the number of Bowman's capsule

4) Equal to the number of Bowman's capsule

20. The region of nephron found in renal medulla is

1) Renal corpuscle

2) Proximal convoluted tubule

3) Henle's loop

4) Distal convoluted tubule

21. Filtration membrane in Malpighian body of the nephrons involves

1) One cellular layer

2) Two cellular layer

3) Three cellular layer

4) Four cellular layer

22. Read the following statements and choose the correct options

I. Afferent arteriole carry blood away from glomerulus towards renal vein

II. Efferent arteriole carry blood towards the glomerulus

III. Podocytes arranged to form slit pores for the filtration of blood into the bowman's capsule

IV. Collecting duct is a straight tube t extends from the cortex of the kidney to the inner parts of the medulla

1) III&IV are correct 2) I&II are correct

3) I&IV are correct 4) II&III are correct

23. How many statements are true

I. Outer layer of kidney is a tough capsule

II. Extension of cortex into medulla region of kidney is called columns of bellini

III. Cortex divided into outer cortex and inner medulla

IV. Inner to the hilum is a broad funnel shaped space called the calyces with projections called renal pelvis

V. The medulla is divided into a few conical masses called medullary pyramids

1) Two 2) One

3) Three 4) All

24. Vasa recta refers to

1) Capillaries present in Bowman's capsule

2) Capillaries running parallel to the Henle's loop

3) Capillaries surrounding kidney in lumbar region

4) Capillaries formed by breakdown of portal vein

25. Read the following statement and choose the correct answer

a. On the basis of relative position in cortex and medulla & length of Henle's loop nephrons are of two types

b. Cortical nephrons have long loop of henle where as juxta medullay nephrons have short loop of henle

c. Cortical nephrons are small in size but as juxta medullay nephrons are large in size

d. Cortical nephrons are about 15% of total nephron & juxta medullay nephrons form 85% of total nephron

1) a & c are true,b&d are false

2) a & b are true,d&c are false

3) b & d are true,a&c are false

4) b & c are true,a&d are false

26. Consider the two statements

Statement 1 : Each nephrons has two parts- the glomerulus and renal corpuscle

Statement 2 : Glomerulus is a tuft of capillaries formed by the afferent arteriole.

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is correct, but statement II is incorrect

27. Which of the following is not a part of Malpighian body

1) Glomerulus

2) Bowman's capsule

3) Proximal convoluted tubule

4) Podocyte

28. Which of the following is not considered as component of tubular parts of nephron

1) DCT 2) PCT

3) Loop of Henle 4) Glomerulus

29. Peritubular capillaries of the nephron arise from

1) Vasarecta 2) Renal Artery

3) Afferent arteriole 4) Efferent arteriole

30. Which of the following is found in the medullary pyramid of kidneys

1) Loop of Henle 2) DCT

3) Malpigian Body 4) Renal corpuscle

31. The ability of the vertebrates to produce concentrated (hyperosmotic) urine usually depends upon the

1) Area of bowman's capsule

2) Length of Henles loop

3) Length of PCT

4) Capillary network forming glomerulus

32. Smooth textured surface observed between the renal capsule and the base of medullary pyramid is considerd as

1) Renal medulla 2) Renal pelvis

3) Renal cortex 4) Hilum

33. How many statements are false

I. Dorsal aorta carries nitrogenous wastes into kidney through renal artery

II. The DCTs of many nephrons open into a straight tube called renal pelvis

III. In majority of the nephrons, the loop of Henle is very long and runs deep into the medulla

IV. PCT of nephron is lined by brush bordered cuboidal epithelium

1) All 2) Two

3) Three 4) One

34. Which of the following is absent at the site of filtration

I. Endothelium of glomerular capillaries

II. Epithelium of bowman's capsule

III. Slit pores between podocytes

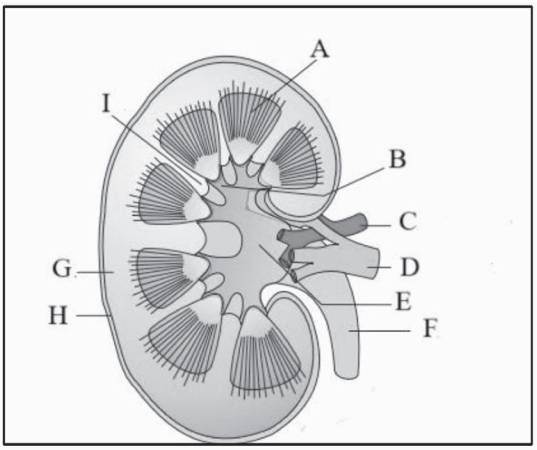
IV. Cellular basement membrane

V. Squamous epithelium

1) II &III alone 2) IV alone

3) V alone 4) None of these

35. Observe the following figure.



i. In which part of the diagram calyces opens into

1) E 2) B

3) F 4) I

ii. Blood vessel that carry nitrogen waste into kidney

1) D 2) C

3) F 4) E

iii. Extension of cortex into medulla is

1) A 2) B

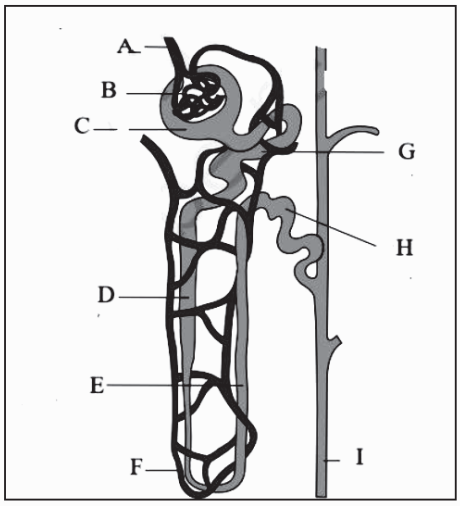
3) I 4) F

iv Blood vessel that contain least amount of urea is

1) F 2) I

3) C 4) D

36. Match the following



I	PCT	i	A
II	Vasa recta	ii	I
III	DCT	iii	G
IV	Afferent arteriole	iv	H
V	Collecting duct	v	F

1) PCT- G , Vasa recta – F, DCT- H, Afferent arteriole- A, Collecting Duct- I

2) PCT- F , Vasa recta – A, DCT- H, Afferent arteriole- G, Collecting Duct- I

3) PCT- G , Vasa recta – H, DCT- F, Afferent arteriole- A, Collecting Duct- I

4) PCT- A , Vasa recta – F, DCT- I, Afferent arteriole- G, Collecting Duct- H

URINE FORMATION & FUNCTION OF THE TUBULES

37. Podocytes are

1) endothelial cells of the glomerulus

2) endothelial cells of Bowman's capsule

3) epithelial cells of the Bowman's capsule

4) epithelial cells of the glomerulus

38. I) Na^+ II) H_2O

III) HCO^{3-} IV) H^+

V) K^+ VI) NH_3

Which of the given ions are reabsorbed and secreted in DCT

1) I,II,III - reabsorbed, IV,V,VI-secreted

2) IV,V,IV- reabsorbed, I,II,III-secreted

3) I,II,V - reabsorbed, III,IV,VI-secreted

4) III,IV,V - reabsorbed, I,II,VI-secreted

39. Damage to renal cortex would most directly impact which of the following function

1) Counter current mechanism

2) Filtration of blood and formation of initial filtrate

3) Reabsorption of water in the Henle's loop

4) Collection of urine from multiple nephron

40. Consider the following statements A,B,C,D and select the correct option

A) Urea is reabsorbed in the entire Henle's loop

B) Water reabsorption is maximum in DCT

C) About 1100-1200 ml of blood by the kidneys per day

D) The glomerular capillary blood pressure causes filtration of blood

	A	B	C	D
1)	F	F	F	T
2)	F	F	T	T
3)	T	T	T	F
4)	T	F	T	F

41. In the inner medulla urine remains

1) Isotonic 2) Hypertonic

3) Hypotonic 4) Alkaline

42. Which of the following statements are true or false

A) Glomerular filtrate is hypertonic solution

B) Filtrate in the PCT is isotonic

C) The filtrate get diluted as it moves down the descending limb but it is more concentrated by the ascending limb

D) Filtrate in the DCT is hypotonic

E) Normal urine is four times concentrated than the initial filtrate

1) B,D,E true, A, C false

2) A, B, C true, D, E false

3) B, D true, A, C,E false

4) A,C,E true, B, D false

43. What is the major significance of selective secretion of hydrogen ,potassium and ammonia in DCT

1) An excellent mechanism of conservation of water

2) It plays a significant role in the regulation of GFR

3) To maintain the ionic balance and pH of the body

4) It helps in micturition

44. The osmolarity of urine at the tip of collecting duct is

1) 1100 $mOsmolL^{-1}$ 2) 1200 $mOsmolL^{-1}$

3) 1300 $mOsmolL^{-1}$ 4) 300 $mOsmolL^{-1}$

45. The segment of nephron which allows passage of small amount of urea into medullary interstitium is

1) PCT 2) DCT

3) Henle's Loop 4) Collecting Duct

46. Out of the four parts given below, which parts play significant role in forming concentrated urine in human

I. Loop of Henle

II. Glomerulus

III. Bowman's capsule

IV. Vasa recta

1) I and II 2) III and IV

3) II and III 4) I and IV

47. Match the following columns

Column I		Column II	
A)	PCT	1)	Concentrated urine formation
B)	DCT	2)	Filtration of blood
C)	Loop of Henle	3)	Reabsorption of 70-80% of electrolytes
D)	Counter current mechanism	4)	Ionic balance
E)	Renal corpuscle	5)	Maintenance of concentration gradient in medulla

	A	B	C	D	E
1)	3	4	1	5	2
2)	3	5	4	2	1
3)	1	3	2	5	4
4)	3	1	4	5	2

48. Identify the correctly matched pair

1)	GFR	125L/min
2)	Urine/day	1-1.5 mL
3)	Urea	25-30g/day
4)	Blood flow through glomerulus/min	500-800ml

49. Kidneys are vital organs of the body because

1) They regulate pH of body fluids

2) They remove metabolic wastes

3) They maintain ionic balance of body fluids

4) All of these

50. Which of the following is a high threshold substance

1) Urea 2) Glucose

3) Ammonia 4) Uric acid

51. Glomerular filtrate consist of

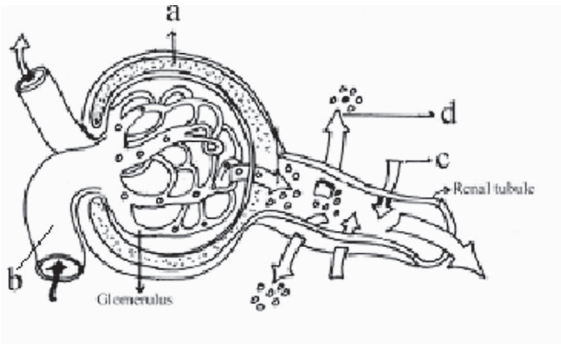
1) All constituents of blood

2) All constituents of blood except proteins

3) All constituents of blood including RBC and protein

4) All constituents of blood except blood cells and proteins

52. Identify [a,b,c & d] in the following diagram



1) a - Glomerulus, b - Renal artery, c- Tubular reabsorption, d- Tubular secretion

2) a - Bowman's capsule, b- Afferent arteriole, c- Tubular reabsorption, d- Tubular secretion

3) a- Bowman's capsule, b- Afferent arteriole, c- Tubular secretion. d - Tubular reabsorption

4) a- Bowman's capsule, b-Dorsal aorta, c- Glomerular filtration, d- Tubular secretion

53. Choose the mismatched pair from the following

A)	Glomerular filtrate	300 mOsmol L^{-1}
B)	Filtrate in PCT	600 mOsmol L^{-1}
C)	Filtrate in inner medulla	1200 mOsmol L^{-1}
D)	Human urine	1200 mOsmol L^{-1}

1) A and B only 2) B only

3) A, C and D only 4) C and D only

54. **Assertion** : NaCl and urea play a significant role in the formation of hypertonic urine

Reason : Selective secretion of urea into the thick segment of ascending limb and reabsorption of NaCl into the peritubular capillaries are observed during urine formation.

1) If both A and R are true and R is the correct explanation of A.

2) If both A and R are true but R is not the correct explanation of A

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

55. GFR is

1) The amount of water reabsorbed by kidney per second

2) The amount of filtrate formed by kidneys per minute

3) The amount of nitrogenous waste removed by kidney per minute

4) The amount of urea formed by kidney per minute

56. Consider the two statements

Statement 1 : When filtrate pass through the descending limb of Henles loop it become concentrated.

Statement 2 : Descending limb allows transport of electrolytes actively or passively

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is correct, but statement II is incorrect

4) Statement I is incorrect, but statement II is correct

57. Consider the two statements

Statement 1 : 70-80% of electrolytes and water are reabsorbed by the segment PCT

Statement 2 : PCT is lined by simple columnar brush border epithelium which increases the surface area for reabsorption.

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is correct, but statement II is incorrect

4) Statement I is incorrect, but statement II is correct

58. **Assertion** : Tubular secretion helps in the maintenance of ionic and acid base balance of body fluids

Reason : During urine formation, the tubular cells secrete substances like H^+, K^+ and ammonia

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

59. Choose the correct pair from the following

1)	Glomerular Filtrate	Hypertonic
2)	Filtrate in PCT	Isotonic
3)	Filtrate in inner medulla	Hypotonic
4)	Filtrate in DCT	Hypertonic

60. The increase in osmolarity from outer to inner medullary interstitium is maintained due to

i) Close proximity between the Henle's loop and vasa recta

ii) Counter current mechanism

iii) Selective secretion of H+,K+,ammonia

iv) Higher blood pressure in glomerular capillaries

1) i and ii 2) Only ii

3) iii and iv 4) i,ii,iii

REGULATION OF KIDNEY FUNCTION

61. Choose the correct option for A,B,C,D from the given options

An excessive loss of fluid from the body can activate A which stimulate the B to release C from the neurohypophysis, facilitates water reabsorption from D, thereby preventing diuresis

1) A - osmoreceptors, B - Adrenal cortex

C- ADH, D - DCT & PCT

2) A - Strech receptors, B - Adrenal medulla C- ADH, D-DCT & Collecting Duct

3) A- osmoreceptors, B- Hypothalamus,

C- ADH, D-DCT & Collecting Duct

4) A- Strech receptors B- Hypothalamus,

C- ADH , D- DCT & Collecting Duct

62. Which of the following is not correct about ADH

1) Reabsorption of water from distal tubule

2) Constriction of blood vessels

3) Dilation of blood vessels

4) Increase GFR

63. **Assertion** : ADH prevents diuresis

Reason : ADH also affect kidney function by its constrictory effect on blood vessel

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

64. If a person passes a very dilute urine but his blood glucose level is normal and experiences excessive thirst ,then it may be due to

1) Fall of blood sugar level

2) Decrease in ADH release from posterior pituitary

3) Excessive Release of insulin

4) Excessive release of glucagon

65. The condition in which the kidneys fail to conserve water leading to water loss and dehydration due to impaired ADH synthesis or release is known as

1) Grave's disease

2) Addison's disease

3) Diabetes insipidus

4) Diabetes mellitus

66. Diuretic substances like tea, coffee, alcohol etc., increase urine output by inhibiting release of hormone

1) Renin 2) Aldosterone

3) Vasopressin 4) Erythropoetin

67. 'RAAS' is :

1) Rennin Aldosterone Adrenaline System

2) Renin Angiotensin Aldosterone System

3) Renin Angiotensinogen Adrenaline Secretion

4) Rennin Aldosterone Angiotensinogen System

68. How many statements are true

I. Angiotensin II being a powerful vasoconstrictor, increase glomerular pressure and thereby GFR

II. Angiotensin II activates adrenal medulla to release aldosterone

III. Aldosterone promote the reabsorption of Na^+ and water from distal part of tubule

V. ANF and ADH are Vasoconstrictors

1) All 2) Three

3) Two 4) One

69. **Assertion** : An increase in glomerular blood pressure can activate the juxta glomerular cells of the kidney to release rennin

Reason : Rennin convert inactive angiotensinogen into angiotensin I

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

70. Which of the following does not occur in response to release of angiotensin II

1) Vasoconstriction

2) Increase in blood pressure

3) Release of mineralocorticoids

4) Decreased reabsorption of Na+ and water

71. If a person drinks very small amount of water,then after prolonged and strenuous exercise the body fluid will have

1) ADH

2) Renin

3) ANF

4) Both I & II

72. Which of the following is not seen in human body if the GFR is low

1) More aldosterone is released by adrenal cortex

2) Increased tubular reabsorption of sodium

3) Increased secretion of ANF from heart wall

4) Increase release of angiotensin II

73. Consider the two statements

Statement 1 : Aldostrone is the main mineralocorticoid of the human body

Statement 2 : Aldostrone is a type of corticoid which regulates the balance of water and electrolytes

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is incorrect, but statement II is correct

74. Consider the two statements

Statement 1 : Feedback mechanism for regulation of kidney involve hypothalamus and JGA & heart

Statement 2 : ANF,mechanism acts as a check on the renin-angiotensin mechanism

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is incorrect, but statement II is correct

75. Which of the following groups of hormones are participated in the regulation of the renal function ?

1) ADH , TSH and ANF

2) ACTH , TSH and ANF

3) ADH , STH and ANF

4) ADH , ANF and Aldosterone

76. Match the items in column I and column II and select the correct option.

Column I		Column II	
a)	Erythropoetin	1)	Juxtaglomerular cells
b)	Vasopressin	2)	Stimulate the release of aldosterone
c)	ANF	3)	RBC production
d)	Renin	4)	Act as vasodilator
e)	Angiotensin II	5)	Hypothalamus

1) a-3, b-5, c-4, d-1, e-2

2) a-3, b-5, c-4, d-2, e-1

3) a-3, b-5, c-2, d-1, e-4

4) a-5, b-4, c-2, d-3, e-1

77. Parasympathetic activity during micturition causes

1) Contraction of smooth muscles of the bladder and simultaneous relaxation of the urethral sphincter

2) Contraction of smooth muscles of the bladder and contraction of the urethral sphincter

3) Relaxation of smooth muscles of the bladder and simultaneous relaxation of the urethral sphincter

4) Relaxation of smooth muscles of the bladder and simultaneous contraction of the urethral sphincter

78. **Assertion** : In human urine is allowed to stand for some time,it smells strongly of ammonia.

Reason : Main constituent of human urine is ammonia.

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

79. The outline of main events during micturition is given below in a random manner. Arrange them in the correct sequence

i) CNS passes motor messages to initiate the contraction of smooth muscles of bladder and

simultaneous relaxation of urethral sphincter.

ii) The bladder fills with urine and becomes distended

iii) Micturition

iv) Stretch receptors on the wall of urinary bladder send signals to CNS

The correct sequence of events is :

1) (iv)→(i)→(iii)→(ii) 2) (ii)→(iv)→(i)→(iii)

3) (ii)→(i)→(iv)→(iii) 4) (iv)→(ii)→(i)→(iii)

80. Consider the two statements

Statement 1 : Deficiency of ADH result in diabetes mellitus

Statement 2 : Glycosuria & Ketonuria are indicative of diabetes mellitus

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is correct, but statement II is incorrect

81. Human urine is usually acidic because

1) Hydrogen ions are actively secreted into the filtrate.

2) The sodium transporter exchanges one hydrogen ion for each sodium ion in peritubular capilliaries.

3) Excreted plasma proteins are acidic.

4) Potassium and sodium exchange generates acidity

ROLE OF OTHER ORGANS IN EXCRETION & DISORDERS OF THE EXCRETORY SYSTEM

82. Select the incorrect statement from the following

1) Liver is the second largest gland in our body

2) Sebum provide protective oily covering for skin

3) Other than kidneys, lungs ,liver ,skin also helps in excretion

4) Small amount of nitrogen wastes eliminated through saliva

83. Sterols, hydrocarbons and waxes are excreted through

1) Bile 2) Expired air

3) Sebum 4) Sweat

84. Our lungs remove how much CO_2 / minute from the body

1) 10 ml 2) 200mL

3) 400 mL 4) 2000 mL

85. Match the following and choose the correct option

1)	Liver	a)	Hydrocarbons
2)	Lungs	b)	Lactic acid
3)	Sweat glands	c)	degraded steroid hormone
4)	Sebaceous gland	d)	CO_2 and H_2O

1) 1-b, 2-d, 3-c, 4-a 2) 1-a, 2-d, 3-b, 4-c

3) 1-c, 2-d, 3-b, 4-a 4)1-a,2-b,3-c,4-d

86. The following is/are removed during haemodialysis

1) Urea 2) Glucose

3) Aminoacids 4) All of the above

87. When kidney of a person is damaged , he/she invariably suffers from anaemia because

1) RBCs pass through the glomerulus

2) Sufficient erythropoietin is not produced

3) Haemoglobin is not synthesized sufficiently

4) Iron and Vitamin B_{12} are not able to bind with haemoglobin

88. Which of the following is correct with respect to haemodialysis

1) Dialysis unit has a coiled cellophane tube

2) Anti-heparin is added prior to haemodialysis

3) Blood is pumped back into body after haemodialysis through an artery

4) Nitrogenous waste are removed by active transport

89. In haemodialysis, which of the following process is primarily used to remove nitrogenous waste from blood

1) Ultrafiltration 2) Active transport

3) Osmosis 4) Diffusion

90. Which of the following organs plays a significant role in eliminating cholesterol from the body

1) Lungs 2) Kidneys

3) Liver 4) Skin

91. Ultimate method in the correction of acute renal failure is

1) Haemodialysis

2) Blood transfusion

3) Renal transplantation

4) Angioplasty

92. Malfunctioning of kidney may lead to accumulation of .....in blood

1) Glucose 2) Amino acids

3) Urea 4) All of these

93. Stone or insoluble mass of crystallised salts formed within the kidney is generally made of

1) Calcium carbonate 2) Calcium Oxalate

3) Silica 4) All of these

94. Find the incorrect match :

1)	Glycosuria	Glucose in urine
2)	Ketonuria	Ketone bodies in urine
3)	Renal calculi	Crystallized salt in kidney
4)	Uremia	Excess urea in urine

95. **Assertion** : Uremia is corrected through artificial kidney

Reason : Artificial kidney performes haemodialysis by removing nitrogenous waste

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

96. Choose the correct statement

I. Ammonia, Urea and Uric acid are the major forms of nitrogenous wastes secreted by the animals

II. Each kidney has nearly two million complex tubular structures called nephrons

III. The afferent arteriole emerging from the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries

IV. PCT maintain the pH and sodium-potassium balance in blood

V. Large amounts of water could be reabsorbed from collecting duct to produce a concentrated urine

1) I, II, IV are true, III, V are false

2) I, II, V are true, III, IV are false

3) I, IV, V are true, II, III are false

4) I, IV are true, II, III, IV are false

97. Match the items of column I with those of column II

Column I		Column II	
a)	Ammonotelism	i)	Birds
b)	Bowman's capsule	ii)	Water reabsorption
c)	Micturition	iii)	Bony fish
d)	Uricotelism	iv)	Elimination of urine
e)	ADH	v)	Renal tubule

1) a-iii, b - v, c-iv, d-i, e-ii

2) a-ii, b-iv, c-v, d-i, e-iii

3) a-iii, b-iv, c-i, d-v, e-ii

4) a-ii, b-iii, c-i, d-iv, e-v

98. Indicate whether the following statements are true or false :

(a) Micturition is carried out by a reflex.

(b) ADH helps in water elimination, making the urine hypotonic.

(c) Protein-free fluid is filtered from blood plasma into the Bowman's capsule.

(d) Henle's loop plays an important role in concentrating the urine.

(e) Glucose is actively reabsorbed in the proximal convoluted tubule

1) a,c,d,e are true b false

2) a,b,c,d,e are true

3) a,b,c,d,e are false

4) a,b,c are true,d,e are false

99. Consider the two statements

Statement 1 : ADH is produced when osmolarity of blood increases above 300mOsmolL^{-1}

Statement 2 : In humans, Malpighian tubules have no role in excretion

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is incorrect, but statement II is correct

100. Which is correct

1) JGA is a special sensitive region formed by cellular modifications in the proximal convoluted tubule and the afferent arteriole at the location of their contact

2) During summer ,when body loses a lot of water by evaporation ,the release of ADH is suppressed

3) Glomerular filtration is a non-selective process performed by the glomerulus using the glomerular capillary blood pressure

4) On an average, 25-30mg urea excreted out per day

SAMPLE QUESTIONS

1. Which of the following sets of animals are uricotelic

1) Fish, frog, lizard and fowl

2) Fish, snake, foul and man

3) Camel, dog, monkey and man

4) Crow, snake, cockroach and lizard

2. Match column I with column II

Column I		Column II	
A)	Ammonotelism	p)	Birds and reptiles
B)	Ureotelism	q)	Bony fishes and aquatic invertebrates
C)	Uricotelism	r)	Mammals, cartilaginous fishes

1) A=p, B=q, C=r 2) A=q, B=p, C=r

3) A=q, B=r, C=p 4) A=r, B=q, C=p

3. Which of the following is not a function of mammalian kidney

1) Water retension

2) Regulation of sodium in the blood

3) Excretion of toxins

4) Synthesis of urea

4. Which of the following statement is correct about ammonotelic animals

1) Ammonia is the most toxic nitrogen waste and requires minimum of water for its elimination

2) They are mostly terrestrial animals

3) Ammonia excreted actively by pumps across body surfaces or through gill surfaces

4) Many bony fishes are ammonotelic

5. Match the excretory structure (Column I) with the organism (Column II):

Column I		Column II	
A)	Protonephridia	1)	Earthworm
B)	Nephridia	2)	Prawn
C)	Malpighian tubules	3)	Planaria
D)	Antennal glands	4)	Cockroach

Choose the correct match

1) A-3, B-1, C-4, D-2 2) A-1, B-3, C-2, D-4

3) A-4, B-2, C-1, D-3 4) A-2, B-4, C-3, D-1

6. Select the correct statement

1) Protonephridia not involved in the removal of nitrogenous wastes

2) Flame cells are another name for nephridia.

3) Nephridia help in osmoregulation only

4) Malpighian tubules help in the removal of nitrogenous wastes and osmoregulation

7. How many statements are true

I. The juxta medullary nephrons have reduced Henle's loop

II. Vasarecta is is well developed in cortical nephrons

III. The PCT and DCT are situated in renal medulla

IV. Glomerulus is a tuft of capillaries formed by the afferent arteriole

1) One 2) Two

3) Three 4) Four

8. Find out the false statement

1) An adult human excretes, on an average, 1 to 1.5 litres of urine per day

2) Our lungs remove about 28 liters of CO2/ day

3) Human kidneys can produce urine nearly four times concentrated than the initial filtrate formed.

4) Sebaceous glands eliminate certain substances like sterols, hydrocarbons and waxes through sebum

5) Decrease in blood flow to the atria of the heart can cause the release of ANF

1) 1,2,5 are false 2) 2 only is false

3) 2&5 are false 4) 3&4 are false

9. Which of the following is the primary function of the peritubular capillaries

1) Filtration of blood

2) Reabsorption and secretion

3) Concentration of urine

4) Collection of urine

10. The glomerular capillary blood pressure causes filtration of blood through three layers in a sequence of

1) Endothelium of glomerular capillary → Basement membrane→Epithelium of Bowman's capsule

2) Epithelium of Bowman's capsule → Endothelium of glomerular capillary → Basement membrane

3) Basement membrane → Endothelium of glomerular capillary →Epithelium of Bowman's capsule

4) Epithelium of Bowman's capsule → Basement membrane → Endothelium of glomerular capillary

11. Select the true statements regarding Tubular reabsorption and tubular secretion

a. Tubular secretion adds materials to the filtrate

b. Tubular secretion adds glucose and aminoacids to blood

c. Tubular reabsorption take useful materials from the filtrate

d. Tubular reabsorption removes nitrogenous wastes from blood

1) a & b are correct 2) a & c are correct

3) b & c are correct 4) b & d are correct

12. In which of the following locations is filtrate osmolarity highest?

1) Tip of the loop of Henle

2) End of distal convoluted tubule

3) Beginning of distal convoluted tubule

4) Descending loop of Henle

13. Length,width,and thickness of the adult human kidney are approximately

1) 12-16 cm, 10-12 cm, 4-6 cm respectively

2) 10-12 cm, 5-7 cm, 2-3 cm respectively

3) 10-12 cm,2-3 cm, 5-7 cm respectively

4)12-16 cm, 5-7 cm, 2-3 cm respectively

14. Proximal Convoluted Tubule of nephron is responsible for

1) Filtration of blood

2) Maintenance of GFR

3) Selective reabsorption of glucose, amino acid, NaCl and water

4) Reabsorption of salt only

15. When filtrate moves in loop of Henle from apex of medullary pyramid to its base,osmolarity changes from

1) 300 to 600 $mOsmolL^{-1}$

2) 600 to 300 $mOsmolL^{-1}$

3) 300 to 600 $mOsmolL^{-1}$

4)1200 to 300 $mOsmolL^{-1}$

16. GFR is 180liter/day. What does it mean

1) 180 L is the amount of urine formed in 1 day

2) 180 L is the amount of filtrate formed per day by 1 nephron

3) 180 L is the amount of filtrate formed per day by 1 kidney

4) 180 L is the amount of filtrate formed per day by both kidney

17. Find the correct pathway of blood in the kidney.

I. Peritubular capillary & vasa recta

II. Renal vein

III. Efferent arteriole

IV. Renal artery

V. Glomerulus

VI. Afferent arteriole

1) I,II,IV,III,VI,V 2) IV,VI,V,I,II,III

3) IV,V,VI,I,II,III 4) IV,VI,V,III,I,II

18. Which of the following is incorrect about urine formation

1) Filtration of blood

2) Active reabsorption of nitrogen waste into blood

3) Secretion of H^+ &K^+

4) Reabsorption of water to produce concentrated urine

19. During tubular secretion which of the following substances are secreted into filtrate

1) glucose amino acids

2) H^+ & K^+ ions

3) Sodium and water

4) Glucose and urea

20. Which of the following statement is incorrect

1) Urine is a light yellow coloured watery fluid

2) Urine has a characteristic odour

3) Urine typically contains glucose and ketone bodies

4) Analysis of urine helps in clinical diagnosis of many metabolic disorders as well as malfunctioning of the kidney

21. Which of the following statements is/are incorrect?

i. Juxta medullary nephrons have a short loop of Henle.

ii. Reabsorption of water occurs actively in the initial segments of the nephron.

iii. Tubular secretion helps in the maintenance of ionic and acid-base balance of body fluids.

iv. The collecting duct plays a role in the maintenance of pH and ionic balance of blood.

1) i and ii 2) ii and iii

3) i, ii, and iii 4) ii, iii, and iv

22. Which of the following is a characteristic of cortical nephrons?

1) Long loop of Henle extending deep into the medulla

2) Vasa recta is highly developed

3) Loop of Henle is short and extends very little into the medulla

4) Involved in the counter current mechanism

23. Which of the following is NOT a function of the collecting duct?

1) Reabsorption of large amounts of water to produce concentrated urine

2) Passage of small amounts of urea into the medullary interstitium

3) Secretion of H^+ and K^+ ions to maintain pH and ionic balance

4) Active secretion of creatinine

24. Which of the following statements are correct?

i. The liver is the largest gland in our body and secretes sweat containing substances like NaCl, urea, lactic acid, etc.

ii. Sebaceous glands eliminate certain substances like sterols, hydrocarbons, and waxes through sebum.

iii. A condition called uremia is caused by malfunctioning of the lungs.

iv. Kidney transplantation is the ultimate method in the correction of acute renal failures.

1) i and iii

2) ii and iv

3) i, ii, and iii

4) ii, iii, and iv

25. Select the correct match

	Column I	Column II
1)	Ascending limb of Henle's loop	Permeable to water, concentrates filtrate
2)	Descending limb of vasa recta	Receive NaCl from the ascending limb of Henle's loop
3)	Medullary interstitium	Osmolarity decreases from cortex to inner medulla
4)	Collecting tubule	Transports NaCl back to the interstitium

26. **Assertion** : ADH facilitates water reabsorption from the latter parts of the tubule, thereby preventing diuresis.

Reason : An increase in body fluid volume can switch off the osmoreceptors and suppress the ADH release to complete the feedback

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

27. Which of the following is correct?

1) Afferent arteriole is narrower than the efferent arteriole

2) Efferent arteriole is broader than the afferent arteriole

3) Efferent arteriole is narrower than the afferent arteriole

4) Both afferent and efferent arterioles have the same diameter

28. A desert animal is likely to have a higher proportion of:

1) Cortical nephrons

2) Juxta medullary nephrons

3) Nephrons with short loops of Henle

4) Nephrons lacking a loop of Henle

29. In a patient with diabetes insipidus, the body is unable to produce sufficient ADH. Which of the following is a likely symptom?

1) Production of small amounts of concentrated urine

2) Increased reabsorption of water in the collecting ducts

3) Frequent urination with large amounts of dilute urine

4) Increased blood pressure due to water retention

30. If the peritubular capillaries surrounding the proximal convoluted tubule (PCT) become blocked, there would be a direct effect on:

1) Glomerular filtration

2) Tubular secretion and reabsorption

3) Counter current mechanism

4) Micturition reflex

31. A new drug increases the permeability of the collecting duct to urea. What effect would this drug have on urine concentration?

1) Increase in urine concentration

2) Decrease in urine concentration

3) No change in urine concentration

4) Urine become hypotonic

32. If a person increases their water intake significantly, which of the following hormonal changes would you expect to see

1) Increased ADH secretion, decreased ANF secretion

2) Increased ADH secretion, increased ANF secretion

3) Decreased ADH secretion, increased ANF secretion

4) Decreased ADH secretion, decreased ANF secretion

33. A patient is experiencing a decrease in GFR which of the following mechanism most likely employ to restore the GFR?

1) Decreased secretion of ADH

2) Activation of RAAS

3) Increased release of ANF

4) None of the above

34. Choose the correct statement about counter current mechanism

1) The flow of filtrate in the same direction in the two limbs of Henle's loop.

2) The flow of blood in the same direction through the two limbs of vasa recta.

3) The flow of filtrate in opposite directions in the two limbs of Henle's loop and the flow of blood in opposite directions through the two limbs of vasa recta.

4) The flow of filtrate in opposite directions in the two limbs of Henle's loop and the flow of blood in the same direction through the two limbs of vasa recta

35. **Assertion** : ADH causes an increase in blood pressure

Reason : ADH is a vaso constrictor

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

36. **Assertion** : The glomerular filtration rate (GFR) is regulated by the juxtaglomerular apparatus (JGA).

Reason : JGA releases renin, which can stimulate glomerular blood flow and thereby the GFR back to normal

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

37. Which of the following factors cannot activate osmoreceptors

a. Changes in blood volume

b. Changes in body fluid volume

c. Changes in ionic concentration

d. Increase in blood pressure

1) a,b,c,d 2) b & c only

3) c only 4) d only

38. **Assertion** : Hemodialysis can help in the removal of urea from the body.

Reason : The dialysing fluid has a higher concentration of nitrogenous wastes than the blood.

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

39. **Assertion** : A kidney transplant from a close relative minimizes the chances of rejection by the immune system of the host.

Reason : Modern clinical procedures have increased the success rate of kidney transplantation

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3) If Assertion is true but Reason is false.

4) If both Assertion and Reason are false

40. How many statements are true

1. Micturition is the process of release of urine, and it is a reflex initiated by the stretching of the urinary bladder.

2. The lungs, liver, and skin also help in the elimination of excretory wastes.

3.Lungs remove significant quantities of water every day.

4. Sweat glands in the skin eliminate water, NaCl, small amounts of urea, lactic acid, etc.

1) Four 2) Three

3) Two 4) One

41. Match Column I with Column II

Column I		Column II	
a)	Uremia	i)	Inflammation of glomeruli of the kidney
b)	Hemodialysis	ii)	Accumulation of urea in the blood
c)	Renal calculi	iii)	Use of an artificial kidney to remove urea from the blood
d)	Glomerulonephritis	iv)	Stone or insoluble mass of crystallized salts within the kidney

1) a) - ii), b) - iii), c) - iv), d) - i)

2) a) -iii), b) - ii), c) - i), d) – iv

3) a) - ii), b) - iii), c) - i), d) - iv)

4) a) - i), b) - ii), c) - iii), d) - iv)

42. A patient is diagnosed with a condition where their kidneys are failing to remove urea effectively from the blood. Which of the following processes would be the most suitable short-term treatment option

1) Kidney transplantation

2) Administration of ADH

3) Hemodialysis

4) Increasing water intake

43. In a hot desert environment, which of the following adaptations would you expect to see in the excretory system of a desert animal

1) Excretion of large amounts of dilute urine

2) Presence of a short loop of Henle

3) Excretion of nitrogenous wastes as uric acid

4) Increased glomerular filtration rate (GFR)

44. PCT helps in the maintenance of pH of the body fluid by

1) selective secretion of H^+ ions

2) selective secretion of ammonia

3) selective secretion of K^+ ions and absorption of HCO_3^- ions

4) all of the above

45. During a long period of dehydration, the body conserves water.

Which of the following hormonal changes would you expect to see

1) Increased ADH secretion, decreased aldosterone secretion

2) Decreased ADH secretion, increased aldosterone secretion

3) Increased ADH secretion, increased aldosterone secretion

4) Decreased ADH secretion, decreased aldosterone secretion

ANSWER KEY

1.	2	21.	2	38.	1	59.	2	80.	3
2.	3	22.	1	39.	2	60.	1	81.	1
3.	4	23.	1	40.	1	61.	3	82.	1
4.	3	24.	2	41.	2	62.	3	83.	3
5.	4	25.	1	42.	1	63.	2	84.	2
6.	2	26.	3	43.	3	64.	2	85.	3
7.	2	27.	3	44.	2	65.	3	86.	1
8.	4	28.	4	45.	4	66.	3	87.	2
9.	4	29.	4	46.	4	67.	2	88.	1
10.	4	30.	1	47.	1	68.	3	89.	4
11.	3	31.	2	48.	3	69.	4	90.	3
12.	4	32.	3	49.	4	70.	4	91.	3
13.	3	33.	2	50.	2	71.	4	92.	3
14.	1	34.	2	51.	4	72.	3	93.	2
15.	3	35.	i.1	52.	3	73.	1	94.	4
16.	2		ii.2	53.	2	74.	1	95.	1
17.	4		iii.3	54.	3	75.	4	96.	3
18.	4		iv.4	55.	2	76.	1	97.	1
19.	4	36.	1	56.	3	77.	1	98.	1
20.	3	37.	3	57.	3	78.	3	99.	1
				58.	1	79.	2	100.	3

SAMPLE QUESTIONS

1.	4	10.	1	19.	2	28.	2	37.	4
2.	3	11.	2	20.	3	29.	3	38.	3
3.	4	12.	4	21.	1	30.	2	39.	2
4.	4	13.	2	22.	3	31.	1	40.	1
5.	1	14.	3	23.	4	32.	3	41.	1
6.	4	15.	4	24.	2	33.	2	42.	3
7.	1	16.	4	25.	2	34.	4	43.	3
8.	3	17.	4	26.	2	35.	1	44.	4
9.	2	18.	2	27.	3	36.	1	45.	3

WORK BOOK

Chapter 09

LOCOMOTION AND MOVEMENT

A) TYPES OF MOVEMENTS

1. Which of the following statement is NOT correct?

1) All locomotions are movements.

2) All movements are not locomotions

3) Animals and plants exhibit a wide range of movements

4) Hydra cannot use its tantacles for locomotion

2. Find out the **incorrect** statement with respect to type of movement.

1) Choanocytes in porifera perform flagellar movement

2) Oviduct and trachea shows ciliary movement

3) Amoeboid movement is due to protoplasmic streaming

4) WBCs and macrophages exhibit flagellar movement.

3. Locomotory structures need not be different from those affecting other types of movements. Which of the following condition **correctly** defines the above statement?

1) In paramecium, cilia helps in the movement of food through cytopharynx and in locomotion as well

2) Hydra can use its tentacles for capturing its prey and also use them for locomotion

3) Humans use limbs for changes in body postures and locomotion as well

4) All of the above

4. Methods of locomotion performed by animals vary with their

a) Habits

b) Habitats

c) level of organisation

d) demand of the situation

1) a and c

2) a,b and c

3) b and d

4) b and c

5. Locomotory structure found in asterias is:

1) Muscular foot 2) Tubefeet

3) Tentacle 4) Setae

6. Amoeboid movement is found in:

1) Trachea

2) Vasa deferentia

3) Sperm

4) Leucocyte

B) MUSCLE

7. All the following are **correct** about muscle, **except**

1) Mesodermal in origin

2) Shows properties like excitability, contractility, extensibility and elasticity

3) Based on location 3 types of muscles – Skeletal, visceral and cardiac

4) 40 – 50% of body weight is contributed by skeletal muscles

8. All the following are **certain** properties of muscles, **except**;

1) Contractility 2) Elasticity

3) Excitability 4) Relaxibility

9. Striated/skeletal muscles attached to a movable or immovable bone by .....?

1) Ligaments

2) Tendons

3) Tendons and ligaments

4) Dense irregular tissue

10. When we lift a heavy object using arms, then

1) triceps contracts and biceps relaxes

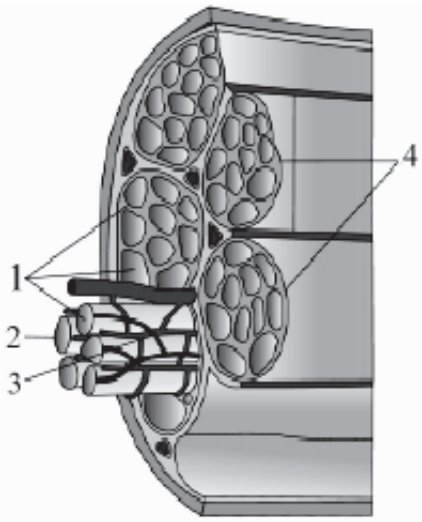
2) biceps contracts and triceps relaxes

3) both biceps and triceps contract

4) both biceps and triceps relax

C) STRUCTURE OF SKELETAL MUSCLE

11. **Diagrammatic cross sectional view of a muscle showing muscle bundles and muscle fibres. From the diagram identify the labelled parts**



1) 1 - Fascicle ,2 - Muscle fibre,3 - Blood capillary,4 - Sarcolemma

2) 1 - Blood capillary, 2 - Fascicle,

3 - Sarcolemma, 4 - Muscle fibre

3) 1 - Muscle fibre,2 - Sarcolemma,3 - Blood capillary,4 - Fascicle

4) 1 - Sarcolemma,2 - Fascicle,3 - Muscle fibre,4 - Blood capillary

12. Select the Correct matching set regarding striated muscle from the following

	Column I	Column II
i)	Muscle fibre	Muscle cell, Myocyte
ii)	Syncitum	Sarcoplasmic reticulum
iii)	Sarcolemma	Muscle cell membrane
iv)	Sarcosome	Ribosome
v)	Myofilaments	Actin, myosin
vi)	Sarcoplasm	Cytoplasm of muscle cell

1) i,iii, v, vi 2) i, iii, iv, v

3) iii, iv, v, vi 4) ii and iv only

13. Pick out the **correct** statement with respect to skeletal muscles

1) Each organised skeletal muscle in our body is made up of a number of fascia

2) Fascicles in a muscle are held together by a collagenous connective tissue layer

3) Each sarcomere is formed of repeated myofibrils

4) A motor nerve along with the muscle fibres connected to it constitute a motor unit

14. Which of the following is **correct** sequence?

1) Muscle bundle → Myocyte → Myofilaments → Myofibrils

2) Muscle bundle → Muscle fibre → Myofilaments → Myofibrils

3) Muscle bundle → Myocyte → Myofibrils → Myofilaments

4) Muscle bundle → Myofibrils → Myofilaments → Myocytes

15. Myofilaments arranged as rod like proteins in the ;

1) Sarcosome of a muscle cell

2) Sarcoplasm of muscle fibres/myofibrils

3) Sarcoplasmic tubule of myocyte

4) Sarcolemma of myofibrils

16. Select the **correct** statements

(i) Sarcoplasm of myocyte contain parallely arranged myofibrils

(ii) Myofibrils show alternate arrangement of actin and myosin filaments

(iii) Isotropic band contains only primary filament

(iv) Anisotropic band contains both primary and secondary filaments

(v) Z-line bisects I-band

(vi) M-line holds thick filaments at the middle of A-band

1) i, ii,iii,iv 2) i, ii, iv, v, vi

3) i, iii, v, vi 4) i, ii, v, vi

17. Which of the following is an elastic fibre that passes through the centre of I-band in a myofibril?

1) Z-line 2) H-band

3) M-line 4) Sarcomere

18. Part of myofibril with both actin and myosin is found in ;

1) M-line 2) A-band

3) H-zone 4) I-band

Assertion - Reason Type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

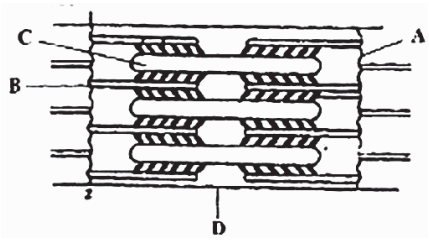
3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

19. **Assertion** : Skeletal muscles involved in locomotion and movement are arranged in antagonistic pairs to move the body parts

Reason : A muscle can move by a body part in one direction by its contraction and another muscle moves that part in opposite direction by its contraction

20. Which of the following is **true** for the labelled parts in the figure below.



1) A - Z line - located at centre of I - band

2) B - Thin filament - occurs in A - band only

3) C - Thick filament - confined to I - band

4) D - H -zone - located at centre of M - line

D) STRUCTURE OF CONTRACTILE PROTEINS

21. Which of the following contractile proteins run close to 'F' actins throughout their length?

1) Meromyosins

2) Tropomyosins

3) Myosin

4) Troponin

22. Select the **correct** option regarding 1,2, and 3

1) 1–Troponin – Pocess myosin binding site

2) 2 – Tropomyosin – Pocess calcium binding site

3) 3 – F – actin – ATP binding site

4) 1 and 2 lies along the grooves of F–actin

23. Which of the following options are **not** applicable to actin filament?

i) Each actin filament is a polymerised protein consisting of F-actins, Tropomyosins and Troponins

ii) G- Actins are polymers of F-actins

iii) An actin filament has two F - actins

iv) Two filamentous proteins, troponins runs close to F- actins

v) In the resting state, a subunit of troponin masks the active site of actin filament

1) ii, iii and iv 2) iv and v

3) ii and iii 4) ii only

24. Which among the following statements about myofilaments is **true**?

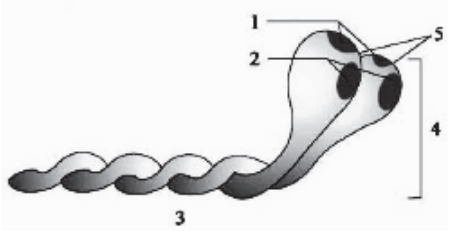
1) Two filamentous actins wound to each other to form the back bone of thick filament.

2) Each troponin subunit possess a binding site for myosin

3) Tropomyosin has a binding site for Ca++

4) Head and short arm of meromyosins projects outward at regular distance and an angle to form cross arms

25. Given below is the diagram of Myosin monomer. Identify the part that can bind with active site of actin molecule.



1) 2 2) 4

3) 3 4) 1

26. The globular head of HMM is an active ATP ase enzyme, and has

a) Actin binding site

b) Myosin binding site

c) ATP binding site

d) Calcium binding site

e) Troponin binding site

1) a,b and c 2) a,c and d

3) a,c and e 4) a and c only

E) MECHANISM OF MUSCLE CONTRACTION

27. Find the **correctly** matched pair

Column I		Column II
1)	Motor unit	a sensory neuron and all muscle fibres connected to it
2)	Motor end plate	the site where a sensory neuron ends on the sarcoplasm of a muscle fibre
3)	Acetyl choline receptors	Present in the plasma membrane of motor neuron in the motor end plate
4)	Acetyl choline	Only neurotransmitter released by motor neurons in the neuro muscular junctions

28. Muscle contraction is initiated by,

1) a signal sent by CNS via a motor neuron

2) a signal sent by PNS via a motor neuron

3) a signal sent by ANS via efferent neuron

4) A signal sent by ANS via efferent neuron

29. Following are certain events in muscle contraction. Arrange the events in **correct** sequence:

i) Binding of Ca^{++} with a subunit of troponin

ii) Myosin head binds to the exposed active sites on actin

iii) Depolarisation of sarcolemma

iv) Neural signal stimulate the release of acetylcholine

v) Action potential spreads throughout the fibre via T-tubules

vi) Increase in Ca^{++} level is sarcoplasm

vii) Cross bridge formation

viii) Z-line pulled inwards

1) v-iv-iii-vi-i-ii-vii-viii 2)iv-iii-v-vi-i-ii-vii-viii

3) iv-v-iii-vi-i-ii-vii-viii 4)iv-vi-v-iii-i-ii-vii-viii

30. Sliding filament theory can be best explained as

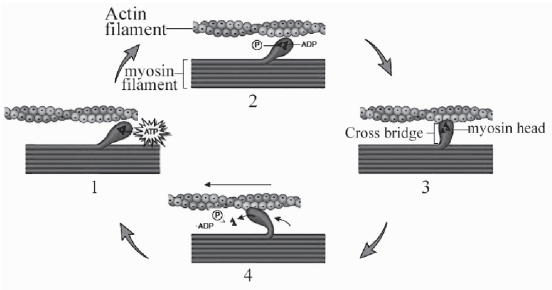
1) When myofilaments slide past each other actin filaments shorten while myosin filament do not shorten

2) Actin and myosin filaments shorten and slide past each other

3) Actin and myosin filaments do not shorten but rather slide past each other

4) When myofilament slide past each other myosin filament shorten while actin filaments do not shorten

31.



Which of the following options is true regarding events in muscle contraction based on the diagram given above

1) 2 - sliding and rotation

2) 2 - formation of cross bridge

3) 4 - breaking of cross bridge

4) 4 - Sliding / Rotation

32. Stimulation of a muscle fibre by a motorneuron occurs at:

1) Sarcoplasmic reticulam

2) Neuro-muscular junction

3) Transverse tubules

4) Triad

33. During muscle contraction, which of the following events occur?

1) Length of thick and thin myofilaments has changed

2) Length of I-band got reduced and A -bands retain the length

3) Z– line widens and Sarcomere shorten

4) H–Zone is unaffected

34. ATP provides energy for muscle contraction by allowing for:

1) An action potential formation in the muscle cell

2) Cross-bridge detachment of myosin from actin

3) Cross-bridge attachment of myosin to actin

4) Release of Ca^{+2} from sarcoplasmic reticulum

35. The action potential that triggers a muscle contraction travels deep within the muscle cell by means of

1) Sarcoplasmic reticulum

2) Transverse tubules

3) Synapse

4) Motor end plates

36. Ca^{+2} bind _____ in the skeletal muscles and leads to exposure of the binding site for _____ on the _____filament. Fill the blanks with appropriate proteins/ components and select the **correct** option.

1) Troponin, myosin, actin

2) Troponin, actin, relaxin

3) Actin, myosin, troponin

4) Tropomyosin, myosin, actin

37. If a stimulus apply several times greater than the threshold stimulus is provided to a muscle fibre, it will

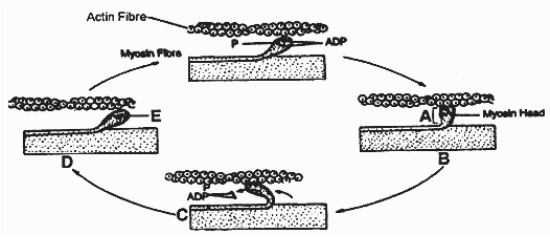
1) Contract with the same force

2) Contract with a greater force

3) Contract with lesser force

4) Undergo tetany

38. Go through the following diagram describing muscle contraction:



Identify A to E: and select the correct option.

1) A - Cross bridge, B - Cross bridge formation, C - Breaking of cross bridge, D - Sliding (rotation)

2) A - Cross bridge, B - Cross bridge formation, C - Sliding / rotation, D - Breaking of cross bridge

3) A - Cross bridge, B - Breaking of Cross bridge, C - sliding / rotation, D - Cross bridge formation

4) A - Cross bridge, B - Cross bridge formation, C - Sliding / rotation, D - ADP

39. During muscular contraction, which of the following events occur?

(i) H-zone disappears

(ii) A band widens

(iii) I band shortens

(iv) Width of A band is unaffected

(v) Z line come closer

1) (i),(iii),(iv) and (v) 2) (i),(ii) and (v)

3) (ii),(iv) and (v) 4) (i),(ii) and (iii)

40. Consider the following statements each with one or two blanks.

(i) Repeated activation of the muscles can lead to the accumulation of (1) due to anaerobic breakdown of glycogen in them, causing fatigue.

(ii) The globular head of meromyosin is an active ATPase enzyme and has binding sites for (2) and active sites for (3)

(iii) Central part of thick filament, not overlapped by thin filaments is called the (4).Which one of the following options correctly fills the given blanks?

Select the correct option with respect to (1), (2), (3), (4)

1) (1) – glucose, (4) – A band

2) (1) – pyruvic acid, (2) – troponin, (3) – myosin

3) (1) – lactic acid (2) – ATP, (3) – actin, (4) – H zone

4) (1) – lactic acid, (4) -1 band

41. Read the following statements carefully and select the appropriate option given below:

i. Muscle contraction is intiated by a signal sent by the central nervous system via a motor neuron

ii. A complex protein troponin is distributed at regular intervals on the tropomyosin

iii. Mechanism of muscle contraction states that the contraction of thick filaments takes place over thin filaments

iv. The Z- line attached to actins are pulled outwards, thereby causing a shortening of sarcomere during contraction

v. Red muscles contain little mitochondria which can utilize the large amount of haemoglobin for ATP production .

1) All are incorrect except i and ii.

2) All are incorrect except ii and iii

3) All are incorrect except iii and iv

4) All are incorrect except iv and v

42. A. Red muscles & B. White muscles

I. Number of mitochondria less.

II. Number of mitochondria more

III. Sarcoplasmic reticulum is abundant

IV. Myoglobin content high

V. Sarcoplasmic reticulum moderate

VI. Aerobic muscles

VII. Depend on anaerobic respiration for energy

VIII. Less myoglobin content

Identify above (I to VIII) traits as characteristic of A and B types of muscles:

1) A - I, III, VII, VIII;B - II, IV, V, VI

2) A - II, IV, V, VI;B - I, III, VII, VIII

3) A - I, III, IV, VII; B - II, V, VI, VIII

4) A - II, V, VI, VIII; B - I, III, IV, VII

43. How many of the following statements are **true** regarding red muscle?

i) Abundant myoglobin and rich blood supply

ii) Plenty of mitochondria and sarcoplasmic reticulum

iii) Fast rate of contraction

iv) Depends aerobic process and are not easily fatigued

v) Thicker in diameter and easily fatigued

1) One 2) Two

3) Three 4) Four

Assertion - Reason Type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

44. **Assertion** : In each sarcomere, the thick filaments are present at the two ends, where as the thin filaments are located centrally

Reason : The thick and thin filaments are alternately arranged and they don't overlap

45. **Assertion** : During contraction, neither the thin filaments nor the thick filaments change in length when the muscle contracts

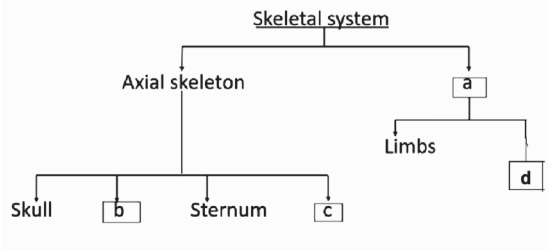
Reason : The myofilaments slide past each other longitudinally, so that the degree of overlap of the thin and thick filaments increases.

46. **Assertion** : Muscle contraction force increases with rise in strength of stimulus

Reason : This is due to increased contraction of individual muscle fibres with increase in stimulus strength.

F) SKELETAL SYSTEM

47. Recognise the flow chart and find out the **correct** match



1) a-Appendicular skeleton, b-Cranium, c-Facial bones , d- Pelvis

2) a- Girdles, b-Vertebral column, c-Cranium, d-Coxal bone

3) a- Appendicular skeleton, b-Vertebral column, c-Ribs, d-Girdles

4) a-Appendicular skeleton, b-Cranial bones, c-Facial bone, d- Girdles

i) AXIAL SKELETON

48. Find out the number of **incorrect** matches about human skeleton

i) Axial skeleton – 80

ii) Appendicular skeleton – 120

iii) Limb bones – 126

iv) Skull bones – 26

v) Vertebral column –29

vi) Facial bones – 12

vii) Ribs – 14

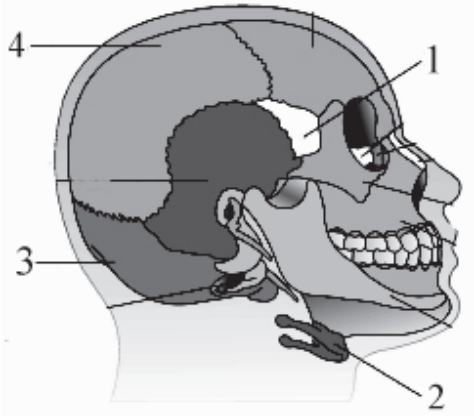
viii) Girdle bones – 2

1) Five 2) Four

3) Six 4) Seven

49. Identify the labelled parts

Diagrammatic view of human skull.



1) 1- Occipital bone, 2 - Frontal bone, 3 - Sphenoid bone, 4 - Hyoid bone

2) 1 - Sphenoid bone, 2 - Hyoid bone,3 - Occipital bone,4 - Parietal bone

3) 1 - Hyoid bone,2 - Parietal bone,3 - Sphenoid bone,4 - Occipital bone

4) 1 - Frontal bone, 2 - Hyoid bone,3 - Occipital bone,4 - Sphenoid bone

50. Find out the **correct** order of the number of bones in the parts of skull such as cranial bone, facial bone, hyoid bone and middle ear bones respectively

1) 14,8,1 and 3 2) 3,8,14 and 1

3) 8,14,1 and 6 4) 14, 8, 3 and 1

51. Choose an unpaired bone in facial region?

1) Palatine bone 2) Ethmoid bone

3) Sphenoid bone 4) Vomer

52. Skull region articulates with the superior region of the __A__ with the help of __B__ occipital condyles; that is the reason human skull is called __C__ skull.

Fill in the blanks A, B and C and select the correct answer

1) A-vertebral column, B-two, C-dicondylic

2) A-vertebral column, B-three, C-dicondylic

3) A-vertebral column, B-one, C- dicondylic

4) A-vertebral column, B-one, C-monocondylic

53. Identify the unpaired bone:

1) Zygomatic 2) Occipital bone

3) Maxilla 4) Nasal bone

54. How many of the following statements concerning vertebral column are **correct**?

a) It is long curved bony rod with two curves

b) Cervical curve and lumbar curve helps in erect posture and bipedal locomotion

c) Lumbar and coccygeal vertebrae are fused ones

d) Thoracic vertebrae serves as the point of attachment for the ribs and musculature of the back

e) Sacrum has facets for the attachment of ilia of hip girdle

1) Two 2) Three

3) Four 4) Five

55. The number of vertebrae present in cervical, thoracic, lumbar, sacral and coccyx regions in an adult human respectively are

1) 12,7,5,1,1 2) 1,7,5,12,1

3) 7,5,1,12,1 4) 7,12,5,1,1

56. Pick the **true** statements with reference to human beings.

I. Vertebral column consists of 26 bones in adult

II. Vertebra is ventrally placed.

III. Spinal canal in vertebra is the passage for spinal cord.

IV. Neural canal is ventrally placed

The option with all correct statement is

1) II, III and IV 2) I, III and IV

3) I, II and IV 4) I, II and III

57. Vertebral formula of child is;

1) $C_7T_{12}L_5S_1Co_1$ 2) $C_7T_{12}L_5S_5Co_2$

3) $C_7T_{12}L_4S_1Co_3$ 4) $C_7T_{12}L_5S_5Co_4$

58. The vertebral column of a young man gets dislocated from the skull. Which parts are likely to be involved directly?

1) One occipital condyle from axis vertebra

2) Hyoid bone from axis vertebra

3) Two occipital condyles from axis vertebra

4) Two occipital condyles from atlas vertebra

59. Which of these statements concerning the ribs is **true**?

1) The head of the ribs attach to the manubrium of sternum.

2) Floating ribs do not attach to vertebrae

3) True ribs attach directly to the sternum with costal cartilage

4) False ribs attached ventrally to the xiphoid process of sternum

60. Find the **mismatch**

1)	Vertebrosternal ribs	1st to 7th pair, directly articulates with hyaline cartilage
2)	False ribs	8th, 9th and 10th pair, articulates with costal cartilage of 7th ribs
3)	Floating ribs	They are free dorsally
4)	Ribcage (37 bones)	Includes thoracic vertebrae, ribs and sternum

61. Out of "X" pairs of ribs in humans only "Y" pairs are true ribs. Select the options that correctly represents values of "X" and "Y" and provides their explanation

1) X = 12, Y = 7; True ribs, attached dorsally to vertebral column and sternum on two ends

2) X = 24, Y = 2; True ribs, attached dorsally to vertebral column but, free on ventral side

3) X = 24, Y =12; True ribs, attached dorsally to vertebral column, free on ventral side

4) X =12, Y =7; True ribs, attached dorsally to vertebral column and ventrally to sternum

62. Out of 'X' pairs of ribs in a human being, only 'Y' pairs are true ribs. Select the option that correctly represents the values of X and Y, and the provided explanation.

1)	X=12, Y=5	True ribs are dorsally attached to vertebral column and sternum on two ends
2)	X=24, Y=7	True ribs are dorsally attached to vertebral column but are free on ventral side
3)	X=24, Y=12	True ribs are dorsally attached to vertebral column but are free on ventral side
4)	X=12, Y=7	True ribs are attached dorsally to vertebral columns and ventrally to the sternum

63. Region of sternum, where no ribs attached

1) Xiphisternum 2) prosternum

3) Manubrium 4) Mesosternum

Assertion - Reason Type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

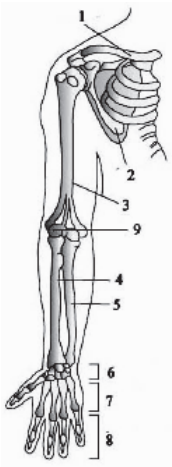
4) If both Assertion and Reason are false

64. **Assertion** : Bone has a very hard non - pliable matrix while cartilage has slightly pliable matrix

Reason : Bone has calcium salts and collagen fibres while cartilage has chondroitin salts

ii) APPENDICULAR SKELETON

65. Frontal view of right pectoral girdle and upper arm are given below. Identify the parts labelled 1,2,4 and 6 are respectivity as:



1) Collar bone – shoulder blade –Ulna – Metacarpals

2) Sternum – Clavicle – Radius – Carpals

3) Shoulder blade – Collar bone – Radius – Wrist bones

4) Clavicle – Scapula – Radius – Carpals

66. The collar bone articulates with shoulder blade through

1) Coracoid process

2) Olecranon process

3) Acromion process

4) Odontoid process

67. Identify the **incorrect** statement regarding girdles

1) Scapula has a slightly elevated ridge called spine

2) Collar bone articulate with acromion process and manubrium of sternum

3) Acetabulum of coxal bone provide place for articulation of Thigh bone

4) Coxal bones of hip girdle meet dorsally to form pubic symphysis

68. Glenoid cavity articulates

1) Scapula with acromion

2) Clavicle with scapula

3) Humerus with scapula

4) Femur with pelvic girdle

69. Scapula is a triangular bone situated in the

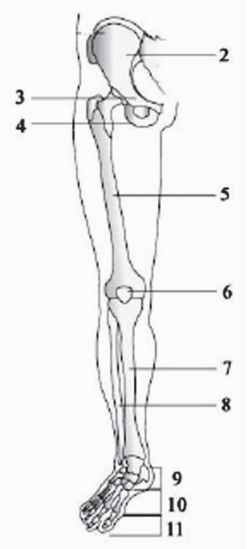
1) dorsal part of thorax between 2nd and 7th ribs

2) ventral part of thorax between 2nd and 7th ribs

3) medial part of thorax between 2nd and 7th ribs

4) none of the above

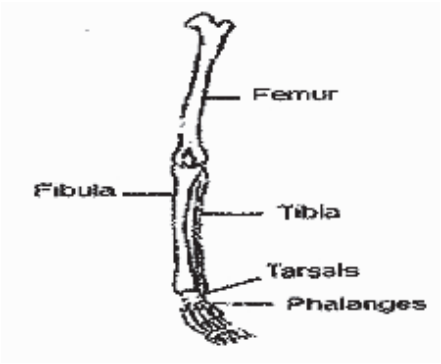
70. Diagrammatic view of right pelvic girdle and lower limb bones are given below. Identify pubis, ischium, Tibia and foot bones respectively as



1) 3-4-8-9 2) 3-4-7-10

3) 2-4-7-9 4) 3-3-7-10

71. Given diagram shows bone of the left human hind limb as seen from front. It has certain mistakes in labelling. Two of the wrongly labelled bones are



1) tibia and tarsals

2) Femur and fibula

3) Fibula and phalanges

4) Tarsal and femur

72. If it is said that both the hind limbs and forelimbs have equal number of bones, then which of the following bone pair have not same number of bones :

1) Carpals and Tarsals

2) Metacarpals and Metatarsal

3) Phalanges

4) Femur and Humerus

73. Olecranon process is found in .....(i)..... but .....(ii)..... found in upper end of shoulder blade. Here (i) and (ii) respectively as:

1) i-Proximal end of ulna; ii-xiphoid process

2) i-Distal end of ulna; ii-Coraccoid process

3) i-Proximal end of radius; ii-Coraccoid process

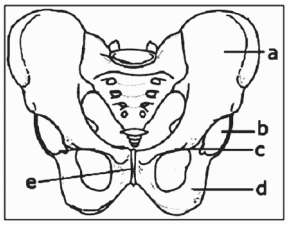
4) i-Proximal end of ulna; ii-Acromion process

74. In pelvic girdle, bone which directly articulated into the sacrum of vertebral column is;

1) Ischium 2) Pubis

3) Coccyx 4) Ilium

75. Identify the labelling a, b, c, d and e of pelvic girdle



1) a-Pubis, b-acetabulum, c-ilium, d-ischium, e-pubic symphysis

2) a-ilium, b-acetabulum, c-pubis, d-ischium, e-pubic symphysis

3) a-ischium, b-acetabulum, c-pubis, d-ilium, e-pubic symphysis

4) a-ilium, b-pubis, c-acetabulum, d-pubic symphysis, e-ischium

76. Fused bones in vertebral column articulated into the .....of hip region.

1) Coccygeal bones

2) Coxal bones of pelvic girdle

3) Coxal bones in pectoral girdle

4) Pubic symphysis

77. Complete the following paragraph and select the correct option. Pelvic girdle consists of two coxal bones. Each coxal bone is formed by the fusion of three bones (i), (ii) and (iii) At the point of fusion of the above bones is a cavity called (iv) to which the thigh bone articulates. The two halves of the pelvic girdle meet ventrally to form the pubic symphysis containing (v). cartilage.

(i)	(ii)	(iii)	(iv)	(v)
1) clavicle	scapula	sternum	glenoid	hyaline
2) ulna	radius	tarsal	acromion	fibrous
3) sacrum	scapula	clavicle	glenoid	yellow
4) ilium	ischium	pubis	aceta bulum	fibrous

G) JOINTS

78. Suture is associated with

1) Cranial bones

2) Phalanges

3) Intervertebral disc

4) Tarsals

79. Which is **incorrect** regarding each joint and its two examples?

1)	Pivot joint	1) Between Atlas & Axis 2) Between radius and ulna
2)	Hinge joint	1) Elbow joint, knee joint 2) Interphalangeal joint
3)	Gliding joint	1) Between carpals 2) Between tarsals
4)	Saddle joint	1) Metacarpo phalangeal joint 2) Carpometacarpal joint of thumb

80. The characteristic and an example of a synovial joints in human is

1) Lymph filled between two bones, limited movement, sliding joint between tarsals

2) Fluid cartilage between bones, limited movement, knee joint

3) Fluid filled between two joints, provides cushion in skull bones

4) Fluid filled synovial cavity between bones, pivot joint

81. Match the following

Column I		Column II	
A)	Hip joint	1)	Fibrous joint
B)	Intervertebral disc	2)	Hinge joint
C)	Cranial sutures	3)	Ball and Socket joint
D)	Joint between phalanges	4)	Saddle joint
E)	Joint between carpal and metacarpal of thumb	5)	Gliding joint
		6)	Cartilaginous joint

1) $\frac{ABCDE}{36124}$ 2) $\frac{ABCDE}{46123}$

3) $\frac{ABCDE}{46213}$ 4) $\frac{ABCDE}{16243}$

82. Which of the following joints does **not** allow any movement?

1) Saddle 2) Cartilaginous

3) Fibrous 4) Pivot

83. Match the following correctly and select the correct option

Column I		Column II	
a)	Pivot joint	i)	Sutures in the skull
b)	Catilaginous joint	ii)	Between atlas and axis
c)	Saddle joint	iii)	Between the adjacent vertebrae
d)	Fibrous joint	iv)	Between carpal and metacarpal of thumb

1) a-iii, b-iv, c-i, d-ii 2) a-i, b-ii, c-iii, d-iv

3) a-iv, b-iii, c-ii, d-i 4) a-ii,b-iii,c-iv, d-i

84. Ankle of each leg consists of group of seven bones called:

1) Carpals 2) Tarsals

3) Phalanges 4) Metacarpals

H) DISORDERS OF MUSCULAR AND SKELETAL SYSTEM

85. An autoimmune disorder affecting neuromuscular junction is:

1) Oesteoporosis 2) Myasthenia gravis

3) Muscular dystrophy 4) Gout

86. Due to the deficiency of calcium ions, sodium channels became activated by a small increase in membrane potential from its normal. Therefore the impulses are discharging repeatedly, this will lead to:

1) Muscle twitch

2) Myasthenia gravis

3) Muscular dystrophy

4) Muscle tetany

87. Which of the following muscular disorder occurs due to hypoparathyroidism and hypercalcitonism?

1) Muscular dystrophy

2) Myasthenia gravis

3) Muscular tetany

4) Rheumatoid arthritis

88. Select the **correct** statement in column II regarding the specific disorder of muscular or skeletal system given in column I

	Column I	Column II
1)	Myasthenia gravis	An autoimmune disorder that inhibits the sliding of myosin filaments
2)	Gout	Inflammation of joints due to extra deposition of calcium
3)	Muscular dystrophy	Age related shortening of muscle
4)	Osteoporosis	Decrease in bone mass and higher chances of fractures with advancing age

89. How many of the following statements are **correct**?

i) Hypercalcemia leads to hyperexcitation / wild contraction of muscle.

ii) Patella cover the knee ventrally

iii) Fascicles held together by an yellow fibrous connective tissue layer called Fascia

iv) Hyoid bone lies at the roof of buccal cavity is also included in the skull

v) Mandible is the only movable bone in the cranium

vi) Obturator foramen is found in pelvic girdle

1) One 2) Two

3) Three 4) Four

90. Which of the following hormones can play a significant role in osteoporosis?

1) Aldosterone and prolactin

2) Progesterone and Aldosterone

3) Estrogen and parathyroid hormone

4) Parathyroid hormone and Prolactin

91. Match the following and select the correct option

Column I		Column II	
a)	Gout	1)	Decrease the density of bone during menopause
b)	Tetany	2)	Progressive degeneration of skeletal muscle, and is inherited
c)	Myasthenia gravis	3)	Abnormal purine metabolism
d)	Muscular dystrophy	4)	Hypocalcemic condition result lack of relaxation between successive stimuli
e)	Osteoporosis	5)	An auto immune disorder, affects motor end plate
f)	Osteoarthritis	6)	Degeneration of articular cartilage

1) a = 3; b = 4; c = 5; d = 2; e = 1; f = 6

2) a = 4; b = 5; c = 1; d = 3; e = 2; f = 6

3) a = 1; b = 5; c = 4; d = 3; e = 2; f = 6

4) a = 6; b = 4; c = 3; d = 5; e = 1; f = 2

92. Match the following

Column I		Column II	
I)	Muscle fatigue	a)	Autoimmune disease
II)	Osteoarthritis	b)	Excessive formation of uric acid
III)	Gout	c)	Demineralization of bone
IV)	Osteoporosis	d)	Accumulation of lactic acid
V)	Rheumatoid arthritis	e)	Degeneration of articular cartilage

1) $\frac{\text{I, II, III, IV, V}}{\text{d e b c a}}$

2) $\frac{\text{I, II, III, IV, V}}{\text{e d b c a}}$

3) $\frac{\text{I, II, III, IV, V}}{\text{e d c b a}}$

4) $\frac{\text{I, II, III, IV, V}}{\text{a b c d e}}$

93. Of the following all disorders which affects the muscular system, except;

1) Osteoporosis

2) Muscular dystrophy

3) Myasthenia gravis

4) Tetany

94. Match the following

Column I		Column II	
a)	Myasthenia gravis	i)	Rapid sustained spasm of muscle due to low Ca^{2+} level in blood
b)	Muscular dystrophy	ii)	Inflammation of joints due to uric acid accumulation in joints
c)	Tetany	iii)	Degeneration of skeletal muscles due to genetic disorder
d)	Gout	iv)	Autoimmune disorder affecting neuro-muscular junction

1) a-iv, b-iii, c-i, d-ii 2) a-i, b-v, c-iii, d-ii

3) a-iv, b-iii, c-ii, d-i 4) a-iii, b-iv, c-ii, d-i

95. Which of the following statements are ?

i) Pain and inflammation occur when too much uric acid crystals deposit in joints during gout.

ii) Tetany is due to hypercalcemia and is characterised by spasms,cramps etc

iii) Bones become weak and brittle in the case of osteoporosis.

iv) If myasthenia gravis is not treated, muscle becomes weaker and paralysed

1) i,iii,iv are correct 2) i,ii,iii are correct

3) ii,iii,iv are correct 4) All are correct

96. Excess of uric acid in blood reacts with Na^+ to form sodium urate crystals and it is deposited into the synovial cavity between joints will cause severe inflammation in joints results

1) Rheumatoid arthritis

2) Gout

3) Osteoarthritis

4) Osteitis

97. Identify the disorder from the following based on the hints given below

i) Degenerative disorder especially during old age

ii) Progressive erosion of articular cartilage in joints

iii) Development of bony lumps or tumors in joints

1) Gout

2) Rheumatoid arthritis

3) Osteoporosis

4) Osteoarthritis

98. Which of the following is incorrect regarding muscular and skeletal disorders?

1) Myasthenia gravis - Auto immune disorder

2) Rheumatoid arthritis - Genetic disorder

3) Muscular tetany-Hormonal imbalance disorder

4) Osteoporosis -Vitamin -D deficiency disorder

99. Osteoporosis in females especially during menopause occurs mainly due to the deficiency of ;

1) Calcium and progesterone in blood

2) Sodium and estrogen in bones

3) Calcium and estrogen in blood

4) Calcium salts and estrogen in bones

100. Acute inflammation in joints in the thumb toe of humans characterised by severe pain and reduces due to the deposition of sodium urate crystals in joints is;

1) Rheumatoid arthritis 2) Osteoarthritis

3) Gouty arthritis 4) Osteoporosis

SAMPLE QUESTIONS

1. Match Column-I with Column-II and select the correct option from the codes given below.

Column I		Column II	
A)	Amoeboid movement	i)	Limbs
B)	Ciliary movement	ii)	Leucocytes
C)	Flagellar Movement	iii)	Trachea
E)	Muscular movement	iv)	Spermatozoa

	A	B	C	D
1)	iii	ii	i	iv
2)	ii	iii	iv	i
3)	i	ii	iii	iv
4)	iv	ii	i	iii

2. Which of the following is **not** an example of ciliary movement?

1) Cilia in Paramecium

2) Cilia in female reproductive tract

3) Cilia in trachea help in removing dust particles and Foreign substances

4) Leucocytes in blood

3. Locomotion is an activity of

1) Skeletal system only

2) Muscular system and neural system

3) Skeletal system and muscular system

4) All the above

4. Which of the cytoskeletal element was involved in Amoeboid movement?

1) Microfilaments

2) Intermediate filament

3) Microtubules

4) All of these

5. Which of the following statement is **incorrect**?

1) Smooth muscles are found in urinary bladder

2) A striated muscle is a syncytium

3) The cytoplasm of striated muscle is called endoplasm.

4) The plasma membrane and ER of striated muscles are called sarcolemma and sarcoplasmic reticulum respectively.

6. Smooth muscles are

1) Involuntary, cylindrical, striated

2) Voluntary, fusiform, uninucleate

3) Involuntary, spindle shaped, non-striated

4) Voluntary, syncytium, cylindrical

7. Skeletal muscle bundles are held together by a common connective tissue layer called:

1) Perimysium 2) Endomysium

3) Fascia 4) Fascicle

8. Actin and Myosin in muscle fibril are arranged

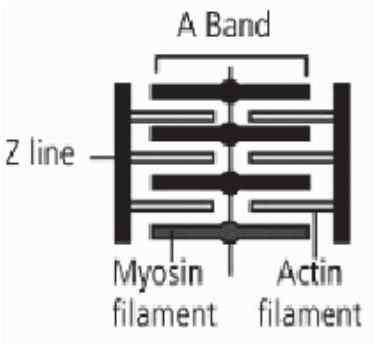
1) Parallel to each other and perpendicular to the longitudinal axis of the myofibrils

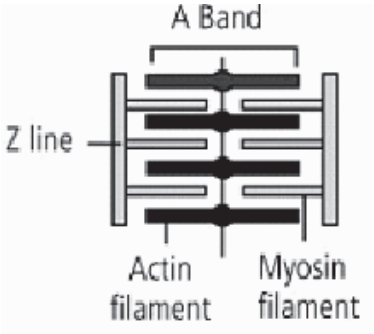
2) Perpendicular to each other and parallel to the longitudinal axis of the myofibrils

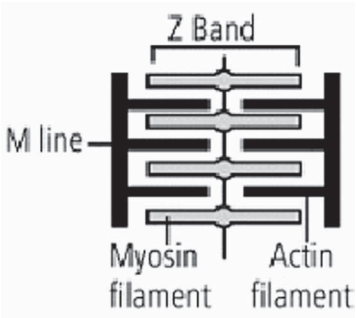
3) Parallel to each other and parallel to the longitudinal axis of the myofibrils

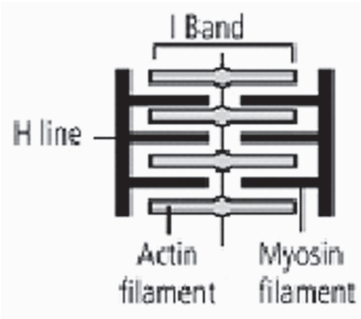
4) Perpendicular to each other perpendicular to the longitudinal axis of the myofibrils

9. Which of the following sarcomeres is labelled correctly

1) 

2) 

3) 

4) 

10. Which statement about the structure of skeletal muscle is true ?

1) The sarcoplasm of the muscle cell is contained within the sarcoplasmic reticulum

2) When a muscle contracts, the A bands of the sarcomere lengthen

3) When a muscle contracts, the H bands of the sarcomere shorten

4) The light bands of the sarcomere are the regions where actin and myosin filaments overlap

11. Choose the correct order of muscle contraction from starting to completion.

1) Stimuli → Neurotransmitter release→ Release of Ca^{2+}→ Cross bridge formation→ Excitation of T-system→Sliding of actin filament

2) Stimuli→ Neurotransmitter release→ Excitation of T system→ Release of Ca^{2+}→

Cross bridge formation→ Sliding of actin filament→'H' band diminishes

3) Stimuli→ Excitation of T-system→ Neurotransmitter secretion→ Cross bridge formation→Sliding of actin filament→ H-band diminishes

4) Stimuli→ Neurotransmitter→ Cross bridge formation→ Excitation of T-system→ Sliding of actin filament

12. Which of the following are **not** applicable to actin filament

(i) An Actin filament has 2 F-actins

(ii) G-Actins are polymers of F-Actin

(iii) Each actin filament is a polymerized protein consisting of F-actin, tropomyosin and Troponins

(iv) Two filamentous proteins, troponins runs close to F-actins

(v) In the resting state, a subunit of troponin mask the binding site of actin filament

1) ii, iii, iv 2) iv, v

3) ii, iii 4) ii, iv

13. Select the **wrong** statement about myosin monomer

1) Meromyosin is the monomeric protein, consists of 2 parts

2) HMM constitute globular head along with short arm

3) Cross arm is the LMM component of meromyosin

4) Globular head shows Mg2+ dependent ATP ase activity

14. H-zone of skeletal muscle is

1) Portion of myosin filaments where there is no overlap with actin filament

2) The central gap between myosin filaments in A-band

3) The central gap between actin filaments extending through myosin filaments in A-band

4) Both 1 & 3

15. Name the bone which is not attached to any other bone in human body

1) Patella 2) Scapula

3) Hyoid 4) Troponin

16. Ions needed for muscle contraction

1) Na^+ & Cl^-

2) Ca^{2+} & Mg^{2+}

3) Fe^{2+} & Ca^{2+}

4) Ca^{2+} & PO_4^{2-} binds to

17. Calcium is important in skeletal muscle contraction because it

1) Binds to troponin to remove the masking of active sites on actin for myosin

2) Activates the myosin ATPase by binding to it

3) Detaches the myosin head from the actin filament

4) Prevents the formation of bonds between the cross bridge with actin filament

18. Match column I with column II and select the right option.

Column I		Column II (Number of bones)	
A)	Cranium/Brainbox	I)	22
B)	Skull (Cranial and facial bones)	II)	8
C)	Face	III)	14
D)	HInd limb	IV)	12 pairs
E)	Ribs	V)	30

1) A - I, B - II, C - III, D - V, E - IV

2) A - II, B - I, C - III, D - V, E - IV

3) A - I, B - II, C - III, D - IV, E - V

4) A - V, B - IV, C - III, D - II, E – I

19. Which of the following are the unpaired bones in our face?

1) Vomer and Mandible

2) Lacrimal bone

3) Maxilla and palatine

4) Zygomatic

20. Paired bones of our cranium

1) Parietal and frontal

2) Occipital bone

3) Temporal bone only

4) Parietal and temporal

21. Our phalangeal formula is

1) 2,3,3,3,2 2) 3,3,3,3,2

3) 2,3,3,3,3 4) 3,3,3,3,3

22. Which of the following joints does not allow any movement?

1) Hinge joint 2) Fibrous joint

3) Cartilaginous joint 4) Synovial joint

23. In old age, stiffness of joints is due to the

1) Hardening of bones

2) Inefficiency of muscles

3) Decrease in synovial fluid

4) Enlargement of bones

24. Gout is a disease that affects the joints and leads to arthritis, due to

1) Accumulation of Calcium oxalate

2) Low Ca^{2+} in body fluid

3) Accumulation of uric acid crystals injoints

4) Degeneration of articular cartilage

25. Write the **wrong** statement with respect to the function of skeletal system

1) Locomotion

2) Erythropoiesis

3) Control of blood sugar

4) Storage of minerals

26. The human ribs are termed as bicephalic because:

1)They have two articulations surfaces on their ventral end

2)They have two articulations surfaces on their dorsal end

3)They have two articulations surfaces on their ventral end and two on dorsal end

4)They have two articulations surfaces on their ventral end and one on dorsal end

27. The combination of a neuron and the muscle fibres it associates with is called

1) Fascicle

2) Motor end plate

3) Motor unit

4)Myoneural junction

28. The sensation of fatigue in muscles after prolonged strenuous physical work, caused by

1) A decrease in the supply of oxygen

2) Minor wear and tear of muscle fibres

3) The depletion of glucose

4) The accumulation of lactic acid

29. A–band is that part of sarcomere in which :

1) Myosin is present

2) Only myosin is present

3) Actin is absent

4) Only actin is present

30. Globular head in a myosin filament is having active site for:

1) ATP 2) Actin

3) Troponin 4) ATP and Actins

31. What happens when calcium ions are transported from sarcoplasm to sarcoplasmic reticulum?

1) Muscle contraction

2) Muscle fatigue

3) Muscle relaxation

4) Myoglobin and mitochondria

32. Select the correct option regarding A,B,C

1) A- tropomyosin , runs close to F - Actin throughout its length

2) B - Troponin - complex protein distributed at regular interval of tropomyosin

3) C - F actin - polymer of monomeric G - actin helically bound to each other

4) None of these

33. Red fibres are muscles rich in:

1) Myoglobin and haemoglobin

2) Cytochromes and haemoglobin

3) Myoglobin only

4) Myoglobin and mitochondria

34. Muscle bundles in skeletal muscles are held together by a common fascia made up of

1) Elastic connective tissue

2) Collagenous connective tissue

3) Reticular connective tissue

4) Adipose connective tissue

35. During muscle contraction

1) Length of I–band remains same

2)Cross – bridges are formed and broken continuously

3) Contraction of myosin and actin is an important event

4) Both 1 and 2

36. Which of the following given information is incorrect?

1) Skull bones –22

2) Vertebro–chondral ribs –14

3) Vertebral bones in adult – 26

4) Coxal bones – 2

37. The scapula is a large triangular flat bone situated in the dorsal part of the thorax between

1) Second and seventh rib

2) Third and fourth rib

3) Fifth and sixth rib

4) Second and fifth rib

38. Match column I with column II and select the correct option from the codes given below.

Column I		Column II	
A)	Humerus	i)	Thigh
B)	Pectoral girdle	ii)	Upper arm
C)	Femur	iii)	Clavicle
D)		iv)	Acetabulum
		v)	Glenoid cavity
		vi)	Scapula

1) A-ii,v B-iii,vi C-i,iv

2) A-ii, iv, B-iii, vi, C-i, v

3) A-i, v, B-ii, iv, C-ii, iv

4) A-iii,vi, B-i,v, C-ii, iv

39. Select the **correct** option about the nature and composition of cartilage

1) Very hard due to calcium salts

2) Very hard due to chondroitin salts

3) Pliable due to calcium salts

4) Pliable due to chondroitin salts

40. Humerus with its rounded upper end (head) articulates into

1) Acromion process 2) Deltoid cavity

3) Glenoid cavity 4) Acetabulum

41. Identify the **incorrectly** matched pair.

Pair of skeletal parts		Category
1)	Sternum and ribs	Axial skeleton
2)	Clavicle and glenoid cavity	Pelvic girdle
3)	Humerus and ulna	Appendicular skeleton
4)	Malleus and stapes	Ear ossicles

42. Which of the following bone **does not** participate in cranium?

1) Maxilla 2) Parietal

3) Occipital 4) Frontal

43. Which of the following statements are **incorrect** regarding a normal human endoskeleton?

(i) The skull is dicondylic

(ii) Metacarpals are five in numbers

(iii) Patella is a cup-shaped bone covering the knee dorsally

iv) Scapula is a large triangular flat bone, situated on the ventral side of the thorax

v) The pelvic girdle has two coxal bones,

1) i and v 2) i and ii

3) ii and v 4) iii and iv

44. Which one of the following is the **correct** description of a certain part of a normal human skeleton?

1) Parietal bone and the temporal bone of the skull are joined by fibrous joint.

2) First vertebra is axis which articulates with the occipital condyles

3) The 9th and 10th pairs of ribs are called the floating ribs.

4) Glenoid cavity is a depression to which the thigh bone articulates

45. The cup - shaped cavity for the articulation of the head of the femur is called

1) Glenoid cavity 2) Acetabulum

3) Obturator 4) Sigmoid notch

ANSWER KEY

1.	4	21.	2	41.	1	61.	4	81.	1
2.	4	22.	4	42.	2	62.	4	82.	3
3.	4	23.	4	43.	2	63.	1	83.	4
4.	3	24.	4	44.	4	64.	1	84.	2
5.	2	25.	4	45.	2	65.	4	85.	2
6.	4	26.	4	46.	1	66.	3	86.	4
7.	4	27.	4	47.	3	67.	4	87.	3
8.	4	28.	1	48.	4	68.	3	88.	4
9.	2	29.	2	49.	2	69.	1	89.	3
10.	2	30.	3	50.	3	70.	2	90.	3
11.	3	31.	4	51.	4	71.	3	91.	1
12.	1	32.	2	52.	1	72.	1	92.	1
13.	2	33.	2	53.	2	73.	4	93.	1
14.	3	34.	3	54.	2	74.	4	94.	1
15.	2	35.	2	55.	4	75.	2	95.	1
16.	2	36.	1	56.	2	76.	2	96.	2
17.	1	37.	1	57.	4	77.	4	97.	4
18.	2	38.	2	58.	4	78.	1	98.	2
19.	1	39.	1	59.	3	79.	4	99.	3
20.	1	40.	3	60.	3	80.	4	100.	3

SAMPLE QUESTIONS

1.	2	10.	3	19.	1	28.	4	37.	1
2.	4	11.	2	20.	4	29.	1	38.	1
3.	3	12.	4	21.	3	30.	4	39.	4
4.	1	13.	3	22.	2	31.	3	40.	3
5.	3	14.	4	23.	3	32.	3	41.	2
6.	3	15.	3	24.	3	33.	4	42.	1
7.	3	16.	2	25.	3	34.	2	43.	4
8.	3	17.	1	26.	2	35.	2	44.	1
9.	1	18.	2	27.	3	36.	2	45.	2

WORK BOOK

Chapter 10

NEURAL CONTROL AND CO-ORDINATION

INTRODUCTION

1. Which of the following is not true

1) Neural system and endocrine system jointly coordinate all the activities of organs

2) The neural system provides an organised network of point-to-point connections

3) Brain and spinal cord are parts of CNS

4) Afferent nerve fibres transmit impulses from CNS to tissue

2. Ladder like nervous system is found in:

1) Porifera

2) Hemichordate

3) Platyhelminthes

4) Aschelminthes

3. Nerve net type nervous system with apolar neurons is present in

1) Porifera

2) Cnidaria

3) Platyhelminthes

4) Aschelminthes

4. Neurons are absent in:

1) Phylum Cnidaria and Ctenophora

2) Phylum Protozoa and Porifera

3) Phylum Porifera and Annelida

4) Phylum Protozoa and Cnidaria

5. Select the incorrect statement from the following

1) Neural system provides a well organised network of point-to-point connections for a quick co-ordination.

2) The endocrine system provides chemical integration through hormones.

3) The neural system is well organised in insects, where a brain and ganglia are present.

4) The vertebrates have a less developed neural system

HUMAN NEURAL SYSTEM

6. In neural system which of the following transmits motor impulses from CNS to skeletal muscles?

1) Somatic neural system

2) ANS

3) Visceral neural system

4) Afferent pathway

7. The -------- neuron receives signals from a sensory organ and transmits the impulse via a dorsal nerve root into the ----------. The --------- neuron then carries signals from CNS to the ----------.

1) efferent, PNS, afferent, receptor

2) afferent, CNS, efferent, receptor

3) afferent, CNS, efferent, effector

4) efferent, PNS, afferent, effector

8. Afferent nerve fibres transmit impulses from

1) CNS to involuntary organs

2) CNS to tissues and organs

3) Tissues and organs to CNS

4) CNS to voluntary organs

9. Match the following and find the matching set

Column I		Column II	
a)	Forebrain	p)	Sensory motor and mixed nerves
b)	Hindbrain	q)	Amygdala, Hippocampus
c)	Cerebral medulla	r)	Cerebrum, thalamus and hypothalamus
d)	Cranial nerve	s)	Cerebellum, pons and medulla oblongata

1) a-r, b-s, c-p, d-q 2) a-s, b-r, c-q, d-p

3) a-r, b-s, c-q, d-p 4) a-p, b-s, c-q, d-r

10. The neural system by which motor impulses from CNS reach smooth muscle is

1) A N S

2) visceral neural system

3)Afferent pathway

4) somatic neural system

11. Match the following and find the correctly matching option

Column I		Column II	
a)	Visceral NS	p)	CNS $\xrightarrow{\text{impulses}}$ skeletal muscles
b)	Somatic NS	q)	afferent and efferent fibres
c)	Autonomous NS	r)	CNS→involntary organs
d)	Peripheral NS	s)	CNS $\overset{\text{impulses}}{\rightleftharpoons}$ visceral orgns

1) a-s, b-p, c-q, d-r 2) a-q, b-r, c-p, d-s

3) a-s, b-p, c-r, d-q 4) a-q, b-s, c-p, d-r

Assertion - Reason Type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

12. **Assertion** : The peripheral nervous system comprises of all the nerves of the body associated with central nervous system

Reason : Peripheral nervous system is the site of information processing and control

13. **Assertion** : In man only peripheral nervous system is present

Reason : The peripheral nervous system includes brain and spinal cord

NEURON AS STRUCTURAL AND FUNCTIONAL UNIT OF NEURAL SYSTEM

14. Which one of the following pairs of structures distinguishes a nerve cell from other types of cells

1) Vacuoles and fibres

2) Flagellum and medullary sheath.

3) Nucleus and mitochondria

4) Perikaryon and dendrites

15. Which of the following is not a part of typical neuron?

1) Nissl's granules 2) Centrosome

3) Dendrite 4) axolemma

16. Nerve cells do not divide because they do not possess

1)Nucleus 2) Mitochondria

3) Centriole 4) Golgi body

17. Schwann cells are found on:

1) Myelinated nerve fibre

2) Unmyelinated nerve fibre

3) CNS

4) Both 1 and 2

18. Which type of neurons are present in olfactory epithelium and retina?

1) Apolar neurons

2) Unipolar neurons

3) Bipolar neurons

4) Multipolar neurons

19. Which statement is not true?

1) Neurons are ectodermal in origin

2) Nissl's granules are clusters of modified mitochondria and RER.

3) Neuroglia are non – nervous supporting nerve cells of neural system.

4) Saltatory conduction is faster and less energy consuming

20. How many of the following statements are true or false?

a) The axons transmit impulses away from the cell body to a synapse.

b) Synaptic vesicle possesses synaptic knobs containing neurotransmitters

c) Myelinated nerve fibres are found in cranial and spinal nerves

d) Neurotransmitters can be synthesised by Nissl's granules

e) monopolar neurons are found in the retina

1) a, b, c, d are true & e false.

2) b , c , d are true & a , e false

3) a , c , d are true & b , e false.

4) All are true except e, only

21. Nissl's granules are present in the..... and are made of ----- &-------respectively.

1) Mast cells and Ribosomes & RER

2) Osteocytes and Mitochondria & RER

3) Neurons and Ribosomes & RER

4) Chondrocytes and Golgi bodies & ER

22. **Assertion** : Multipolar neurons have two or more axons and one Dendron

Reason : Multipolar neurons are usually found in the retina

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

23. Consider the two statements

Statement 1 : Secretions of Nissl's granules are stored in seminal vesicles

Statement 2 : Neurotransmitters are released into the synaptic cleft

1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is correct, but statement II is incorrect

4) Statement I is incorrect, but statement II is correct

24. Consider the two statements

Statement 1 : Multipolar neurons have three main parts , cyton , axon and synaptic knob

Statement 2 : Nissl's granules are present in cyton and axon only

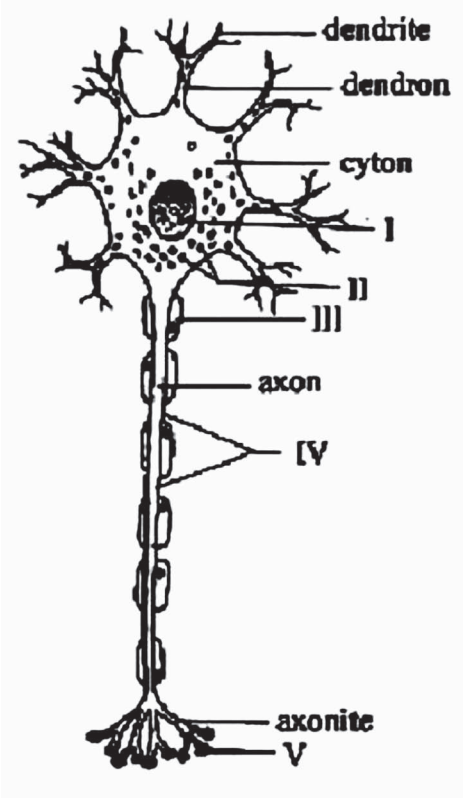
1) Both statement I & II are correct

2) Both statement I & II are incorrect

3) Statement I is incorrect, but statement II is correct

4) Statement I is incorrect, but statement II is correct

25. In neurons, the neurotransmitters are produced and stored respectively, in parts labelled



1) I and V

2) II and V

3) III and V

4) II and V

26. Nissl's granules are found in

1) Cell body

2) Axon

3) dendrite

4) Both 1 and 3

27. Which type of neurons are present in cerebral cortex

1) Apolar neurons

2) pseudo unipolar neurons

3) bipolar neurons

4) multipolar neurons

28. Select the incorrect statement.

1) Neurons are mesodermal in origin

2) The neural system is in the form of network in Hydra.

3) Schwann cells and oligodendrocytes are neuroglial cells

4) Nerve cells have the property of excitability and conductivity

29. Which of the following statements is correct?

1)Axon →Cyton →dendrites represent impulse flow direction through a neuron

2) Synaptic vesicles contain synaptic Knobs.

3) Cyton contains granular bodies called ion channels.

4) Nodes of Ranvier are axon exposed gaps in myelinated neurons

GENERATION AND CONDUCTION OF NERVE IMPULSE

30. When a neuron is in resting stage ie, not conducting any impulse, the axonal membrane is

1) Comparatively more permeable to K^+ and nearly impermeable to Na^+

2) Comparatively more permeable to Na^+ ions and nearly impermeable to K

3) Equally permeable to both Na^+ and K^+\

4) Impermeable to both Na^+ and K^+

31. Which of the following happens at the site of application of a stimulus

1) a rapid influx of K^+

2) a rapid influx of Na^+

3) a rapid efflux of K^+

4) a rapid efflux of Na^+

32. During the conduction of an impulse ,on the inside of axolemma of a neuron , electrical potential changes from

1) –ve to +ve and remains +ve.

2) –ve to +ve and then to -ve

3) +ve to -ve and -ve

4) +ve to -ve andthen to +ve

33. In a nerve if sodium pump is blocked, which of the following is most likely to happen?

1) Na^+ and K^+ will increase outside the cell

2) Na^+ outside the nerve will increase

3) Na^+ inside the nerve will increase

4) K^+ inside the nerve will increase

34. Depolarisation of nerve cell involves

1) Influx of K^+

2) Influx of Na^+

3) Influx of Ca^{2+} and Cl^-

4) Efflux of Na^+

35. Arrange the following events in correct sequence during generation and conduction of impulse.

1. Application of an external stimuli.

2. Influx of Na^+

3. Opening of sodium gates.

4. Formation of action potential

5. Depolarisation

6. Repolarisation.

1) 2-1-3-5-4-6 2) 1-2-3-4-5-6

3) 1-3-2 -5-4-6 4) 3-2-1-5-4-6

36. The normal resting potential of a neuron is:

1) -55 mV 2) +30 mV

3) +70 mV 4) -70 mV

37. The synapse consists of :

1) Post synaptic membrane

2) Pre synaptic membrane

3) Synaptic cleft

4) All of the above

38. Which of the following is not true about chemical synapse

1) Transmission is as along an axon.

2) Synaptic delay present

3) Neurotransmitters are employed.

4) Conduction is only in axon dendron direction

39. Which of the following statement is not related to the transfer of information across an electrical synapse?

1) Transmission is through tight junctions between pre and post synaptic membranes.

2) Neurotransmitters are not involved in transmission.

3) Transmission is very fast and synaptic delay is absent.

4) Transmission is similar to impulse conduction along a single axon

40. One of the main events during repolarisation is

1) Influx of K^+ 2) Influx of Na^+

3)Efflux of K^+ 4) Efflux of Na^+

41. To maintain the resting potential, Na+ / K+ pump, move in and out ..... respectively

1) $3Na^+$ and $2K^+$ 2) $2Na^+$ and $3K^+$

3) $3K^+$ and $2 Na^+$ 4) $2K^+$ and $3Na^+$

42. Receptor site for neurotransmitters are present on :

1) Membranes of synaptic vesicles

2) Pre synaptic membrane

3) Tips of axons

4) Post synaptic membrane

43. During chemical synaptic transmission the neurotransmitters are released from

1) Receptor proteins

2) Post – synaptic membrane

3) Synaptic vesicles

4) Both 1 & 2

44. Which of the following does not act as a neurotransmitter?

1) Epinephrine 2) Norepinephrine

3) Cortisone 4) Acetylcholine

45. Unidirectional transmission of a nerve impulse through nerve fibre is due to the fact that

1) Nerve fibre is insulated by medullary sheath

2) Sodium pump starts operating only at the cyton and continues into the nerve fibre

3) Neurotransmitters are released by dendrites and not by the axon endings.

4) Neurotransmitters are released by the axon endings and not by dendrites

46. Which of the following is the most abundant neurotransmitter?

1) Acetyl choline 2) Epinephrine

3) Nor epinephrine 4) Dopamine

47. The release of neurotransmitters from synaptic vesicle is regulated by

1) Mg^{++} 2) Ca^{++}

3) Na^+ 4) K^+

48. Steps in synaptic conduction are given below

1. Synaptic vesicles release neurotransmitters.

2. Arrival of action potential in synaptic knob.

3.Neuro transmitter bind to specific receptors.

4.Release of Ca ions into synaptic knob and adheres to synaptic vesicles.

5.Post synaptic membrane is repolarised by inactivating neurotransmitter

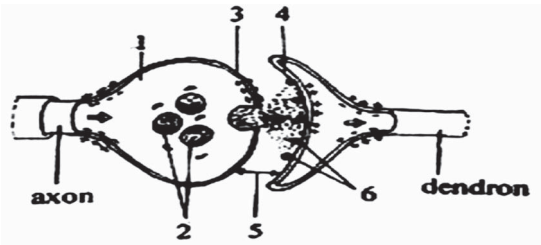
6.Regeneration of a new action potential on the post synaptic membrane.

The correct sequence of events is given by

1) 2 -1- 4 -3- 5 -6 2) 4 -1 -2- 3- 6- 5

3) 2- 4- 1 -3- 6- 5 4) 3 2- 1 -4 -6- 5

49. The sketch of a chemical synapse is given below



During synaptic transmission which numbered parts in the figure bind with calcium ions and neurotransmitters respectively.

1) 3 and 2 2) 2 and 6

3) 3 and 6 4) 5 and 6

50. Efflux of K+ takes place in a neuron during

1) Resting condition

2) Depolarisation

3) Repolarisation

4) Propagation of the impulse

Assertion- Reason type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

51. **Assertion** : Transmission of the nerve impulse across a synapse is accomplished by neuro transmitters

Reason : Transmission across a synapse usually requires neuro transmitters because there is a space called synaptic cleft between the neurons to bind with the receptors

52. **Assertion** : Electrical synapses are rare in our nervous system.

Reason : Impulse transmission across an electrical synapse is slower than across a chemical synapse

53. **Assertion** : In a polarized neuron ,the axoplasm inside the axon contains high concentration of K^+ ions and negatively charged proteins

Reason : In resting neuron , the axonal membrane is comparatively more permeable to K^+ and nearly impermeable to Na ions

54. **Assertion** : Resting potential is maintained by differential concentration of Na^+ and K^+

Reason : Neurons use electrogenic energy to maintain resting potential

55. Select the correct one regarding electrical synapses.

1) neurotransmitters are employed for synaptic conduction.

2) Impulse transmission is bi-directional between axon and dendron

3) Impulse transmission is slower.

4) synaptic delay takes place

56. Find out the false statement.

1) Saltatory conduction is a type of impulse conduction along myelinated neurons.

2) Myelinated nerve fibres are found in spinal and cranial nerves.

3) Unmyelinated nerve fibres have nodes of Ranvier

4) Bipolar neurons are present in olfactory epithelium

57. When a neuron is depolarised, the axonal membrane has

1) Negative charge outside and positive charge inside

2) Positive charge outside and negative charge inside

3) Negative charge inside and outside

4) Positive charge inside and outside

58. Sodium- potassium pump is an example for .....A....., and transports .....B.....

1) A-Active transport, B-3 Na^+ ions outwards for every 2 K^+ ions into the cell.

2) A-Passive transport, B-2 Na^+ ions outwards for every 3 K^+ ions into the cell.

3) A-Passive transport, B-2 K^+ ions outwards for every 3 Na^+ ions into the cell.

4) A-Active transport, B-3 K^+ ions outwards for every 2 Na^+ ions into the cell

59. During the production and transmission of potential on the inner side of the plasma membrane has which type of electric charge?

1) First positive, then negative and continue to be negative.

2) First negative, then positive and again back to negative.

3) First negative, then positive and continue to be positive.

4) First positive, then negative and again back to positive.

60. The deficiency of a neurotransmitter called dopamine leads to

1) Parkinson's disease

2) Dementia

3) Multiple sclerosis

4) Alzheimer's disease

CENTRAL NEURAL SYSTEM

61. The forebrain consists of ;

1) cerebellum , thalamus and hypothalamus.

2) Pons , cerebrum and diencephalon

3) Thalamus , hypothalamus and cerebrum

4) Limbic system , diencephalon and cerebellum

62. The sequence of arrangement of meninges around the brain from inside to outside is :

1) Dura mater - arachnoid membrane- Pia mater

2) Pia mater - arachnoid membrane -dura mater.

3) Dura mater-pia mater-arachnoid mem brane.

4) Arachnoid membrane - pia mater - dura mater

63. The derivatives of embryonic diencephalon of brain is

1) Olfactory lobes and cerebrum

2) Corporaquadrigemina and pons

3) Thalamus and hypothalamus

4) Cerebellum and medulla oblongata

64. Corpus callosum:

1)Interconnects different parts of brain

2) Act as a nerve tract to connect the two cerebellar hemispheres.

3) Act as centre for sensory and motor signalling.

4) Act as a nerve tract to connect the cerebral hemispheres

65. How many of the following statements are true ?

1) The dura mater lies very close to the nervous tissue.

2) Longitudinal fissure separates cerebrum into two cerebellar hemispheres

3) Cerebral cortex is referred to as grey matter due to cell bodies and dendrites.

4) Cerebellar medulla is made up of grey matter.

1) 3 2) 4

3) 2 4) 1

66. Which part of the brain act as appetite centre, endocrine part of brain and thermostat.

1) Medulla oblongata

2) Cerebellar cortex

3) Hypothalamus

4) Corpora quadrigemina

67. Which of the following is not a part of fore brain ?

1) Hypothalamus

2) Thalamus

3) Cerebrum

4) Corpora quadrigemina

68. Which part of brain is concerned with complex functions like intersensory association, memory and communication.

1) Limbic system 2) Hippocampus

3) Association area 4) Pons varoli

69. Which among the following play a significant role in the control and regulation of sexual behaviour and expression of emotional reactions?

1) Limbic system and hypothalamus

2) Corpora quadrigemina and pons

3) Hypothalamus only.

4) Cerebellum and Limbic system

70. The defect in which part of the brain would results in inability to express emotions?

1) Cerebellum 2) Thalamus

3) Limbic system 4) Medulla

71. Injury localised to the hypothalamus would likely disrupt

1) Co-ordination during locomotion

2) Short term memory

3) Regulation of body temperature.

4) Complex functions such as decision making

72. Match the following items in column A and B and choose the right option

Column A		Column B	
a)	Hypothalamus	1)	Regulation of behavioural activities
b)	Hippocampus	2)	Inter sensory association, memory and communications
c)	Dura matter	3)	Storage conversion of short to long term and recollection of memory
d)	Association area	4)	Thermostat and appetite centre
e)	Limbic system	5)	Outer most meninges of brain

1) a-2, b-1, c-4, d-3, e-5

2) a-3, b-1, c-2, d-5, e-4

3) a-4, b-3, c-5, d-2, e-1

4) a-4, b-3, c-2, d-5, e-1

73. All the following are functions of hypothalamus except;

1) Production of neurohormones.

2) Appetite centre.

3) Thermostat and osmostat.

4) Audiovisual reflex centre of the body

74. The part of the brain located between thalamus and pons is

1) Forebrain 2) Midbrain

3) Hindbrain 4) Diencephalon

75. The part of brain known as" little brain" is :

1) Cerebrum 2) Thalamus

3) Cerebellum 4) Pons varoli

76. Conversion of short term memory into long term memory , recollection of memory are related to :

1) Cerebellum

2) Hippocampus

3) Hypothalamus

4) Corpora quadrigemina

77. The activities of equilibrium , balancing and coordination of muscles are governed by

1) Cerebellum

2) Medulla oblongata

3) Cerebrum

4) Diencephalon

78. Which of the following play a significant role in the control and regulation of behavioural and emotional activities, motivation and existence of the species?

1) Hypothalamus and medulla oblongata

2) Cerebellum and cerebrum

3) Limbic system and hypothalamus

4) Corpora quadrigemina and pons

79. The main function of cerebellum is the reflex control of

1) Cardiac muscles 2) Skeletal muscles

3) Visceral muscles 4) Sense organs

80. In brain, the pons connects

1) Brain with spinal cord

2) Cerebrum with cerebellum

3) Two lobes of cerebellum

4) Two lobes of cerebrum

81. Which of the following is not under the control medulla oblongata?

1) Vomiting 2) Heart rate

3) Motivation 4) Inspiration

82. Respiratory centres are located in :

1) Cerebellum and pons varoli

2) Medulla oblongata and pons varoli

3) Medulla and cortex of cerebrum

4) Thalamus and corpus callosum

83. Identify the incorrect statements.

A) The cerebral hemispheres are ventrally connected by corpus callosum.

B) The hypothalamus contains centres which control body temperature, urge for eating and drinking

C) cerebral cortex is referred to as white matter due to its white colouration

D) The cerebrum wraps around a structure called thalamus

E) Limbic lobe consists of amygdala and pons varoli Choose the correct option:

1) A and B only

2) A ,B,C and E only

3) C and E only

4) A,C and D only

84. Study the following list and find out the parts of brain stem

1) Hind brain

2) Cerebrum

3) Mid brain

4) Hypothalamus

5) Medulla oblongata 6) Pons varoli

7) Cerebrum

1) 1, 3 & 7 2) 3, 5 & 6

3) 1, 5 & 7 4) 5, 6 & 7

85. Midbrain is present between

1) Thalamus and pons

2) Pons and medulla oblongata

3) Medulla oblongata and spinal cord

4) Above thalamus

86. In brain corpora quadrigemina serves as :

1) Appetite centre.

2) Centre to control anger , rage and fear.

3) Convert short term memory into long term memory.

4) Serves as audio – visual centre

87. The canal of mid brain is :

1) Paracoels

2) Cerebellar aqueduct

3) Metacoel

4) Cerebral aqueduct

88. Human hind brain comprises of

1) Thalamus , cerebellum , medulla oblongata.

2) Pons , cerebrum , medulla oblongata.

3) Pons , cerebellum , medulla oblongata.

4) Pons , hypothalamus , medulla oblongata

89. Which of the following regions of the brain is incorrectly paired with its function?

1) Cerebrum-calculation and contemplation

2) Corpus callosum-communication between right and left cerebral cortex.

3) Cerebellum-language comprehension

4) Medulla Oblongata-Homeostatic function

Assertion- Reason type Questions

1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion

2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

3) If Assertion is true but Reason is false

4) If both Assertion and Reason are false

90. **Assertion** : Brain stem consists of Mid brain, Pons varoli and Medulla oblongata

Reason : Brain stem connect brain and spinalcord

91. **Assertion** : Medulla contains centres which control respiration , cardiovascular reflexes and gastric secretions

Reason : Medulla contains several neuro secretory cells which secrete hormones

92. You are watching a horror movie and you notice your heart is beating fast and mouth is dry. It is because of

1) Fight and flight response
2) Sympathetic nervous system
3) Parasympathetic nervous system
4) Both 1 and 2

93. Find the correctly matching option

a)	Multiple sclerosis	1)	Abnormal electrical activity of brain
b)	Alzheimer's disease	2)	Dopamine deficiency leading to destruction of neurons
c)	Epilepsy	3)	Accumulation of beta amyloid proteins in brain neurons
d)	Parkinson's disease	4)	Progressive destruction of myelin sheath in neurons

1) a-3, b-4, c-1, d-2 2) a-4, b-3, c-1, d-2
3) a-2, b-3, c-4, d-1 4) a-4, b-2, c-3, d-1

Statement Questions

1) Statement 1 is correct and statement 2 is wrong
2) Both statement 1 and 2 are correct
3) Statement 1 is wrong and statement 2 correct
4) Both statement 1 and 2 are wrong

Read the following statements and choose the correct option

94. **Statement 1** : Cerebellum is the second largest part of the brain

Statement 2 : Cerebellum is a major co ordinating centre for motor and sensory signals

95. **Statement 1** : Cerebral cortex is referred to as grey matter due to its greyish appearance

Statement 2 : The grey colour is due the concentration of cell bodies and dendrons

96. **Statement 1** : All motor neurons are afferent neurons

Statement 2 : Motor neurons transmit impulses from sense organs to CNS

97. **Statement 1** : Dorsally the mid brain consists of four rounded bodies called corpora quadrigemina

Statement 2 : Mid brain controls the balance and equilibrium of our body

98. **Statement 1** : The brain stem consists of fore brain , pons and medulla oblongata

Statement 2 : The medulla contains centres which control respiration

99. **Statement 1** : The midbrain is located between the thalamus/ hypothalamus of the forebrain and pons of the hindbrain

Statement 2 : The midbrain receives and integrates visual, tactile and auditory inputs

100. **Statement 1** : Inner parts of cerebral hemispheres and a group of associated deep structures form a complex structure called limbic system

Statement 2 : It is concerned with olfaction,autonomic responses,regulation of sexual behaviour, expression of emotional reactions

SAMPLE QUESTIONS

1. The part of PNS relay impulses from CNS to skeletal muscle is

1) Sympathetic nervous system

2) Parasympathetic nervous system

3) Somatic neural system

4) Autonomous neural system

2. Short fibres which branch repeatedly and project out of the cell body and contain Nissl's granules are called

1) Dendrites. 2) Axonites

3) Synaptic knob 4) Nodes of Ranvier

3. Which of the following statement is wrong?

1) Neurons are absent in phylum protozoa and phylum porifera

2) Peristalsis is accelerated in vigorous exercise

3) Ladder-like nervous system is seen in platyhelminthes

4) Cnidaria is the first phylum to develop neural coordination

4. Neuron clusters found in PNS are called

1) Nuclei 2) Ganglia

3) Plexuses 4) Cell bodies

5. Nissl granules are not found in

1) Cell bodies 2) Dendrites

3) Axons 4) Dendron

6. Neurons with one axon and many dendrons are called

1) Unipolar neurons

2) Bipolar neurons

3) Multipolar neurons

4) Pseudo unipolar neurons

7. Schwann cells are found around the axons of

1) Peripheral neural system

2) Myelinated neurons

3) Non-myelinated neurons

4) All the above

8. Neurotransmitters can be produced in …… (a)…… and stored in …..(b)……. .

(a) and (b) are respectively

1)Synaptic cleft and presynaptic membrane

2) Nissl granules and synaptic vesicles

3) Synaptic knob and axon hillock

4) Cell bodies and receptors

9. The events in production of nerve impulse is given below.

a) efflux of K^+

b) influx of Na^+

c) application of stimulus

d) closing of Na^+ channels

e) opening of Na^+ channels

The correct order is given by

1) c- e- a -d- b 2) c- b- a -d- e

3) c- e- b- a -d 4) c -d-b -e -a

10. Find the wrong statement

1) A new action potential is generated on post synaptic membrane of chemical synapses

2) The new potential developed may be either excitatory or inhibitory

3) Dura mater is close to brain cortex

4) Subarachnoid space is between arachnoid and pia mater

11. All the following statements are true except

1) Hypothalamus and medulla oblongata are involuntary in function

2) Thalamus is the major coordinating centre for sensory and motor signalling

3) For cerebrum and cerebellum, the cortex is formed of grey matter

4) Midbrain is located between pons and medulla oblongata

12. How many of the following statements are true?

a) Brain acts as command and control system

b) Thalamus wraps around cerebrum

c) Pons consists of fibre tracts that inter connect different regions of brain

d) Hippocampus is located in cerebral cortex

1) one 2) three

3) two 4) four

13. Unipolar neurons are found in

1) Cerebral cortex

2) Olfactory epithelium

3) Retina

4) Embryonic stage

14. Myelinated nerve fibre is

1) enclosed by Schwann cell which form myelin sheath around them

2) enclosed by Schwann cell which does not form myelin sheath

3) absent in cerebral cortex

4) not found in cranial and spinal nerves

15. Cerebral aqueduct is the CSF filled duct connecting IIIrd and IVth ventricle. IIIrd ventricle is the chamber of

1) Cerebrum 2) Thalamus

3) Hypothalamus 4) Pons

16. The temporal lobe of cerebrum has

1)auditory and olfactory centre

2)Visual centre

3) Taste centre

4) equilibrium centre

17. Vomit centre is located in

1) Medulla oblongata 2) cerebellum

3) Hypothalamus 4) Pons

18. How many of the following statements are true about neurons

1) neurons are the structural and functional units of neural system

2) Neurons can detect, receive and transmit different stimuli

3) Neurons are ectodermal in original

4) Neurons are the longest cells in the human body

1) 4 2) 3

3) 2 4) 1

19. The site of information processing and control is

1) CNS

2) PNS

3) Visceral neural system

4) Somatic neural system

20. All are parts of PNS except

1) Visceral neural system

2) Autonomous neural system

3) Somatic neural system

4) Central neural system

21. Which of the following types of neurons have only one axon?

1)Unipolar 2) Bipolar

3) Multipolar 4) All of the above

22. Neurotransmitters are employed in conducting impulses through

1) Electrical synapse

2) Chemical synapse

3) Axons

4) Both 1 and 2

23. The layer of cranial meninges with vascular connection is

1) Pia mater

2) Arachnoid membrane

3) Duramater

4) Sub arachnoid space

24. The major coordinating centre of brain for both sensory and motor signalling is

1) Thalamus 2) Hypothalamus

3) Pons varoli 4) Cerebellum

25. The part of the brain regulating sexual behaviour, emotional reactions and motivation is
1) Brain stem 2) Limbic lobe
3) Association area 4) cerebellum

26. Damage to cerebellum causes
1) Loss of balance
2) Loss of consciousness
3) Loss of libido
4) Loss of appetite

27. Canal of mid brain is
1) Central canal
2) Cavity of diencephalon
3) Neural canal
4) Cerebral aqueduct

28. Read the list of parts of brain. Match the parts involved in limbic system
a) cerebellum
b) cerebrum
c)Hippocampus
d)Pons
e) amygdala
f) medulla oblongata
1) a, b,d,e 2) b,c,d,f
3) c,e 4) d,e,f

29. Pons varoli is located
1) between midbrain and thalamus
2) between midbrain and medulla oblongata
3) below cerebrum
4) below thalamus

30. Neurons are the least regenerative cells because of the absence of
1) Mitochondria 2) Golgi bodies
3) Centrioles 4) Nucleus

31. Cerebral cortex is thickly packed with
1) unipolar neurons
2) bipolar neurons
3) multipolar neurons
4) pseudo unipolar neurons

32. Nissl's granules are mainly composed of
1) DNA and RNA
2) RER and free ribososmes
3) Mitochondria
4) Lysosomes and vacuoles

33. Dendrites transmit impulses
1) from cell body to axons
2) towards the cell body
3) from axon terminal to cyton
4) across chemical synapse

34. On application of stimulus in a neuron
1) K^+ efflux occurs
2) K^+ influx occurs
3) Na^+ efflux occurs
4) Na^+ influx occurs

35. Which of the following is not true of human brain?
1) It serves as command and control system
2) It controls voluntary movements
3) It is the centre of spinal reflexes
4) It controls thoughts memory and speech

36. Which of the following is not a part of brain stem?
1) Mid brain
2) Cerebellum
3) Pons
4) Medulla oblongata

37. A person feel hunger. The part of the brain activated is
1) Cerebral cortex 2) Thalamus
3) Hypothalamus 4) Neurohypophysis

38. The gateway to cerebral cortex is
1) Thalamus
2) Hypothalamus
3) Cerebellum
4) Medulla oblongata

39. Which part of the brain is known as the Master clock?
1) Thalamus
2) Hypothalamus
3) Cerebrum
4) Medulla oblongata

40. Neurons are excitable cells because

1) they lack centrioles

2) nissl's granules present in the cell body

3) their membranes are in a polarised state

4) they are covered by myelin sheath

41. Nodes of Ranvier is

1) unmyelinated part of unmyelinated neuron

2) Unmyelinated part of myelinated neuron

3) the part where neurilemma is absent

4) the part where myelin sheath present

42. Which of the following is incorrect regarding electrical synapse

1) Impulses travel continuously as in an axon

2) Impulse transmission is faster

3) It is absent in human body

4) Neurotransmitters are not involved

43. Diencephalon represents

1) Thalamus and hypothalamus

2) mid brain and pons

3) Pons and cerebellum

4) pons and medulla oblongata

44. Which of the following is correct regarding brain stem

1) Mid brain, pons and cerebellum makes up the brain stem

2) It forms the connection between brain and spinal cord

3) It is the centre of balance and equilibrium

4) It acts as a coordinating centre for sensory and motor signalling

45. The nerve fibre tract that inter connect different regions of brain and related with breathing regulation is

1) medulla oblongata 2) Cerebellum

3) Pons 4) Cerebrum

46. The part of the brain which receives and integrates visual, tactile and auditory inputs is

1) Cerebellum

2) Mid brain

3) Pons

4) medulla oblongata

47. Which of the following is not a function related to medulla oblongata

1) Cardiovascular reflexes

2) Vomiting

3) Peristalsis

4) Temperature regulation

48. The part of brain integrates information received from the semicircular canals of the ear and the auditory system is

1) Cerebellum

2) Mid brain

3) Cerebrum

4) medulla oblongata

49. Find the incorrect statement

1) The neural system coordinates and integrates functions as well as metabolic and homeostatic activity of all organs

2) Neurons are the functional units of neural system

3) The electrical potential difference across the resting neural membrane is called the resting potential

4) The forebrain consists of cerebellum pons and medulla oblongata

50. Corpora quadrigemina is

1) canal of midbrain

2) round swellings in mid brain

3) nerve fibre tract connecting cerebral hemispheres

4) the ventricle in diencephalon

ANSWER KEY

1.	4	21.	3	41.	4	61.	3	81.	3
2.	3	22.	4	42.	4	62.	2	82.	2
3.	2	23.	4	43.	3	63.	3	83.	3
4.	2	24.	2	44.	3	64.	4	84.	2
5.	4	25.	2	45.	4	65.	4	85.	1
6.	1	26.	4	46.	1	66.	3	86.	4
7.	3	27.	4	47.	2	67.	4	87.	4
8.	3	28.	1	48.	3	68.	3	88.	3
9.	3	29.	4	49.	2	69.	1	89.	3
10.	1	30.	1	50.	3	70.	3	90.	2
11.	3	31.	2	51.	1	71.	3	91.	3
12.	3	32.	2	52.	3	72.	3	92.	4
13.	4	33.	3	53.	1	73.	4	93.	2
14.	4	34.	2	54.	1	74.	2	94.	1
15.	2	35.	3	55.	2	75.	3	95.	2
16.	3	36.	4	56.	3	76.	2	96.	4
17.	4	37.	4	57.	1	77.	1	97.	1
18.	3	38.	1	58.	1	78.	3	98.	3
19.	2	39.	1	59.	2	79.	2	99.	2
20.	3	40.	3	60.	1	80.	2	100.	2

SAMPLE QUESTIONS

1.	3	11.	4	21.	4	31.	3	41.	2
2.	1	12.	3	22.	2	32.	2	42.	3
3.	2	13.	4	23.	1	33.	2	43.	1
4.	2	14.	1	24.	1	34.	4	44.	2
5.	3	15.	2	25.	2	35.	3	45.	3
6.	3	16.	1	26.	1	36.	2	46.	2
7.	4	17.	1	27.	4	37.	3	47.	4
8.	2	18.	1	28.	3	38.	1	48.	1
9.	3	19.	1	29.	2	39.	2	49.	4
10.	3	20.	4	30.	3	40.	3	50.	2

WORK BOOK

Chapter 11

CHEMICAL CO-ORDINATION AND INTEGRATION

QUESTIONS

1. Which of the following characteristics are true for hormones?

I) Intracellular messenger

II) Non- nutrient chemicals

III) Produced in trace amounts

IV) Produced in large amounts

Choose the correct answer from the options given below

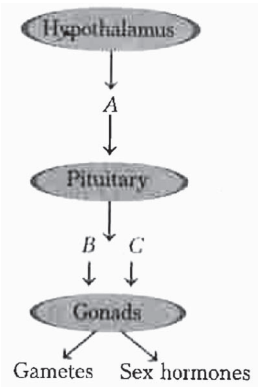
1) I and II

2) I, II and III

3) I, II and IV

4) II and III

2. Identify the hormones, labelled as A, B and C in the following figure.



1) A-GH, B-FSH, C-LH

2) A-GnRH, B-FSH, C-LH

3) A-GH, B-GnRH, C-PRL

4) A-GnRH, B-GH, C-PRL

3. Hypothalamic GnRH (Gonadotropin Releasing Hormone) stimulates the

1) pancreas to release the gonadotropin

2) pituitary to synthesise and release of gonadotropin

3) testis to release the gonadotropin

4) hypothalamus to release the gonadotropin

4. Which of the following statements is correct w.r.t sella tursica?

1) It is involved in transport of hormones from hypothalamus to pituitary gland

2) It is a stalk like structure through which pituitary gland is attached to hypothalamus

3) It is a bony structure in which hypothalamus is located in brain

4) It is a bony cavity in which pituitary gland is located

5. What is true about neurohypophysis?

1) Stores hormone produced by adenohypophysis

2) Functionless in human

3) Stores and releases neurohormones secreted by hypothalamus

4) Secretes its own hormone

6. Identify the incorrect match pair from the following option

1) Growth hormone → produced by anterior pituitary

2) ACTH→produced by posterior pituitary

3) MSH → produced by anterior pituitary

4) Oxytocin→produced by posterior pituitary

7. Which of the following hormones is not secreted by anterior pituitary?

1) Growth hormone

2) Follicle stimulating hormone

3) Oxytocin

4) Adrenocorticotropic hormone

8. Transport of hormone occur through axons from

1) Hypothalamus → adenohypophysis

2) Adenohypophysis → target organ/tissue

3) Hypothalamus → neurohypophysis

4) Neurohypophysis → target organ/tissue

9. The acromegaly is a disease caused due to

1) hyposecretion of growth hormone during childhood

2) hypersecretion of growth hormone during middle age

3) hyposecretion of growth hormone during middle age

4) hypersecretion of growth hormone during childhood

10. The secretion of ACTH from the pituitary stimulates the release of

1) aldosterone from the adrenal medulla

2) cortisol from the adrenal cortex

3) epinephrine from the adrenal medulla

4) renin from the kidney

11. Which of the following match pair is incorrect w.r.t hormones and their functions?

1) Prolactin→ regulates growth of mammary glands

2) LH→regulates spermatogenesis in males

3) FSH → stimulate growth of ovarian follicles in females

4) Oxytocin→ stimulate contraction of smooth muscles

12. What is the main cause of diabetes insipidus?

1) Hypersecretion of vasopressin hormone

2) Hyposecretion of insulin hormone

3) Hypersecretion of insulin hormone

4) Hyposecretion of anti-diuretic hormone

13. Which of the following match pair is incorrect?

1) Thymosin→promotes production of antibodies

2) Thyrocalcitonin→regulates blood calcium level

3) Vasopressin→promotes diuresis

4) Pineal gland→located on dorsal side of forebrain

14. Melatonin released by pineal gland perform following functions, except

1) maintaining the body temperature

2) regulation of diurnal rhythm of the body

3) influences menstrual cycle as well as body's defence capability

4) indirect regulation of muscle movement

15. The thymus gland is a lobular structure present on .....It promotes production of antibodies to provide.....

1) ventral side of aorta: cell mediated immunity

2) base of neck: humoral immunity

3) dorsal side of aorta: humoral immunity

4) ventral side of aorta; hormonal immunity

16. Given below are two statements,

Statement I : LH maintains the corpus luteum formed from the remnants of the Graafian follicles after ovulation.

Statement II : Thymus is degenerated in old individuals resulting in a decreased production of thymosins

Choose the correct answer from the options given below:

1) Both statement I and statement II are correct

2) Both statement I and statement II are incorrect

3) Statement I is correct, but statement II is incorrect

4) Statement II is incorrect, but statement I is correct

17. Which of the following conditions is not linked to deficiency of thyroid hormone?

1) Cretinism

2) Goitre

3) Myxoedema

4) Exophthalmic goitre

18. Find out the option which is not correct w.r.t functions of thyroid hormone.

1) It control the metabolism of carbohydrates and fats

2) It influence the maintenance of water and electrolyte

3) Secretes thyroalcitonin hormone

4) Stimulates reabsorption of water and electrolytes by the distal tubules

19. Grave's disease is a form of hyperthyroidism characterised by

I. Protrusion of the eyeballs

II. Decreased basal metabolic rate

III. Enlargement of thyroid gland

IV. Weight loss

Choose the correct answer from the options given below.

1) I and II 2) III and IV

3) I, III and IV 4) I, II, III and IV

20. Identify the incorrect match pair

1) Aldosterone → Mineralocortocoids

2) PTH→Hypocalcemic hormone

3) Thyroid →Secretes T_3 and T_4 hormones

4) Cortisol→Stimulates RBC production

21. Select the incorrect features w.r.t aldosterone.

1) Regulate the balance of water and electrolyte in the body

2) Help in maintenance of osmotic pressure and blood pressure

3) Stimulate reabsorption of sodium ions and water

4) Acts on renal tubules as well as blood vessels of the kidney

22. Given below are few functions w.r.t cortisol

I. It suppresses the immune response

II. Produce anti-inflammatory reactions

III. Inhibit cellular uptake of aminoacids

IV. Inhibit lipolysis and proteolysis

Choose the correct answer from the options given below.

1) I, II and III 2) II and III only

3) II, III and IV 4) III and IV only

23. Identify the option which correctly represent the layers of adrenal cortex from outermost to inner most layer

1) Zona glomerulosa, Zona fasciculata, Zona reticularis

2) Zona fasciculata, Zona glomerulosa, Zona reticularis

3) Zona reticularis, Zona fasciculata, Zona glomerulosa

4) Zona reticularis, Zona glomerulosa, Zona fasciculata

24. Select the statement which is incorrect w.r.t catecholamines

1) These hormones are secreted by centrally located tissues of adrenal gland

2) These hormones are secreted in response to stress of any kind

3) They stimulate breakdown of lipids and proteins

4) They decrease the concentration of glucose in the blood

25. Consider the following statements.

Statement I : Noradrenaline and adrenaline increase the strength of heart contraction and the rate of respiration

Statement II : Androgenic steroids secreted by adrenal gland play a role in growth of pubic hair during puberty.

Choose the correct options

1) Statement I is correct, but statement II is incorrect

2) Statement I is incorrect, but statement II is correct

3) Both statement I and statement II are correct

4) Both statement I and statement II are incorrect

26. Glucagon produced by $\alpha-$cells of islets of Langerhans

1) Converts glucose to glycogen

2) Converts glycogen to glycose

3) Converts glucose to glucogenic amino acids

4) Converts glucose to pyruvate

27. Prolonged hyperglycemia leads to a complex disorder called diabetes mellitus which is associated with

1) decreased secretion of glucose in the body

2) loss of glucose through urine and formation of ketone bodies

3) accumulation of glucose and ketone bodies in the joints

4) accumulation of glucose in the bones

28. Which of the following is not a function of androgens?

1) Play a major stimulatory role in the formation of spermatozoa in males

2) Regulate the menstrual cycle in females

3) Acts on CNS and influence libido in males

4) Produce anabolic effects on protein and carbohydrate metabolism

29. Progesterone is a/an

1) enzyme for digesting proteins

2) hormone to initiate uterine contraction

3) amino acid which may be cause of alkaptonuria

4) hormone concerned with retention and maintenance of pregnancy

30. Choose the incorrect match pair

1) Glucagon → Peptide hormone

2) Insulin →Acts as both hepatocytes and adipocytes

3) Progesterone → Peptide hormone

4) Androgens → Secreted by leydig cells

31. Identify the incorrect match pair among the options given below

1) GIP → Gastric Inhibitory Peptide

2) ANF → Atrial Natriuretic Factor

3) CCK→Inhibit Gastric Secretion

4) Gastrin→Acts on gastric glands

32. Given below are two statements

Statement I : The atrial wall of the heart produce atrial natriuretic factor which decreases the blood pressure

Statement II : Glucagon stimulates glycogenolysis and gluconeogenesis resulting in hyperglycemia.

Choose the correct answer from the options given below.

1) Both statement I and statement II are correct

2) Both statement I and statement II are incorrect

3) Statement I is correct, but statement II is incorrect

4) Statement I is incorrect, but statemen II is correct

33. Select the incorrect match pair from the following options

1) CCK→ Targets both pancreas and gall bladder

2) Cortisol → Inflammatory mineralocorticoid

3) Gastrin → stimulates gastric gland secretion

4) Progesterone →stimulates milk secretion

34. Which of the following is correct w.r.t steroid hormones?

1) It works via second messenger

2) It triggers rapid, short term response in cells

3) It alters the activity of genes

4) It initiates open channels in plasma membrane

35. How many of the following are second messegers?

Cyclic AMP, IP_3, Ca^{2+} and K^+

1) One 2) Two

3) Three 4) Four

36. Choose the correct statement

1) Organised endocrine glands include pineal gland, pituitary gland, pacreas, liver, ovary and testis with primary endocrine functions

2) In nervous system, the response is for long duration whereas in endocrine system, it is for short duration

3) Invertebrates possess very simple endocrine system whereas a large number of chemicals acts as hormones in vertebrates

4) Hormones are produced in trace amounts by ducted glands only

37. Which of the following hormones are secreted by hypothalamus?

I. Thyroid stimulating hormone

II. Gonadotropin releasing hormone

III. Prolactin inhibiting hormone

IV. Follicle stimulating releasing hormone

Choose the correct option

1) I and II 2) Only IV

3) II and III 4) Only II

38. Select the correct statement from the options given below,

1) Gonadotropin Releasing Hormone (GnRH) inhibits the pituitary synthesis

2) Somatostatin stimulates the release of growth hormones

3) Nuclei present in hypothalamus are group of neurosecretory cells which produce hormones

4) Neural regulation of hypothalamus is under the anterior pituitary

39. In an accident, the anterior pituitary of a four year old boy was severely damaged, but the boy survived. What is likely to happen?

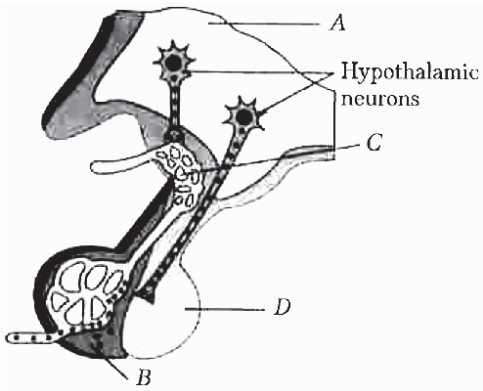
1) High levels of thyroxine will be released

2) Spermatogenesis will be stimulated

3) The boy will not grow much in height

4) The growth of mammary glands will be stimulated

40. Find out the correct labelling of the given figure



1) A-Portal circulation, B- Hypothalamus,

C- Adenohypophysis, D- Neurohypophysis

2) A-Hypothalamus, B- Adenohypophysis, C-Portal circulation, D-Neurohypophysis

3) A-Hypothalamus, B- Adenohypophysis, C- Neurohypophysis, D-Portal circulation

4) A-Neurohypophysis, B-Hypothalamus, C-Adenohypophysis, D-Portal circuilation

41. In hypophysis, pars intermedia is almost merged with

1) pars distalis 2) pars nervosa

3) stalk 4) sella tursica

42. The ACTH released from anterior pituitary

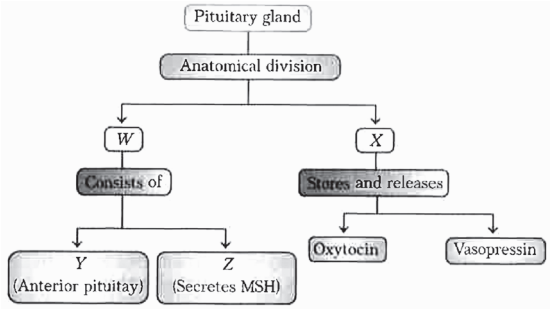
1) stimulates synthesis and secretion of steroid hormones

2) stimulates synthesis and secretion of gonadotropins

3) inhibits the secretion of TSH

4) inhibits the secretion of glucocorticoids and mineral corticoids

43. Identify W, X, Y and Z in the given flowchart and select the correct option



	W	X	Y	Z
1)	Neuro hypophysis	Adeno hypophysis	Pars distalis	Pars inter media
2)	Adeno hypophysis	Neuro hypophysis	Pars inter media	Pars distalis
3)	Adeno hypophysis	Neuro hypophysis	Pars distalis	Pars inter media
4)	Neuro hypophysis	Adeno hypophysis	Pars inter media	Pars distalis

44. What is/are the function of oxytocin in hormone?

I. Ejection of milk from mammary glands

II. Contraction of uterus during childbirth

III. Maintenance of corpus luteum

IV. Stimulates reproductive system

Choose the correct option

1) Only IV

2) I and II

3) III and IV

4) II and IV

45. Out of the following matches which one is correct w.r.t source glands, hormone and its function

	Source glands	Hormones	Functions
1)	Anterior pituitary	Oxytocin	Contraction of uterus muscles during childbirth
2)	Posterior pituitary	Vasopressin	Stimulates reabsorption of water by the distal tubules in nephron
3)	Corpus luteum	Oestrogen	Supports pregnancy
4)	Thyroid	Thyroxine	Regulates blood calcium level

46. If you were outside for a long time on a hot, dry day, without anything to drink, which of the following would happen?

1) The production pressure of your blood would decrease

2) The production of thyroxine by your thyroid gland would increase

3) The secretion of ADH from your pituitary gland would increase

4) The reabsorption of fluid from your kidney tubule would decrease

47. Pars distalis region of pituitary does not produce these hormones

I. Melanocyte stimulating hormone

II. Vasopressin

III. Prolactin

IV. Growth hormone

Choose the correct answer from the options given below

1) I and II 2) II and IV

3) I and III 4) II and III

48. Out of the following options which one is not a function of pineal gland?

1) Lighten the skin colour

2) Control hunger and thirst

3) Regulate menstrual cycle

4) Provide Immunity to the body

49. The swelling around eyes, large and popping eyeballs are observed in an individual who has

1) less secretion of thyroxine in adults

2) excess secretion of thyroxine

3) excess secretion of calcitonin

4) less secretion of thyroxine right from birth

50. Calcitonin is a thyroid hormone which

1) elevates calcium level in blood

2) has no effect on calcium

3) elevates potassium level in blood

4) lower calcium level in blood

51. Which of the following is not a symptom of exophthalmic goitre?

1) Degeneration of sex organs

2) Protrusion of eye ball

3) Increased basal metabolic rate

4) Weight loss

52. Identify the incorrect match pair from the following options

1) Nuclei → Neurosecretory cells present in pituitary gland

2) Pars intermedia → Secretes only MSH

3) Cretinism →Stunted growth due to hypothyroidism

4) Grave's disease→Occurs due to hyperthyroidism

53. A pregnant female delivers a baby who suffers from stunted growth, mental retardation/low intelligence quotient and abnormal skin. This is the result of

1) low secretion of growth hormone

2) cancer of thyroid hormone

3) over secretion of pars distalis

4) deficiency of iodine in diet

54. Select the incorrect match pair from the following options

1) Fight and Flight hormone → Cause piloerection

2) Glucagon→Stimulates gluconeogenesis

3) Insulin→Acts on both adipocytes and hepatocytes

4) Zona glomerulosa→ Inner layer of adrenal cortex

55. Out of the following match which one is correct w.r.t hormones, its source and function.

	Hormone	Source	Function
1)	Vasopressin	Posterior pituitary	Increases loss of water through urine
2)	Norepinephrine	Adrenal medulla	Increases heart beat, rate of respiration and alertness
3)	Glucagon	Beta cells of Islets of Langerhans	Stimulates glycogenolysis
4)	Prolactin	Posterior pituitary	Regulates growth of mammary glands and milk formation in females

56. There are three endocrine glands involved in carbohydrate metabolism, mark the correct set.

1) Pancreas, neurohypophysis and adrenal

2) Pancreas, pituitary and thyroid

3) Pancreas, pituitary and liver

4) Pancreas, adenohypophysis and adrenal

57. Mary is about to face an interview. But during the first five minutes before interview she experiences sweating, increased rate of heart beat, respiration etc. Which of the following hormones are responsible for her restlessness?

1) Oestrogen and progesterone

2) Oxytocin and vasopressin

3) Adrenaline and nor adrenaline

4) Insulin and glucagon

58. Which one of the following is the correctly matched pair of the organ and the hormone it secretes?

1)	Thyroid	Epinephrine
2)	Alpha cells of pancreas	Glucagon
3)	Anterior pituitary	Adrenaline
4)	Stomach epithelium	Secretin

59. Identify the incorrect statement about diabetes mellitus

1) It is the result of deficiency of insulin

2) Blood has excess glucose

3) Cells fail to pick up glucose from blood

4) More sugar is burnt in the body of a diabetic than a normal person

60. An overdose of intravenous insulin may lead to the death of an individual due to an

1) excessive increase of blood glucose

2) excessive decrease of blood glucose

3) inhibition of glucagon secretion

4) overproduction of histamine

61. Identify the incorrect match pair w.r.t antagonistic hormone

1)	Insulin	Glucagon
2)	Calcitonin	Parathyroid hormone
3)	Somatostatin	Growth hormone
4)	Adrenaline	Nor adrenaline

62. If in case the islets of Langerhans stop functioning, which hormone will be in short supply and what will be its effect?

1)	Insulin	Blood glucose level will rise
2)	Adrenaline	Heartbeat will increase
3)	Thyroxine	Growth will be retarded
4)	Cortisol	Tetany will develop

63. In the homeostatic control of blood sugar level, which organs function as modulator and effector, respectively?

1) Liver and islets of Langerhans

2) Hypothalamus and liver

3) Hypothalamus and islets of Langerhans

4) Islets of Langerhans and hypothalamus

64. Which of the following statements is false?

1) Hormone produced by thyroid control protein and fat metabolism

2) Hormone produced by ovary promotes the uterine contraction

3) Hormone produced by duodenum stimulates pancreas

4) Hormone produced by adrenal medulla stimulates heart

65. Hypothalamus is the source of

1) gastrin 2) vasopressin

3) thymosin 4) secretin

66. How many of these are steroid hormones?

Insulin, Glucagon, Cortisol, Estradiol, Testosterone, Progesterone

1) 2 2) 3

3) 4 4) 5

67. Which of the following hormones bind to intracellular receptors?

I. Glucagon

II. Cortisol

III. Oestrogen

IV. Oxytocin

V. Progesterone

VI. Testosterone

Choose the correct answer from the options given below.

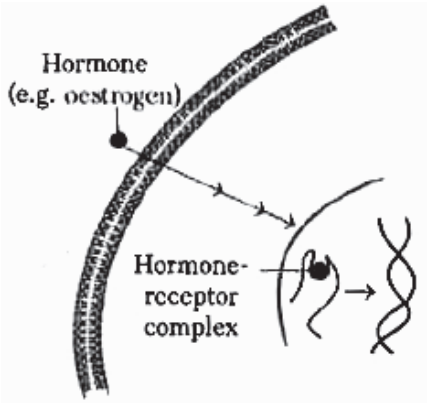
1) I, III, IV and V

2) II, III and V

3) I, IV, V and VI

4) II, III, V and VI

68. Observe the given figure carefully and choose the correct statement which correctly explain the given figure.



1) Mode of action of a steroid hormone that act through cell surface

2) Mechanism of steroid hormone action that acts at genetic level

3) action of a protein hormone that act through cell surface

4) model of action of a protein hormone that acts

69. Steroid hormones easily pass through the plasma membrane by simple diffusion because they

1) are water soluble

2) contain carbon and hydrogen

3) enter through pores

4) are lipid soluble

Assertion and Reason Type Question

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

70. **Assertion** : The person with diabetes insipidus feels thirsty

Reason : A person with diabetes insipidus suffers from excess secretion of vasopressin

71. **Assertion** : Hypoglycemia disorder is due to the imbalance of glucagon and insulin hormone.

Reason : In hypoglycemia, the level of insulin decreases and glucagon increases.

Statement Type Question

Given below are two statements. Read the following statements and choose the correct answer from the options given below.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

72. **Statement A**: Low level of Ca^{2+} in blood stimulate secretion of calcitonin.

Statement B: Steroid hormones transmit their information by stimulating the receptors present in nucleus.

73. **Statement A**: Acromegaly is caused by excess secretion of growth hormone during childhood.

Statement B: Melanocyte stimulating hormone is secreted by pars distalis region of pituitary gland.

74. **Statement A**: The thyroid hormone plays an important role in the regulation of the basal metabolic rate.

Statement B: Thryocalcitonin regulates calcium balance in the body

75. Given below are few statements. Identify the correct statements.

I. Grave's disease is caused by malfunctioning of adrenal gland

II. Androgens acts on central nervous system and influence the male sexual behaviour (libido)

III. Thymus in humans is mainly concerned with regulation of body temperature

IV. Hyposecretion of ADH results in diabetes insipidus.

Choose the correct answer from the options given below.

1) I and II 2) I and IV

3) II and III 4) II and IV

76. Given below are few statements.

I) Oxytocin is called milk ejection hormone

II) Mineralocorticoids regulate water and electrolyte content of the body.

III) Oestrogen stimulates growth and development of female accessory sex organs

IV) The endocrine portion of pancreas consists of islets of Langerhans which represents 98-99% of the pancreatic tissue

Choose the option representing incorrect statements.

1) I and II

2) I, II and III

3) III and IV

4) IV only

77. Read the following statements

I) The releasing hormones of hypothalamus always inhibits the secretion of pituitary hormones.

II) GnRH stimulates pituitary synthesis and releases of gonadotropins

III) Somatostatin is produced in hypothalamus and inhibits the release of growth hormone from pituitary gland

IV) Somatostatin is also called Growth Hormone Inhibiting Hormone (GHIH)

V) Hypothalamus is connected to the pituitary gland by a stalk

Which of the above statements are correct?

1) II, III, IV and V

2) I, II and III

3) I, IV and V

4) Only I

78. Given below are few statements. Choose the correct statements.

I) Adrenal gland is present on the anterior part of the kidney

II) Epinephrine and norepinephrine are known as hypoglycemic hormone

III) Hyposecretion of thyroxine during pregnancy causes stunted growth of the foetus

IV) Leydig cells present in seminiferous tubules and corpus luteum are major target of LH.

V) Cyclic AMP acts as a secondary messenger for follicle stimulating hormone

Choose the correct answer from the options given below.

1) I, II and IV

2) I, III and V

3) II, III and IV

4) III, IV and V

79. Match the following columns

Column I		Column II	
A)	Oestrogen	1)	Gonads
B)	FSH and LH	2)	Anterior pituitary
C)	Androgens	3)	Testis
D)	Gonadotropin releasing hormone	4)	Ovary

Codes

	A	B	C	D
1)	1	2	3	4
2)	4	1	3	2
3)	2	3	4	1
4)	3	4	1	2

80. Match the following columns

Column I		Column II	
A)	ACTH	1)	Stimulates secretion of androgens
B)	LH	2)	Development of ovarian follicles in female
C)	FSH	3)	Stimulates secretion of glucocorticoids
D)	MSH	4)	Regulates pigmentation of the skin

Codes

	A	B	C	D
1)	3	1	2	4
2)	4	3	2	1
3)	1	4	3	2
4)	2	4	3	1

81. Match the following columns

Column I		Column II	
A)	Epinephrine	1)	Polypeptide hormone
B)	Insulin	2)	Interact with membrane bound receptor
C)	Follicle stimulating hormone	3)	Aminoacid derivative
D)	Thyroxine	4)	Interact with intracellular receptor

Codes

	A	B	C	D
1)	3	1	4	2
2)	1	3	4	2
3)	1	3	2	4
4)	3	1	2	4

82. Match the following columns

Column I		Column II	
A)	Gastrin	1)	Inhibits gastric secretions
B)	Secretin	2)	Stimulates secretion of HCl
C)	Cholecytokinin	3)	Stimulates secretion of HCO_3^- ions
D)	GIP	4)	Stimulates secretion of bile juice

Codes

	A	B	C	D
1)	4	1	3	2
2)	3	2	4	1
3)	2	3	4	1
4)	2	4	1	3

83. Which ones of the following are not under the control of thyroid hormone?
A) Maintenance of water and electrolyte balance
B) Regulation of basal metabolic rate
C) Normal rhythm of sleep -wake cycle
D) Development of immune system
E) Support the process of RBCs formation
Choose the correct answer from the options given below.
1) B and C 2) C and D
3) D and E 4) A and D

84. Which of the following is not a steroid hormone?
1) Cortisol 2) Testosterone
3) Progesterone 4) Glucagon

85. Erythropoietin which stimulates RBC formation is produced by
1) juxtaglomerular cells of the kidney
2) alpha cells of pancreas
3) the cells of rostral adenohypophysis
4) the cells of bone marrow

86. Match the following columns and select the correct option from the codes given below

Column I		Column II	
A)	Pituitary hormone	1)	Steroid
B)	Epinephrine	2)	Neuropeptides
C)	Endorphins	3)	Peptides, proteins
D)	Cortisol	4)	Biogenic amines

Codes

	A	B	C	D
1)	4	1	2	3
2)	3	4	2	1
3)	4	3	1	2
4)	3	4	1	2

87. Match the following columns and select the correct option

Column I		Column II	
A)	Pituitary gland	1)	Grave's disease
B)	Thyroid gland	2)	Diabetes mellitus
C)	Adrenal gland	3)	Diabetes insipidus
D)	Pancreas	4)	Addison's disease

Codes

	A	B	C	D
1)	3	2	1	4
2)	3	1	4	2
3)	2	1	4	3
4)	4	3	1	2

88. Match the following hormones with the respective disease.

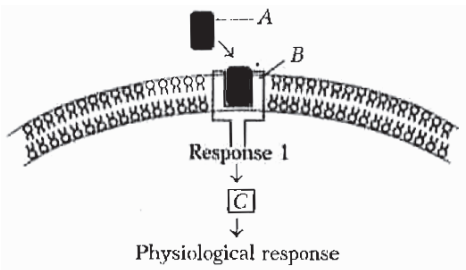
A)	Insulin	i)	Addison's disease
B)	Thyroxine	ii)	Diabetes insipidus
C)	Corticoids	iii)	Acromegaly
D)	Growth hormone	iv)	Goitre
		v)	Diabetes mellitus

Select the correct option

	A	B	C	D
1)	ii	iv	iii	i
2)	v	iv	i	iii
3)	ii	iv	i	iii
4)	v	i	ii	iii

89. Which of the following conditions will stimulate parathyroid gland to release parathyroid hormone?
1) Fall in active vitamin D levels
2) Fall in blood Ca^{+2} levels
3) Fall in bone Ca^{+2} levels
4) Rise in blood Ca^{+2} levels

90. Identify A, B and C in the diagrammatic representation of the mechanism of hormone action.



Select the correct option from the following.
1) A- Steroid hormone, B -Hormone receptor complx, C- Protein
2) A-Protein hormone, B - Receptor, C- Cyclic AMP
3) A - Steroid hormone, B- Receptor, C-Second messenger
4) A- Protein hormone,B - Cyclic AMP, C- Hormone receptor complex

91. How does steroid hormone influence the cellular activities?

1) Binding to DNA and forming a gene hormone complex

2) Activating cyclic AMP located on the cell membrane

3) Binds to membrane bound receptors

4) Changing the permeability of the cell membrane

92. Which of the following hormones can play a significant role in osteoporosis?

1) Oestrogen and parathyroid hormone

2) Progesterone and aldosterone

3) Aldosterone and prolactin

4) Parathyroid hormone and prolactin

93. Which of the following is an amino acid derived hormone?

1) Epinephrine 2) Estrogen

3) Estradiol 4) Progesterone

94. Which of the following pairs of hormones are not antagonistic (having opposite effects) to each other?

1)	Insulin	Glucagon
2)	Aldosterone	Atrial Natriuretic factor
3)	Relaxin	Inhibin
4)	Parathormone	Calcitonin

95. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilisation

1) Insulin 2) Glucagon

3) Secretion 4) Gastrin

96. Grave's disease is caused due to

1) hyposecretion of thyroid gland

2) hypersecretion of thyroid gland

3) hypersecretion of adrenal gland

4) hyposection of adrenal gland

97. Match Lisi I with List II

	List I		List II
A)	Exophthalmic goitre	1)	Excess secretion of cortisol, moon face and hyperglycemia
B)	Acromegaly	2)	Hyposecretion of thyroid hormone and stunted growth
C)	Cushing's syndrome	3)	Hypersecretion of thryoid hormone and protruding eye balls
D)	Cretinism	4)	Excessive secretion of growth hormone

Codes

	A	B	C	D
1)	1	3	2	4
2)	4	2	1	3
3)	3	4	2	1
4)	3	4	1	2

98. GnRH, a hypothalamic hormone, needed in reproduction, acts on

1) anterior pituitary gland and stimulates secretion of LH and oxytocin

2) anterior pituitary gland and stimulates secretion of LH and FSH

3) posterior pituitary gland and stimulates secretion of oxytocin and FSH

4) posterior pityitary gland and stimulates secretion of LH and relaxin

99. Hypersecretion of growth hormone in adults does not cause further increase in height because

1) growth hormone becomes inactive in adults

2) epiphyseal plates close after adolescence

3) bones loose their sensitivity to growth hormone in adults

4) muscle fibres do not grow in size after birth

100. Hormones stored and released from neurohypophysis are

1) thyroid stimulating hormone and oxytocin

2) oxytocin and vasopressin

3) follicle stimulating hormone and leutinizing hormone

4) prolactin and vasopressin

SAMPLE QUESTIONS

1. Endocrine glands

1) secrete nutrient chemicals

2) are extracellular messengers

3) are ductless gland

4) secrete vitamins

2. Which of the following is located on ventral side of aorta behind sternum?

1) Thyroid 2) Parathyroid

3) Pineal gland 4) Thymus

3. Which of the following is not a stress hormone?

1) Adrenaline 2) Nor-adrenaline

3) Cortisol 4) Melatonin

4. Which of the following is both endocrine and exocrine?

1) Pancreas 2) Pituitary

3) Parathyroid 4) Pineal gland

5. Match the following

Column I		Column II	
A)	Hypothalamus	P)	at dorsal side of forebrain
B)	Pineal gland	Q)	on either side of trachea
C)	Thyroid	R)	on the back side of thyroid
D)	Parathyroid	S)	the basal part of diencephalon

1) A-P; B-S; C-R; D-Q

2) A-S; B-P, C-Q; D-R

3) A-S; B-Q; C-R; D-P

4) A-Q; B-R; C-P; D-S

6. All are thyroid hormone except

1) OT 2) TCT

3) T_3 4) T_4

7. Goitre is characterised by

1) shrinking of thyroid

2) enlargement of thyroid

3) inflammation of pineal gland

4) degeneration of thymus

8. The hypothalamic hormones passing through axons to hypophysis are

1) GnRH and GH 2) OT and ADH

3) CRH and MRH 4) GHIH and FSH

9. Anterior pituitary receives hypothalamic hormones through

1) hepatoportal circulation

2) hypophyseal portal circulation

3) renal portal circulation

4) axons

10. Posterior pituitary is also known as

1) neurohypophysis and pars nervosa

2) adenohypophysis and pars nervosa

3) neurohypophysis and pars distalis

4) adenohypophysis and pars distalis

11. Match the following and select the correct option

Column I		Column II	
A)	lymphocytes	P)	Grave's disease
B)	thymosins	Q)	Humoral immunity
C)	hyperthyroidism	R)	Cell mediated immunity
D)	hypothryoidism	S)	Cretinism

1) A-P, B-R, C-S, D-P
2) A-R, B-P, C-Q, D-S
3) A-R, B-Q, C-P, D-S
4) A-Q, B-R, C-S, D-P

12. How many of the following statements are true?

a) The secretion of PTH is regulated by circulating levels of Ca^{2+}

b) Follicular cells of thyroid synthesis T_3 and T_4

c) Dietary deficiency of Iodine causes goitre

d) Aldosterone stimulates reabsorption of Na^+ and water

1) one 2) two
3) three 4) four

13. Which hormone is primarily responsible for stimulating the secretion of glucocorticoids from the adrenal cortex?

1) TSH 2) ACTH
3) LH 4) FSH

14. What is the primary function of insulin?

1) Increase blood glucose levels
2) Decrease blood glucose levels
3) Stimulate erythropoiesis
4) Regulate calcium levels

15. What is the main hormone secreted by the adrenal medulla?

1) Cortisol 2) Aldosterone
3) Epinephrine 4) Insulin

16. Which gland secretes melatonin?

1) Thyroid 2) Pineal
3) Adrenal 4) Thymus

17. What is the role of glucagon in the body?

1) Decrease blood sugar levels
2) Increase blood sugar levels
3) Regulate calcium levels
4) Stimulate protein synthesis

18. Which hormone is responsible for stimulating the growth of female secondary sex characteristics?

1) Testosterone 2) Estrogen
3) Progesterone 4) Androgens

19. What is the primary function of aldosterone?

1) Increase blood glucose
2) Regulate water and electrolyte balance
3) Stimulate milk production
4) Increase metabolic rate

20. What is the primary function of thymosins?

1) Regulate metabolism
2) Stimulate immune responses
3) Control blood pressure
4) Increase blood sugar levels

21. Which hormone is known as the "fight or flight" hormone?

1) Cortisol
2) Epinephrine/Adrenaline
3) Insulin
4) Glucagon

22. What is the effect of atrial natriuretic (ANF)?

1) Increase blood pressure
2) Decrease blood pressure
3) Increase heart rate
4) Decrease glucose levels

23. Which hormone is primarily involved in the regulation of the menstrual cycle?

1) Testosterone 2) Estrogen
3) Progesterone 4) Both 2 and 3

24. What is the main function of thyroid hormones?

1) Regulates calcium levels
2) Controls metabolic rate
3) Stimulates growth
4) Regulates blood pressure

25. Which hormone is secreted by the pancreas to lower blood glucose levels?

1) Glucagon 2) Insulin
3) Cortisol 4) Epinephrine

26. What is the function of cholecystokinin (CCK)?

1) Stimulates gastric acid secretion
2) Stimulates the release and pancreatic enzyme secretion
3) Regulates blood sugar
4) Increases metabolic rate

27. Which hormone is responsible for the development of male secondary sexual characteristics?

1) Estrogen 2) Progesteron
3) Testosterone 4) Oxytocin

28. What is the function of secretin?

1) Stimulate gastric secretion
2) Stimulate bicarbonate secretion from the pancreas
3) Regulate calcium levels
4) Increase blood pressure

29. Which hormone acts on the smooth muscles of the uterus during childbirth?

1) Prolactin 2) Oxytocin
3) Estrogen 4) Progestrone

30. What is the primary role of calcitonin?

1) Increase blood calcium levels
2) Decrease blood calcium levels
3) Regulate blood sugar
4) Stimulate growth

31. Which hormone is released by the hypothalamus to stimulate the pituitary gland?

1) Growth hormone
2) Gonadotropin-releasing hormone (GnRH)
3) Insulin
4) Cortisol

32. What is the effect of vasopressin (ADH) on the kidneys?

1) Increase urine output
2) Decrease urine output
3) Increase glucose reabsorption
4) Decrease water reabsorption

33. A temporary endocrine gland in human being is

1) corpus luteum 2) pineal gland
3) thymus 4) pituitary

34. What type of hormone is cortisol?

1) Peptide hormone
2) Steroid hormone
3) Amino acid derivative
4) Protein hormone

35. What is the effect of glucagon on blood glucose levels?

1) Decreases blood glucose levels
2) Increases blood glucose levels
3) Has no effect
4) Regulates blood pressure

36. What is the effect of thyroid hormones on the body?

1) Increase metabolic rate
2) Decrease heart rate
3) Inhibit growth
4) Promote sleep

37. Which hormone is responsible for stimulating ovulation?

1) FSH 2) LH
3) Estrogen 4) Progesterone

38. Which of the following glands is known as a ductless gland?

1) Salivary gland 2) Sweat gland
3) Endocrine gland 4) Sebaceous gland

39. What is the primary role of parathyroid hormone (PTH)?

1) Regulate blood glucose levels
2) Increase blood calcium levels
3) Stimulate red blood cell production
4) Promote digestion

40. What type of hormones interact with membrane bound receptors?

1) Steroid hormones
2) Peptide hormones
3) Iodothyronines
4) Amino acid derivatives

41. What is the role of aldosterone in the body?

1) Stimulates erythropoiesis
2) Regulates blood pressure and electrolyte balance
3) Promotes growth of hair
4) Stimulates milk production

42. What role do androgens play in males?

1) Stimulate milk production
2) Regulate spermatogenesis
3) Inhibit growth of facial hair
4) Decrease libido

43. What is the role of FSH in the human body?

1) Stimulates the production of insulin
2) Regulates water balance
3) Stimulates growth and development of ovarian follicles
4) Inhibits growth hormone secretion

44. Which of the following hormones is produced by the hypothalamus?

1) Thyroid stimulating hormone (TSH)
2) Gonadotropin releasing hormone (GnRH)
3) Adrenocorticotropic hormone (ACTH)
4) Prolactin

45. What is the function of glucagon in the body?

1) Stimulates glycogenesis
2) Stimulates glycogenolysis
3) Inhibits gluconeogenesis
4) Promotes protein synthesis

46. What is the effect of parathyroid hormone (PTH)?

1) Increases blood calcium levels
2) Decreases blood calcium levels
3) Stimulates insulin secretion
4) Regulates metabolism

47. Insulin and glucagon are classified as

1) Steroid hormones
2) Peptide hormones
3) Amino acid derivatives
4) Iodothyronines

48. Which gland secretes hormones that regulate digestion?

1) Thyroid gland 2) Pancreas
3) Adrenal gland 4) Pituitary gland

49. **Statement Type Question**

Given below are two statements. Read the following statements and choose the correct answer from the options given below.

1) Both Statement I and Statement II are correct
2) Both Statement I and Statement II are incorrect
3) Statement I is correct but Statement II is incorrect
4) Statement I is incorrect but Statement II is correct

Statement A : Insulin and glucagon are peptide hormones.

Statement B : Adrenaline is an aminoacid hormone

50. **Assertion and Reason Type Question**

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion
2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion
3) Assertion is true statement but Reason is false
4) Both Assertion and Reason are false

Assertion : Immune responses of old persons become weak.

Reason : Thymus gets degenerated in old individuals.

ANSWER KEY

1.	4	21.	4	41.	1	61.	4	81.	4
2.	2	22.	1	42.	1	62.	1	82.	3
3.	2	23.	1	43.	3	63.	3	83.	2
4.	4	24.	4	44.	2	64.	2	84.	4
5.	3	25.	3	45.	2	65.	2	85.	1
6.	2	26.	2	46.	3	66.	3	86.	2
7.	3	27.	2	47.	1	67.	4	87.	2
8.	3	28.	2	48.	1	68.	2	88.	2
9.	2	29.	4	49.	2	69.	4	89.	2
10.	2	30.	3	50.	4	70.	3	90.	2
11.	2	31.	3	51.	1	71.	3	91.	1
12.	4	32.	1	52.	1	72.	4	92.	1
13.	3	33.	2	53.	4	73.	2	93.	1
14.	4	34.	3	54.	4	74.	1	94.	3
15.	1	35.	3	55.	2	75.	4	95.	1
16.	1	36.	3	56.	4	76.	4	96.	2
17.	4	37.	3	57.	3	77.	1	97.	4
18.	4	38.	3	58.	2	78.	2	98.	2
19.	3	39.	3	59.	4	79.	2	99.	2
20.	2	40.	2	60.	2	80.	1	100.	2

SAMPLE QUESTIONS

1.	3	11.	3	21.	2	31.	2	41.	2
2.	4	12.	4	22.	2	32.	2	42.	2
3.	4	13.	2	23.	4	33.	1	43.	3
4.	1	14.	2	24.	2	34.	2	44.	2
5.	2	15.	3	25.	2	35.	2	45.	2
6.	1	16.	2	26.	2	36.	1	46.	1
7.	2	17.	2	27.	3	37.	2	47.	2
8.	2	18.	2	28.	2	38.	3	48.	2
9.	2	19.	2	29.	2	39.	2	49.	1
10.	1	20.	2	30.	2	40.	2	50.	1

WORK BOOK

Chapter 12

HUMAN REPRODUCTION

MALE REPRODUCTIVE SYSTEM

1. The primary sex organ in human males is:

1) Penis 2) Testes

3) Prostate gland 4) Vas deferens

2. The testes are located in the scrotum because:

1) It provides support

2) It protects the sperm

3) It maintains a lower temperature for spermatogenesis

4) It helps in ejaculation

3. Which of the following cells produce testosterone?

1) Spermatogonia 2) Sertoli cells

3) Leydig cells 4) Spermatids

4. The site of sperm production in the testes is:

1) Epididymis

2) Seminiferous tubules

3) Vas deferens

4) Prostate gland

5. Which cells provide nourishment to developing sperm cells?

1) Leydig cells 2) Sertoli cells

3) Spermatocytes 4) Germ cells

6. The epididymis is responsible for:

1) Production of sperm

2) Storage and maturation of sperm

3) Production of testosterone

4) Transport of urine

7. The tube that carries sperm from the epididymis to the urethra is called:

1) Ureter 2) Vas deferens

3) Fallopian tube 4) Urethra

8. The seminal vesicles secrete fluid that is rich in:

1) Proteins 2) Fructose

3) Lipids 4) Glucose

9. The function of the prostate gland is to:

1) Store sperm

2) Nourish sperm with an alkaline secretion

3) Transport sperm

4) Produce testosterone

10. Which of the following is a common passage for both urine and semen?

1) Vas deferens

2) Epididymis

3) Urethra

4) Seminiferous tubules

11. Which of the following glands secretes a lubricating fluid during ejaculation?

1) Prostate gland

2) Seminal vesicles

3) Bulbourethral glands (Cowper's glands)

4) Leydig cells

12. The part of the sperm that contains enzymes to penetrate the egg is:

1) Midpiece 2) Tail

3) Head 4) Acrosome

13. The mitochondria in sperm are located in the:

1) Head 2) Middle piece

3) Tail 4) Acrosome

14. The hormone that stimulates testosterone production is:

1) FSH 2) LH

3) Estrogen 4) Progesterone

15. The function of the scrotum is to:

1) Store sperm

2) Transport sperm

3) Regulate testicular temperature

4) Secrete testosterone

FEMALE REPRODUCTIVE SYSTEM

16. The primary female reproductive organ is:

1) Uterus 2) Ovary

3) Fallopian tube 4) Vagina

17. The female reproductive system consists of how many ovaries?

1) One 2) Two

3) Three 4) Four

18. The process of ovum release from the ovary is called:

1) Fertilization 2) Menstruation

3) Ovulation 4) Implantation

19. The site of fertilization in the female reproductive system is:

1) Uterus 2) Ovary

3) Vagina 4) Fallopian tube

20. The layer of the uterus that undergoes cyclic changes during the menstrual cycle is:

1) Myometrium 2) Perimetrium

3) Endometrium 4) Serosa

21. Which hormone is responsible for ovulation?

1) Estrogen

2) Progesterone

3) Luteinizing Hormone (LH)

4) Oxytocin

22. The hormone responsible for the maintenance of pregnancy is:

1) Estrogen 2) Oxytocin

3) Progesterone 4) FSH

23. The finger-like projections in the fallopian tube are called:

1) Fimbriae 2) Villi

3) Cilia 4) Follicles

24. Which of the following structures stores and releases the mature ovum?

1) Uterus 2) Ovary

3) Fallopian tube 4) Vagina

25. In females, the external genitalia include:

1) Uterus

2) Ovaries

3) Mons, labia, clitoris

4) Fallopian tubes

26. The muscular layer of the uterus responsible for contractions during childbirth is:

1) Endometrium 2) Myometrium

3) Perimetrium 4) Placenta

27. The hormone responsible for milk ejection during lactation is:

1) Estrogen 2) Progesterone

3) Oxytocin 4) Prolactin

28. Which gland secretes FSH and LH in females?

1) Thyroid gland 2) Pituitary gland

3) Adrenal gland 4) Pancreas

29. The menstrual cycle in human females is regulated by:

1) Only estrogen

2) Only progesterone

3) Both estrogen and progesterone

4) Testosterone

30. The structure that forms after ovulation and secretes progesterone is:

1) Graafian follicle 2) Corpus luteum

3) Endometrium 4) Oocyte

GAMETOGENESIS

31. Gametogenesis is the process of:

1) Fusion of gametes

2) Formation of gametes

3) Fertilization

4) Cleavage

32. The male gametes are called:

1) Spermatogonia 2) Spermatozoa

3) Spermatocytes 4) Spermatids

33. The process of sperm formation is known as:

1) Oogenesis 2) Spermatogenesis

3) Fertilization 4) Gametogenesis

34. The formation of ova in females is called:

1) Oogenesis

2) Spermatogenesis

3) Ovulation

4) Fertilization

35. Where does spermatogenesis occur in males?

1) Epididymis

2) Prostate gland

3) Seminiferous tubules

4) Vas deferens

36. Spermatogenesis begins at:

1) Birth

2) Puberty

3) Embryonic stage

4) Menopause

37. Which of the following is the diploid cell in spermatogenesis?

1) Spermatid

2) Primary spermatocyte

3) Secondary spermatocyte

4) Sperm

38. 1^0 oocyte in 1^0 follicle is arrested in which stage

1) Anaphase I 2) Metaphase II

3) Prophase I 4) Telophase II

39. The number of chromosomes in a secondary spermatocyte is:

1) 23 2) 46

3) 92 4) 24

40. The process of formation of a mature spermatozoon from spermatid is called

1) Spermatogenesis

2) Spermiogenesis

3) Spermiation

4) Spermatid formation

41. The release of sperm from the seminiferous tubules is called:

1) Spermiogenesis 2) Spermiation

3) Ejaculation 4) Fertilization

42. Oogenesis begins in females:

1) At puberty

2) At birth

3) Before birth (fetal stage)

4) At menopause

43. The 2^0 oocyte is arrested in which phase till sperm entry

1) Metaphase II 2) Prophase I

3) Anaphase I 4) Telophase I

44. How many functional ova are produced from one primary oocyte?

1) 1 2) 2

3) 3 4) 4

45. The first meiotic division of oogenesis is completed at which stage

1) Primary follicle 2) Secondary follicle

3) Tertiary follicle 4) Primary oocyte

46. The second meiotic division in oogenesis is completed:

1) the entry of sperm into egg cytoplasm

2) Before ovulation

3) During puberty

4) At birth

47. The polar bodies produced during oogenesis:

1) Develop into eggs

2) Are discarded

3) Fuse with sperm

4) Help in fertilization

48. The hormone essential for spermatogenesis is:

1) Progesterone 2) Estrogen

3) Testosterone 4) Oxytocin

49. Which of the following supports the development of sperm?

1) Leydig cells 2) Sertoli cells

3) Granulosa cells 4) Theca cells

50. The corpus luteum is formed from:

1) Primary oocyte

2) Graafian follicle

3) Polar body

4) Secondary oocyte

51. The acrosome in sperm is derived from:

1) Golgi bodies 2) Mitochondria

3) Nucleus 4) Lysosome

52. The acrosome in sperm are found in:

1) Middle piece 2) Head

3) Tail 4) Neck

53. Which of the following is NOT a difference between spermatogenesis and oogenesis?

1) Spermatogenesis produces four sperm, oogenesis produces one ovum

2) Oogenesis begins before birth, spermatogenesis begins at puberty

3) Oogenesis produces gametes continuously, spermatogenesis is cyclic

4) Oogenesis involves arrest at different stages, spermatogenesis does not

54. The zona pellucida surrounds the:

1) Primary follicle

2) Secondary oocyte

3) Sperm

4) Sertoli cell

55. The hormone that triggers ovulation is:

1) FSH 2) LH

3) Estrogen 4) Progesterone

THE MENSTRUAL CYCLE

56. The menstrual cycle is regulated by which organ?

1) Ovaries only

2) Uterus

3) Pituitary gland only

4) Both ovaries and pituitary gland

57. What is the average duration of the menstrual cycle in a healthy female?

1) 14 days 2) 21 days

3) 28 days 4) 35 days

58. Which hormone triggers ovulation?

1) Follicle-Stimulating Hormone (FSH)

2) Luteinizing Hormone (LH)

3) Progesterone

4) Estrogen

59. Ovulation generally occurs on which day of a 28-day menstrual cycle?

1) 5th day 2) 10th day

3) 14th day 4) 20th day

60. The menstrual cycle consists of how many phases?

1) Two 2) Three

3) Four 4) Five

61. Which phase of the menstrual cycle involves shedding of the endometrial lining?

1) Follicular phase 2) Luteal phase

3) Ovulatory phase 4) Menstrual phase

62. The follicular phase is mainly influenced by which hormone?

1) LH 2) FSH

3) Progesterone 4) Oxytocin

63. During the follicular phase, developing follicles release

1) LH 2) Progesterone

3) Estrogen 4) FSH

64. Which structure forms after ovulation and secretes progesterone?

1) Graafian follicle 2) Corpus luteum

3) Endometrium 4) Oocyte

65. The luteal phase is mainly controlled by:

1) FSH 2) LH

3) Progesterone 4) Estrogen

66. What happens if fertilization does not occur?

1) Progesterone levels increase

2) Endometrial lining is maintained

3) Corpus luteum degenerates

4) Ovulation occurs again immediately

67. The first menstruation in females is called:

1) Menopause 2) Ovulation

3) Menarche 4) Fertilization

68. The cessation of the menstrual cycle in older females is called:

1) Menarche 2) Ovulation

3) Menopause 4) Fertilization

69. Which hormone is responsible for thickening the endometrial lining?

1) Oxytocin 2) Estrogen

3) LH 4) Testosterone

70. Which gland secretes FSH and LH?

1) Ovaries 2) Adrenal gland

3) Pituitary gland 4) Thyroid gland

HORMONES IN MENSTRUAL CYCLE

71. Which gland secretes FSH and LH, the key hormones regulating the menstrual cycle?

1) Ovaries 2) Adrenal gland

3) Pituitary gland 4) Thyroid gland

72. The hormone responsible for stimulating follicle growth in the ovary is:

1) LH (Luteinizing Hormone)

2) Estrogen

3) FSH (Follicle-Stimulating Hormone)

4) Progesterone

73. The surge of which hormone triggers ovulation around the 14th day of the menstrual cycle?

1) FSH 2) Progesterone

3) LH 4) Oxytocin

74. Which hormone helps in thickening the endometrial lining during the follicular phase?

1) Progesterone 2) Estrogen

3) FSH 4) Oxytocin

75. After ovulation, which structure forms in the ovary and secretes progesterone?

1) Graafian follicle 2) Corpus luteum

3) Endometrium 4) Oocyte

76. Progesterone is mainly responsible for:

1) Ovulation

2) Growth of follicles

3) Maintaining the uterine lining for pregnancy

4) Menstruation

77. If fertilization does not occur, which hormone levels drop, leading to menstruation?

1) Estrogen and LH

2) Progesterone and estrogen

3) FSH and progesterone

4) LH and FSH

78. The hormone that inhibits FSH secretion to prevent multiple follicle maturation is:

1) Estrogen 2) Progesterone

3) Inhibin 4) LH

79. The luteal phase of the menstrual cycle is dominated by which hormone?

1) FSH 2) Estrogen

3) Progesterone 4) LH

80. Which hormone like substance helps in the contraction of the uterus during menstruation?

1) Progesterone 2) Estrogen

3) Prostaglandins 4) LH

FERTILIZATION

81. Fertilization in humans occurs in the:

1) Ovary 2) Uterus

3) Vagina 4) Fallopian tube

82. The process of fusion of male and female gametes is called:

1) Implantation 2) Fertilization

3) Cleavage 4) Ovulation

83. The sperm receptor is present in the:

1) Zona pellucida 2) Acrosome

3) Perivitelline space 4) Plasma membrane

84. The enzyme responsible for breaking the zona pellucida barrier is:

1) Pepsin 2) Hyaluronidase

3) Zonalysin 4) Coronalysin

85. The fusion of sperm and ovum restores the chromosome number to:

1) Haploid (n) 2) Diploid (2n)

3) Triploid (3n) 4) Tetraploid (4n)

86. After fertilization, the zygote undergoes rapid mitotic divisions called:

1) Meiosis 2) Cleavage

3) Gastrulation 4) Organogenesis

87. The first mitotic division of the zygote occurs in:

1) Uterus 2) Fallopian tube

3) Ovary 4) Vagina

88. The hollow, ball-like structure formed after cleavage is called:

1) Zygote 2) Morula

3) Blastula 4) Gastrula

89. The morula consists of how many cells?

1) 2 2) 4

3) 8–16 4) 32

90. The blastocyst gets implanted into the:

1) Ovary 2) Uterus

3) Fallopian tube 4) Cervix

91. The process of implantation occurs on which day after fertilization?

1) 1st day 2) 4th day

3) 7th day 4) 14th day

92. The three germ layers formed during gastrulation are:

1) Ectoderm, mesoderm, endoderm

2) Epidermis, dermis, endoderm

3) Blastoderm, mesoderm, entoderm

4) Chorion, amnion, allantois

93. The ectoderm gives rise to:

1) Nervous system and skin

2) Muscles and bones

3) Digestive organs

4) Lungs and liver

94. The mesoderm forms:

1) Skin and brain

2) Muscles, bones, and circulatory system

3) Lungs and digestive tract

4) Kidneys and intestines

95. The placenta is derived from:

1) Only maternal tissues

2) Only fetal tissues

3) Both maternal and foetal tissues

4) Endometrial lining only

96. The function of the placenta is to:

1) Provide oxygen and nutrients to the fetus

2) Remove waste from the fetus

3) Produce hormones

4) All of the above

97. Which hormone is secreted by the placenta to maintain pregnancy?

1) Oxytocin 2) Progesterone

3) Estrogen 4) Both 2 and 3

98. The fluid-filled sac that protects the developing fetus is called:

1) Placenta 2) Chorion

3) Amnion 4) Yolk sac

99. The gestation period in humans is approximately:

1) 5 months 2) 6 months

3) 9 months 4) 12 months

100. The hormone responsible for uterine contractions during childbirth is:

1) Progesterone 2) Oxytocin

3) Estrogen 4) LH

CHILDBIRTH (PARTURITION)

101. The process of childbirth is known as:

1) Gestation 2) Parturition

3) Ovulation 4) Implantation

102. Which hormone plays a key role in uterine contractions during childbirth?

1) Estrogen 2) Progesterone

3) Oxytocin 4) FSH

103. The hormone that inhibits uterine contractions during pregnancy is:

1) Estrogen 2) Progesterone

3) Oxytocin 4) LH

104. The signal for parturition originates from:

1) Mother's brain

2) Foetus and placenta

3) Ovary

4) Pituitary gland

105. The hormone that stimulates the release of oxytocin during labor is:

1) Prolactin 2) Relaxin

3) Cortisol 4) Estrogen

106. The softening and widening of the cervix before childbirth is caused by:

1) Oxytocin 2) Relaxin

3) Prolactin 4) Estrogen

107. The expulsion of the placenta after childbirth is called:

1) After birth 2) Implantation

3) Gestation 4) Lactation

LACTATION

108. The process of milk production in the mammary glands is called:

1) Lactation 2) Ovulation

3) Parturition 4) Fertilization

109. Which hormone stimulates milk production after childbirth?

1) Oxytocin 2) Prolactin

3) Estrogen 4) Progesterone

110. The hormone responsible for the ejection of milk during breastfeeding is:

1) Prolactin 2) Oxytocin

3) Estrogen 4) Relaxin

111. The first milk produced by the mother after childbirth is called:

1) Amniotic fluid 2) Colostrum

3) Placental milk 4) Mature milk

112. Colostrum is rich in:

1) Fats

2) Carbohydrates

3) Antibodies and nutrients

4) Iron

113. Which hormone inhibits ovulation during lactation?

1) Estrogen 2) Progesterone

3) Prolactin 4) LH

114. The let-down reflex in breastfeeding is triggered by:

1) Progesterone 2) Oxytocin

3) Estrogen 4) FSH

115. The benefit of breastfeeding for the baby includes:

1) Immunity boost

2) Better digestion

3) Stronger bonding with the mother

4) All of the above

SAMPLE QUESTIONS

1. The correct sequence of reproductive events in humans is :

1) gametogenesis → insemination → fertilization → gestation → implantation → parturition

2) gametogenesis → insemination → implantation → fertilization → gestation → parturition

3) gametogenesis → insemination → fertilization → implantation → gestation → parturition

4) gametogenesis → gestation → fertilization → implantation → parturition

2. Select the incorrect statement.

1) Humans are sexually reproducing and viviparous

2) There are remarkable differences between the reproductive events in the male and female

3) Formation of gametes is called spermiogenesis

4) Formation of gametes in female is called oogenesis

3. The function of scrotum is to-

1) Keep testis in normal body temperature

2) Control the release of male hormones

3) Maintain testes in a temperature 2-3 degrees less than normal body temperature

4) Maintain testis in a temperature 2-3 degrees higher than the normal body temperature for optimum sperm production

4. Which of the following cells present in mammalian testes are specialized to provide nourishment for the sperms?

1) Leydig's cells 2) Oxyntic cells

3) Sertoli cells 4) Interstitial cells

5. Which of the following is a common duct for urinary system and reproductive system in males?

1) Ureter

2) Urethra

3) Vasa efferentia

4) Vas deferens

6. Which among the following is an unpaired male accessory sex gland?

1) Prostate gland

2) Cowper's gland

3) Bulbourethral gland

4) Seminal vesicle

7. Which is the correct sequence of sperm formation?

1) Spermatids, spermatocytes, spermatogonia, spermatozoa

2) spermatogonia, spermatocytes, spermatozoa, spermatids

3) spermatogonia, spermatids, spermatocytes, spermatozoa

4) spermatogonia, spermatocytes, spermatids, spermatozoa

8. During spermatogenesis, which of the following stage is the first to contain haploid number of chromosomes?

1) Spermatogonium

2) Primary spermatocyte

3) Spermatid

4) Secondary spermatocyte

9. Rupturing of endometrium occurs due to the fall in

1) Estrogen 2) FSH

3) GnRH 4) Progesterone

10. Which of the following hormone is not secreted by human placenta?

1) Human placental lactogen

2) hCG

3) Progesterone

4) FSH

11. Read the following statements

i) Hypothyroidism may cause irregular menstrual cycles in adult women.

ii) Spermatids are changed into spermatozoa by spermiogenesis.

iii) Human chorionic gonadotropin (hCG) stimulates corpus luteum to secrete progesterone and estrogen

iv) During ovulation FSH and LH attain their peak level and progesterone shows a sharp fall

Of the above statements.

1) Only (i) and (ii) are true

2) (i), (ii), (iii) are true

3) only (i) is true

4) only (iv) is true

Assertion Reason Type Questions

1) If both assertion and reason are true and the reason is the correct explanation of the assertion

2) If both assertion and reason are true but reason is not the correct explanation of the assertion

3) If assertion is true but reason is false

4) If the assertion is false and reason is true

12. **Assertion** : In humans, male gamete determines whether the baby formed will be male or female .

Reason : Sex in human is a polygenic trait depending upon a cumulative effect of some genes on X-chromosome and some on Y- chromosome

13. **Assertion** : Corpus luteum is formed from the ruptured Graafian follicle

Reason : The remnants of the ruptured Graafian follicle undergoes luteinization and thus corpus luteum will be formed.

14. **Assertion** : In a human female, first few menstrual cycles may be anovulatory.

Reason : Inadequate level of gonadotropins retards ovarian follicle maturation and ovulation

15. Read the following statements

a) Epididymis, vas deferens, ejaculatory duct etc store and transport the sperms from the testis to the outside through urethra

b) Urethra extends through the penis to its external opening called urethral meatus.

c) The enlarged end of male external genitalia is called foreskin

d) The loose fold of skin, that covers the enlarged end of penis is called glans penis

Of the above statements

1) Only one is true

2) Only two are true

3) Three are true

4) All are true

16. Read the following statements

a) Cervical canal along with vagina form the birth canal

b) The clitoris is a tiny finger like structure which lies at the lower junction of two labia minora, below the urethral opening

c) Several mammary ducts join to form a wider mammary ampulla, which is connected to lactiferous duct

d) The middle layer of uterus shows thick layer of smooth muscles

Of the above statements

1) 'a' and 'c' are true, 'b' and 'd' are false

2) a,c and d are true, b is false

3) b, c and d are true, a is false

4) all are true

17. In the male reproductive system, sperms are temporarily stored in :

1) rete testis 2) vas deferens

3) seminal vesicle 4) epididymis

18. Which of the following statements are incorrect?

i) Pectoralis major muscle is seen associated with thick middle layer of uterus

ii) The target organ of GnRH is gonad

iii) An elongated haploid nucleus is present in the head of a human sperm

iv) Human sperm contains a single mitochondrion, which provides energy for its motility

1) i and iv are incorrect

2) only iii is incorrect

3) i, ii and iv are incorrect

4) all are incorrect

19. **Statement I** : Progesterone keeps a possible minimum level during the proliferative phase

Statement II : Progesterone shows a notable rise in the first half of post ovulatory period, eventhough fertilization does not take place.

1) Both statements I and II are correct

2) Both statements I and II are incorrect

3) Statement I is correct and statement II is incorrect

4) Statement I is incorrect and statement II is correct

20. During fertilization the sperm fuses with

1) secondary spermatocyte

2) secondary oocyte

3) ootid

4) primary oocyte

21. Select the incorrect statement.

1) Placenta is connected to the embryo through umbilical cord

2) The presence of hCG in urine indicates pregnancy.

3) Inner cell mass contains stem cells which have the potency to give rise to all the tissues and organs

4) Cleavage will be started when the zygote reaches the uterus

22. Which of the following is a nutritive membrane in a human embryo?

1) inner cell mass 2) trophoblast

3) blastocoel 4) embryonal knob

23. Foetal ejection reflex in a human female triggers the release of :

1) hcG from placenta

2) hpL from placenta

3) oxytocin from maternal posterior pituitary

4) colostrum

24. Chromosome number is halved during the :

1) formation of first polar body

2) formation of second polar body

3) meiosis II

4) division of secondary oocyte

25. In which part of a human sperm, mitochondria are present?

1) Head 2) Neck

3) Middle piece 4) Tail

26. Which of the following is referred to as gestation?

1) period of pregnancy

2) period of implantation

3) period of parturition and afterbirth

4) period of insemination and fertilization

27. Division of zygote starts in :

1) Cervix 2) Uterus

3) Oviduct 4) Endometrium

28. Stem cells are present in :

1) trophoblast

2) inner cell mass

3) blastocoel

4) all of the above

29. One million primary oocytes and one million secondary spermatocytes will give :

1) one million ova and four million sperms

2) two million ova and two million sperms

3) two million ova and four million sperms

4) one million ova and two million sperms

30. In a human foetus, limbs and digits develop after :

1) 8 weeks 2) first trimester

3) 12 weeks 4) 5 months

31. How are mature human sperms and ova similar?

1) They are formed before birth

2) They have flagella for motility

3) They have the same number of chromosomes

4) They have the same size

32. Proliferation of endometrium is done by :

1) progesterone 2) estrogen

3) hPL 4) relaxin

33. The hormone that acts on Sertoli cells and stimulate the process of spermiogenesis is:

1) Gn RH 2) LH

3) Inhibin 4) FSH

34. Spermatids mature in :

1) Leydig cells

2) Seminal vesicles

3) Sertoli cells

4) Immunocompetent cells

35. Gestation period is the duration between :

1) implantation and childbirth

2) fertilization and childbirth

3) copulation and childbirth

4) insemination and childbirth

36. Select the correct sequence of embryonic development in humans :

1) Fertilization → Cleavage → Morula → Zygote → Blastula

2) Fertilization → Zygote → Cleavage → Morula → Blastula

3) Cleavage → Zygote → Fertilization → Morula → Blastula

4) Cleavage → Fertilization → Zygote → Morula → Blastula

37. The main function of hCG is to stimulate :

1) uterus to produce progesterone and estrogen

2) endometrial mucosa to produce relaxin

3) corpus luteum to produce progesterone and estrogen

4) placenta to produce cortisol

38. At which stage of life, oogenesis is initiated?

1) Birth 2) Puberty

3) Foetal stage 4) Adult

39. First menstrual cycle is known as :

1) Amenorrhoea 2) Menopause

3) Metastasis 4) Menarche

40. Primary sex organ means :

1) Copulatory organ

2) Internal genitalia

3) Gonad

4) External genitalia

41. Which of the following hormone acts on Sertoli cells and stimulates the process of spermiogenesis?

1) LH 2) GHRH

3) FSH 4) GnRH

42. What is the ratio of the number of gametes produced from one primary spermatocyte and primary oocyte?

1) 1 : 1 2) 1 : 4

3) 4 : 1 4) 2 : 2

43. First meiotic division in primary oocyte will be completed in :

1) Primary follicle

2) Graafian follicle

3) Secondary follicle

4) Tertiary follicle

44. Sperm maturation occurs in :

1) seminiferous tubule

2) epididymis

3) rete testes

4) vasa efferentia

45. Antrum present in :

1) Tertiary follicle

2) Graafian follicle

3) Both 1 and 2

4) Primary follicle

46. During pregnancy no menstrual cycles develop because of :

1) low level of FSH and LH

2) low estrogen and progesterone level

3) low prolactin level

4) low cortisol level

47. Read the following statements.

a) Viability of sperm is determined by its motility

b) Survival of sperms depends on the pH of the medium and is more active in alkaline medium

c) During menopause there is abrupt increase in ovarian hormones like estrogen and progesterone

d) Oesteoporosis will be increased during the post menopausal period

1) a and b are true but c and d are false

2) a, b and d are true but c is false

3) a, b and c are true but d is false

4) a is true but b, c and d are false

48. How many of the following statements are true?

i) Plasmin is an anticoagulant present in menstrual fluid which prevents clot formation

ii) The granulosa cells of ovarian follicles produce inhibin, like that of Sertoli cells in testes

iii) Inhibin inhibits FSH synthesis

iv) Inner cell mass contains stem cells which have the potency to give rise to all the tissues and organs

1) Only two are true

2) Only three are true

3) Only one is true

4) All are true

49. In a human female menstruation can be postponed by the administration of the synthetic form of :

1) LH only

2) FSH only

3) Progesterone and estrogen

4) LH and FSH

50. Longest gestation period is seen in

1) Dog 2) Cow

3) Elephant 4) Camel

ANSWER KEY

1.	2	24.	2	47.	2	70.	3	93.	1
2.	3	25.	3	48.	3	71.	3	94.	2
3.	3	26.	2	49.	2	72.	3	95.	3
4.	2	27.	3	50.	2	73.	3	96.	4
5.	2	28.	2	51.	1	74.	2	97.	4
6.	2	29.	3	52.	2	75.	2	98.	3
7.	2	30.	2	53.	3	76.	3	99.	3
8.	2	31.	2	54.	2	77.	2	100.	2
9.	2	32.	2	55.	2	78.	3	101.	2
10.	3	33.	2	56.	4	79.	3	102.	3
11.	3	34.	1	57.	3	80.	3	103.	2
12.	4	35.	3	58.	2	81.	4	104.	2
13.	2	36.	2	59.	3	82.	2	105.	3
14.	2	37.	2	60.	3	83.	1	106.	2
15.	3	38.	3	61.	4	84.	3	107.	1
16.	2	39.	1	62.	2	85.	2	108.	1
17.	2	40.	2	63.	3	86.	2	109.	2
18.	3	41.	2	64.	2	87.	2	110.	2
19.	4	42.	3	65.	3	88.	3	111.	2
20.	3	43.	1	66.	3	89.	3	112.	3
21.	3	44.	1	67.	3	90.	2	113.	3
22.	3	45.	3	68.	3	91.	3	114.	2
23.	1	46.	1	69.	2	92.	1	115.	4

SAMPLE QUESTIONS

1.	3	11.	2	21.	4	31.	3	41.	3
2.	3	12.	3	22.	2	32.	2	42.	3
3.	3	13.	1	23.	3	33.	4	43.	4
4.	3	14.	1	24.	1	34.	3	44.	2
5.	2	15.	2	25.	3	35.	2	45.	3
6.	1	16.	2	26.	1	36.	2	46.	1
7.	4	17.	4	27.	3	37.	3	47.	2
8.	4	18.	3	28.	2	38.	3	48.	4
9.	4	19.	1	29.	4	39.	4	49.	3
10.	4	20.	3	30.	1	40.	3	50.	3

WORK BOOK

Chapter 13

REPRODUCTIVE HEALTH

POPULATION AND REPRODUCTIVE HEALTH

1. What is the primary cause of population explosion in India?

1) Increased birth rate and decreased death rate

2) Increased death rate and decreased birth rate

3) High infant mortality rate

4) Increased emigration

2. Which of the following is NOT a method of birth control?

1) Tubectomy 2) Vasectomy

3) IVF 4) Copper-T

3. Which factor is responsible for the rapid decline in death rate in India?

1) Improved healthcare

2) Increased migration

3) Decreased birth rate

4) Increased natural disasters

4. The government promotes reproductive health through which of the following programs?

1) Swachh Bharat Abhiyan

2) National Population Policy

3) Make in India

4) Digital India

5. Which contraceptive method is best for women who do not want hormonal contraception?

1) Oral contraceptive pills

2) Copper-T

3) Contraceptive implants

4) Injectable contraceptives

6. Which of the following is a temporary method of contraception?

1) Vasectomy 2) Tubectomy

3) Oral pills 4) None of the above

7. What is the function of Copper-T?

1) Increases sperm count

2) Decreases sperm motility

3) Stimulates ovulation

4) Enhances fertilization

8. India's first family planning program was launched in which year?

1) 1950 2) 1951

3) 1962 4) 1972

9. The primary objective of reproductive health programs is to:

1) Reduce the population to zero

2) Promote safe sexual practices and family planning

3) Increase birth rate

4) Decrease literacy rate

10. Medical Termination of Pregnancy (MTP) is legally permitted up to:

1) 12 weeks 2) 20 weeks

3) 24 weeks 4) 30 weeks

11. Which of the following is a permanent method of contraception?

1) Condoms

2) Oral contraceptive pills

3) Vasectomy

4) Copper-T

12. The population growth rate is expressed as:

1) Birth rate - Death rate

2) Birth rate + Death rate

3) Death rate / Birth rate

4) Birth rate only

13. Which hormone is commonly used in oral contraceptive pills?

1) Estrogen and Progesterone

2) Insulin

3) Oxytocin

4) Adrenaline

14. Amniocentesis is a technique used to detect:

1) Pregnancy

2) Genetic disorders in a foetus

3) Infertility in women

4) Contraceptive failure

15. The ideal birth control method for a newly married couple planning to delay pregnancy is:

1) Vasectomy 2) Tubectomy

3) Condoms 4) IUD

16. The most effective method of natural contraception is:

1) Withdrawal method

2) Coitus interruptus

3) Periodic abstinence

4) Lactational amenorrhea

17. What is the primary reason for high infant mortality in developing countries?

1) Poor nutrition and healthcare

2) High literacy rates

3) Urbanization

4) Overuse of contraceptives

18. India's fertility rate has been declining due to:

1) Increased use of contraception

2) Improved child survival rates

3) Economic development

4) All of the above

19. The term "demographic transition" refers to:

1) Change in population growth over time

2) Shift from urban to rural population

3) Decrease in life expectancy

4) Increase in infant mortality

20. The natural method of contraception based on ovulation timing is called:

1) Barrier method 2) Rhythm method

3) Surgical method 4) Hormonal method

21. Which of the following is NOT an advantage of using condoms?

1) Protection against STDs

2) Easily available

3) Prevent pregnancy

4) Permanent contraception

22. What is the minimum legal age of marriage for females in India?

1) 16 years 2) 18 years

3) 20 years 4) 21 years

23. A major factor responsible for population growth in India is:

1) High literacy rate

2) Lack of awareness about contraception

3) High use of contraceptives

4) Strict population control laws

24. The primary purpose of National Family Welfare Program is to:

1) Encourage large families

2) Promote contraceptive use and reproductive health

3) Ban birth control

4) Promote polygamy

25. Which of the following diseases is NOT sexually transmitted?

1) Gonorrhea 2) Syphilis

3) Tuberculosis 4) AIDS

BIRTH CONTROL

26. What is the primary goal of birth control?

1) Decrease the birth rate

2) Prevent unwanted pregnancies

3) Promote multiple pregnancies

4) Stop human reproduction

27. Which of the following is a natural method of contraception?

1) Oral pills 2) Vasectomy

3) Rhythm method 4) Copper-T

28. Which of the following is NOT a barrier method of contraception?

1) Condoms 2) Diaphragm

3) Copper-T 4) Cervical cap

29. The oral contraceptive pill mainly contains:

1) FSH and LH

2) Oxytocin and prolactin

3) Estrogen and progesterone

4) Testosterone and estrogen

30. Which of the following contraceptive methods prevents implantation of the fertilized egg?

1) Condoms

2) Combined pills

3) Vasectomy

4) Withdrawal method

31. Vasectomy is performed in:

1) Females

2) Males

3) Both males and females

4) Only newborns

32. Tubectomy is performed in:

1) Males

2) Females

3) Both males and females

4) None of the above

33. Which method of contraception offers protection against sexually transmitted diseases (STDs)?

1) Oral pills 2) Condoms

3) IUDs 4) Tubectomy

34. What is the function of Cu^{2+} ions in Copper-T?

1) Kills sperms & reduce sperm motility

2) Prevents oogenesis

3) Prevents implantation

4) Stimulates ovulation

35. Which hormone-based contraceptive is injected into the body?

1) Copper-T 2) Depo-Provera

3) Condoms 4) Cervical cap

36. Which of the following is a surgical method of contraception?

1) Vasectomy

2) IUDs

3) Oral pills

4) Contraceptive patches

37. What is the main disadvantage of natural birth control methods?

1) Expensive

2) High failure rate

3) Causes infertility

4) Leads to hormonal imbalance

38. Which of the following birth control methods requires a doctor's prescription?

1) Condoms

2) Oral contraceptive pills

3) Withdrawal method

4) Rhythm method

39. How do hormonal contraceptives prevent pregnancy?

1) Blocking sperm entry

2) Inhibiting ovulation

3) Killing sperm

4) Thickening the uterine lining

40. Which of the following is a long-acting reversible contraceptive (LARC)?

1) Condoms

2) IUD (Intrauterine Device)

3) Withdrawal method

4) Tubectomy

41. What is the effectiveness of male condoms in preventing pregnancy?

1) 100%

2) About 98% when used correctly

3) 50%

4) 30%

42. Which birth control method involves the least side effects?

1) Oral pills

2) IUDs

3) Condoms

4) Hormonal injections

43. The contraceptive device called "Lippes Loop" belongs to which category?

1) Barrier method

2) Hormonal method

3) IUD (Intrauterine Device)

4) Natural method

44. Which of the following is a post-coital contraceptive?

1) Copper-T

2) Oral contraceptive pills

3) Emergency pills (like i-Pill)

4) Vasectomy

45. Which of the following contraceptive methods is irreversible?

1) Vasectomy 2) Copper-T

3) Oral pills 4) Condoms

46. Oral contraceptive pills work by:

1) Preventing ovulation

2) Killing sperm

3) Blocking sperm entry

4) Destroying eggs

47. Which of the following birth control methods is the most cost-effective in the long run?

1) Condoms

2) Oral pills

3) IUDs

4) Saheli

48. Which of the following is NOT an advantage of using birth control pills?

1) Highly effective

2) Protects against STDs

3) Regulates menstrual cycles

4) Reduces risk of ovarian cancer

49. Which of the following methods is commonly used for male contraception?

1) Tubectomy 2) Vasectomy

3) Oral pills 4) IUD

50. Birth control methods are important for:

1) Family planning

2) Preventing STDs

3) Controlling population growth

4) All of the above

Medical termination of Pregnancy (MTP)

51. Medical Termination of Pregnancy (MTP) is commonly known as:

1) Sterilization

2) Induced abortion

3) Ovulation induction

4) Implantation prevention

52. MTP is legally permitted up to how many weeks in India?

1) 12 weeks 2) 20 weeks

3) 24 weeks 4) 30 weeks

53. The primary reason for legalizing MTP is:

1) Population control

2) Reducing maternal mortality from unsafe abortions

3) Encouraging family planning

4) Preventing menstruation disorders

54. Which of the following is NOT a reason for performing MTP?

1) Risk to the mother's health

2) Unwanted pregnancy

3) Sex selection

4) Fetal abnormalities

55. MTP is most effective when performed during:

1) First trimester

2) Second trimester

3) Third trimester

4) Any time during pregnancy

56. Unsafe abortion is a major cause of:

1) Birth defects

2) Maternal death

3) Increase in fertility rate

4) Multiple pregnancies

57. For conducting MTP in India, report of two medical practioners are needed if the pregnancy lasted for

1) 1 month 2) 1 to 3 months

3) 3 to 6 months 4) 6 to 9 months

58. The risk of complications in MTP increases significantly if performed after:

1) 4 weeks 2) 8 weeks

3) 12 weeks 4) 20 weeks

59. MTP is NOT recommended as a:

1) Contraceptive method

2) Measure to prevent unwanted pregnancy

3) Way to terminate pregnancies due to fetal abnormalities

4) Life-saving procedure for women with health risks

60. In India, which act regulates MTP?

1) Reproductive Health Act

2) Medical Termination of Pregnancy Act

3) Child Protection Act

4) Women's Health and Safety Act

AMINOCENTESIS

61. Amniocentesis is a prenatal diagnostic technique used to detect:

1) Diabetes

2) Genetic disorders in the foetus

3) Infertility in women

4) Contraceptive failure

62. The fluid collected during amniocentesis is:

1) Seminal fluid 2) Amniotic fluid

3) Cerebrospinal fluid 4) Urine

63. Amniocentesis is best performed during which trimester of pregnancy?

1) First trimester

2) Second trimester

3) Third trimester

4) Any time during pregnancy

64. Which of the following conditions can be detected by amniocentesis?

1) Common cold 2) Down syndrome

3) Malaria 4) AIDS

65. What is the major ethical concern associated with amniocentesis?

1) Risk of miscarriage

2) Detection of genetic disorders

3) Use for sex determination

4) High cost

66. Why is amniocentesis banned for sex determination in India?

1) To prevent female foeticide

2) To reduce pregnancy costs

3) To improve male birth rates

4) To promote contraception

67. Which of the following is a possible risk of amniocentesis?

1) Infection 2) Cancer

3) Infertility 4) Birth defects

68. Amniocentesis is most useful for detecting:

1) HIV infection in the mother

2) Chromosomal abnormalities in the foetus

3) Sexually transmitted diseases

4) Kidney infections

69. Amniotic fluid contains:

1) Blood cells only

2) Foetal cells and enzymes

3) Sperm cells

4) Urine and bacteria

70. A major limitation of amniocentesis is:

1) It is 100% risk-free

2) Results are available immediately

3) It carries a small risk of miscarriage

4) It can be performed at any stage of pregnancy

ASSISTED REPRODUCTIVE TECHNOLOGIES (ART)

71. What does ART stand for in reproductive biology?

1) Artificial Reproduction Technology

2) Assisted Reproductive Technology

3) Advanced Reproductive Treatment

4) Artificial Reproductive Therapy

72. Which of the following is NOT an ART technique?

1) In vitro fertilization (IVF)

2) Gamete intrafallopian transfer (GIFT)

3) Tubectomy

4) Intracytoplasmic sperm injection (ICSI)

73. In vitro fertilization (IVF) is commonly known as:

1) Artificial insemination

2) Test-tube baby technique

3) GIFT

4) ZIFT

74. The first successful test-tube baby was born in:

1) 1978 2) 1985

3) 1965 4) 1990

75. In which ART procedure are sperm directly injected into the cytoplasm of an egg?

1) IVF 2) ICSI

3) GIFT 4) ZIFT

76. Which ART technique involves placing both sperm and eggs in the fallopian tube?

1) IVF 2) ICSI

3) GIFT 4) ZIFT

77. In which ART technique is a fertilized zygote directly placed in the fallopian tube?

1) ICSI 2) ZIFT

3) GIFT 4) IVF

78. What is the main purpose of ART?

1) Contraception

2) Helping infertile couples conceive

3) Preventing sexually transmitted diseases

4) Genetic modification

79. Which hormone is used to stimulate ovulation in ART procedures?

1) Estrogen

2) Progesterone

3) Human Chorionic Gonadotropin (hCG)

4) Insulin

80. Which ART method involves artificially introducing sperm into the female reproductive tract?

1) ZIFT

2) ICSI

3) AI (Artificial Insemination)

4) GIFT

81. Artificial insemination (AI) is recommended for couples with:

1) Female infertility

2) Male infertility due to low sperm count

3) Ovulation problems

4) High fertility

82. What is the full form of ICSI?

1) Intrauterine Cytoplasmic Sperm Insertion

2) Intracytoplasmic Sperm Injection

3) Intraovarian Cytoplasmic Sperm Infusion

4) Intrafallopian Cell Sperm Injection

83. Which ART technique is preferred when male sperm quality is very poor?

1) GIFT 2) ZIFT

3) ICSI 4) IVF

84. What is the main difference between IVF and ZIFT?

1) IVF is performed inside the body, while ZIFT is outside

2) ZIFT places a fertilized zygote in the fallopian tube, while IVF forms a zygote outside the body

3) IVF is only for males, while ZIFT is for females

4) ZIFT is a natural fertilization method

85. The success rate of ART depends on:

1) Age of the couple

2) Quality of gametes

3) Health of the female reproductive system

4) All of the above

86. Which of the following is NOT an advantage of ART?

1) Helps infertile couples have children

2) Allows for genetic screening of embryos

3) Guarantees 100% success

4) Can be used in surrogacy

87. Which ART technique can be used for couples where the woman has blocked fallopian tubes?

1) ICSI 2) IUT

3) GIFT 4) ZIFT

88. Why is ART not accessible to everyone?

1) Ethical and religious concerns

2) High cost

3) Low success rate in some cases

4) All of the above

89. Surrogacy involves:

1) An infertile woman carrying her own child

2) A woman carrying a pregnancy for another couple

3) A couple adopting a child

4) Artificial insemination without fertilization

90. In ART, sperm or egg donation is recommended when:

1) A couple has normal fertility

2) A couple cannot produce healthy gametes

3) A couple wants multiple children

4) There is no genetic disorder present

91. Which ART technique is commonly used in surrogate pregnancies?

1) GIFT

2) ICSI

3) IVF

4) Artificial insemination

92. Which of the following statements about ART is FALSE?

1) ART can help infertile couples conceive

2) ART includes IVF, ICSI, GIFT, and ZIFT

3) ART is risk-free and has no ethical concerns

4) ART can involve sperm or egg donation

93. The major risk of ART procedures is:

1) Multiple pregnancies

2) Reduced fertility

3) Sexually transmitted infections

4) Complete infertility

94. Which of the following statements is true about GIFT?

1) Fertilization occurs inside the female body

2) The fertilized embryo is transferred to the uterus

3) The zygote is directly implanted in the uterus

4) It involves injecting sperm into an egg in the lab

95. The ethical concerns regarding ART mainly revolve around:

1) Cost

2) Multiple births

3) Use of donor gametes and embryo selection

4) Increase in fertility rates

96. In Assisted Reproductive Technology, IVF involves the transfer of:

1) Ovum into the fallopian tube

2) Zygote into the fallopian tube

3) Zygote into the uterus

4) Embryo with 16 blastomeres into the fallopian tube

97. Which of the following is not an assisted reproductive technology (ART)?

1) ZIFT 2) GIFT
3) ICSI 4) MTP

98. Which of the following is a birth control method?

1) GIFT 2) IVF. ET
3) ICSI 4) IUCD

99. Which of the following is wrongly matched?

1) IUI - semen collected from husband or donor is artificially introduced into the uterus
2) GIFT - Transfer of embryos with more than 8 blastomeres into the fallopian tube
3) ICSI - Sperm directly injected into the ovum
4) ZIFT - Transfer of embryos with up to 8 blastomeres into the fallopian tube

100. In vitro fertilisation is a technique that involves transfer of which one of the following into the fallopian tube

1) Either zygote or early embryo up to 8 cell stage
2) Embryo of 32 cell stage
3) Zygote only
4) Embryo only up to 8 cell stage

SAMPLE QUESTIONS

1. The first nation in the world to initiate various action plans at national level towards attaining a reproductively healthy society?

1) USA 2) UK
3) France 4) India

2. Population growth rate of India, according to 2011 census was :

1) 17/1000/year 2) 20/1000/year
3) 22/1000/year 4) 18/1000/year

3. Study of human population and prediction about its future is called :

1) demography 2) zoogeography
3) geriatrics 4) dermatology

4. Which of the following contraceptive is most widely accepted in India?

1) Surgical method 2) Pills
3) Barrier methods 4) IUDs

5. Which of the following group contains only copper releasing intra uterine devices?

1) LNG-20 ; CuT, Cu 7
2) Progestasert, Multiload-375, LNG-20
3) Progestasert, CuT, Multiload-375
4) Multiload-375, CuT, Cu 7

6. In amniocentesis the sample fluid is taken from the

1) foetal blood
2) mother's blood
3) fluid surrounding foetus
4) fluid surrounding the gravid uterus

7. Which of the following is a hormone releasing intra uterine device?

1) Vault 2) Multiload 375
3) Progestasert 4) Diaphragm

8. Which of the following is considered as the main demerit of tubectomy?

1) Creates nausea
2) Intermittent abdominal pain
3) Irregular Menstrual bleeding
4) Reversibility is poor

9. Permanent fertility control in female is not obtained by

1) Tubectomy 2) Hysterectomy

3) Oophorectomy 4) Vasectomy

10. A contraceptive pill prevents ovulation by:

1) blocking fallopian tube

2) stimulating the release of FSH and LH

3) killing the ovum

4) inhibiting the release of FSH and LH

11. Which of the following is not a method of contraception?

1) Pills containing vasopressin and oxytocin

2) Lippes loop

3) Tubectomy

4) Condoms

12. Lippes loop is

1) a traditional contraceptive method

2) an oral contraceptive

3) a non medicated intra uterine contraceptive device

4) a surgical contraceptive method

13. Which of the following is a copper releasing IUD?

1) Cervical cap 2) Saheli

3) LNG - 20 4) Multiload - 375

14. CuT, LNG -20 and Cu 7 are examples of

1) contraceptive pills

2) surgical methods of sterilization

3) assisted reproductive technology

4) Intra uterine devices

15. For amniocentesis, the sample fluid is taken during :

1) lactation 2) menopause

3) gestation 4) menstruation

16. Copper T prevents

1) fertilization 2) egg maturation

3) ovulation 4) menstruation

17. Progestasert is an IUD which makes the uterus unsuitable and cervix hostile to the sperms as it is a/an :

1) Copper releasing IUD

2) Ideal contraceptive

3) Non medicated IUD

4) Hormone releasing IUD

18. Progesterone present in oral contraceptive pills functions by preventing :

1) coitus 2) ovulation

3) insemination 4) menstruation

19. Saheli is:

1) a steroidal oral contraceptive for males

2) a surgical method of sterilization

3) a non steroidal oral contraceptive for males

4) a non steroidal oral contraceptive for females

20. After tubectomy which part of the female reproductive system remains blocked?

1) Cervix 2) Uterus cavity

3) Ovary 4) Fallopian tubes

21. Which of the following is **incorrect** regarding vasectomy?

1) Almost irreversible sterility

2) Vasa deferentia are cut and tied

3) Ejaculation occurs

4) No sperm occurs in epididymis

22. Which of the following contraceptive method exhibits maximum failure chance?

1) Hormone releasing IUCD

2) Vasectomy

3) Implants

4) Periodic abstinence

23. Tubectomy is a method of sterilization in which

1) ovaries are removed surgically

2) Small part of vas deferens is removed or tied up

3) Small part of fallopian tube is removed and tied up

4) Uterus is removed surgically

24. Hysterectomy is the surgical removal of

1) Ovary 2) Uterus

3) Fallopian tube 4) Testis

25. Intentional or voluntary termination of pregnancy before its full term is called

1) Parturition 2) MTP

3) IUCD 4) RTI

26. STIs may lead to complications such as

1) Pelvic Inflammatory Diseases (PID)

2) Abortions and still births

3) Ectopic pregnancies & infertility

4) All the above

27. Ectopic pregnancies are referred to as:

1) pregnancies with genetic abnormalities

2) implantation of defective embryo in the uterus

3) implantation of embryo at a site other than uterus

4) pregnancies terminated due to hormonal imbalance

28. Which of the following STI is caused by a protozoan?

1) Trichomoniasis 2) Chlamydiasis

3) Gonorrhoea 4) Syphilis

29. Which of the following is a sexually transmitted infection caused by a virus and can get transmitted by blood transfusion also?

1) Gonorrhoea

2) Chlamydiasis

3) Syphilis

4) Hepatitis-B(serum hepatitis)

30. 'IUI' is a technique practiced under:

1) ART 2) RCH

3) IUDs 4) MTP

31. In vitro fertilization and embryo transfer technology is commonly called as

1) IUI technology

2) GIFT technology

3) ICSI technology

4) Test tube baby programme

32. A childless couple can be assisted to have a child through a technique called GIFT. Expand GIFT

1) Gamete Inseminated Fallopian Transfer

2) Gamete Internal Fertilization and Transfer

3) Germ cell Internal Fallopian Transfer

4) Gamete Intra Fallopian Transfer

33. In the case of a couple, where the man is having very low sperm count, which of the following technique may be suitable for fertilization?

1) IUCD 2) AI

3) GIFT 4) MTP

34. **Statement I** : Intra cytoplasmic sperm injection (ICSI) is a procedure to form an embryo artificially.

Statement II : Sperm is directly injected into the ovum in ICSI procedure.

1) Statement I is correct but statement II is incorrect

2) Statement I is incorrect but statement II is correct

3) Both statements are correct

4) Both statements are incorrect

35. The technique called gamete intra fallopian transfer is recommended for those females

1) Who cannot provide suitable environment for fertilization

2) Who cannot retain foetus inside the uterus

3) Who cannot produce an ovum

4) Who can produce an ovum

36. Which of the following method of ART is an example for in vitro fertilisation and in vivo development?

1) ZIFT 2) GIFT

3) IUCD 4) IUD

37. Artificial insemination means

1) introduction of sperms of a healthy donor into the ovary

2) transfer of sperms of a healthy donor to a test tube containing ova

3) transfer of sperms of husband to a test tube containing ova

4) artificial introduction of sperms of a healthy donor to the vagina

38. Which of the following statements is correct about test tube baby?

1) Both fertilization and development are done outside the body

2) Rearing of premature baby in an incubator

3) Fertilization and development are done inside the body

4) Fertilization occurs outside the body but development occurs inside the womb

39. How many of the following statements are applicable for the contraceptive device - diaphragm?

i) It prevents the entry of sperms into uterus

ii) It covers the cervical region

iii) It is introduced into the uterus

iv) It increases phagocytosis of sperms within the uterus

1) Only one 2) Only three

3) Only two 4) All

40. As a result of vasectomy :

1) Semen shows no sperms

2) no orgasm occurs

3) libido will be decreased

4) impotence occurs

41. Which of the following methods of ART is not an example for in vitro fertilisation?

1) ZIFT 2) IUT

3) ICSI 4) GIFT

42. Natural methods for contraception work on the principle of preventing :

1) the proliferation of endometrium

2) ovulation

3) implantation

4) fertilization

43. Infertility cases either due to inability of the male partner to inseminate the female, could be corrected by :

1) ZIFT 2) GIFT

3) IUT 4) IUI

44. After tubectomy

1) Ovaries do not produce ova

2) Menstrual cycles do not occur

3) Fertilization does not occur

4) Proliferation of endometrium does not occur

45. Intensely lactating mothers do not generally conceive due to the :

1) Suppression of gamete transport

2) Suppression of gonadotropins

3) Suppression of fertilization

4) Hypersecretion of gonadotropins

46. Which of the following is a correct surgical procedure as a contraceptive method?

1) Hysterectomy

2) Ovariectomy

3) Vasectomy

4) Castration

47. Match the items in column I and II suitably.

Column I		Column II	
i)	Cu 7	a)	barrier method
ii)	Lippes loop	b)	Non-mediated IUCD
iii)	Vaults	c)	Copper releasing IUCD
iv)	LNG-20	d)	Hormone releasing IUCD

1) i-d, ii-c, iii-a, iv-b

2) i-c, ii-b, iii-d, iv-a

3) i-c, ii-b, iii-a, iv-d

4) i-b, ii-a, iii-c, iv-d

48. Match the column I and II suitably.

Column I		Column II	
a)	Saheli	i)	Absence of menstrual cycles
b)	Lactational amenohorrea	ii)	Barrier method
c)	Progestasert	iii)	Blocks estrogen receptors
d)	Cervical caps	iv)	Hormones releasing IUCD
		v)	Copper releasing IUCD

1) a-iv, b-ii, c-i, d-v

2) a-iii, b-i, c-iv, d-ii

3) a-i, b-iii, c-iv, d-v

4) a-iii, b-i, c-ii, d-iv

Assertion Reason Type Question

49. **Assertion** : Saheli is an oral contraceptive.

Reason : The mode of action of Saheli is similar to that of combined pill.

1)) Both assertion and reason are true, and reason is the correct explanation of assertion

2) Both assertion and reason are true, but reason is not a correct explanation of assertion

3) Assertion is true, but reason is false

4) Both assertion and reason are false

50. In IVF technique, fusion of ovum and sperm occurs in :

1) uterus

2) fallopian tube

3) culture medium

4) vagina

ANSWER KEY

1.	1	21.	4	41.	2	61.	2	81.	2
2.	3	22.	2	42.	3	62.	2	82.	2
3.	1	23.	2	43.	3	63.	2	83.	3
4.	2	24.	2	44.	3	64.	2	84.	2
5.	2	25.	3	45.	1	65.	3	85.	4
6.	3	26.	1	46.	1	66.	1	86.	3
7.	2	27.	3	47.	3	67.	1	87.	2
8.	2	28.	3	48.	2	68.	2	88.	4
9.	2	29.	3	49.	2	69.	2	89.	2
10.	3	30.	2	50.	4	70.	3	90.	2
11.	3	31.	2	51.	2	71.	2	91.	3
12.	1	32.	2	52.	3	72.	3	92.	3
13.	1	33.	2	53.	2	73.	2	93.	1
14.	2	34.	3	54.	3	74.	1	94.	1
15.	4	35.	2	55.	1	75.	2	95.	3
16.	3	36.	1	56.	2	76.	3	96.	2
17.	1	37.	2	57.	3	77.	2	97.	4
18.	4	38.	2	58.	3	78.	2	98.	4
19.	1	39.	2	59.	1	79.	3	99.	2
20.	2	40.	2	60.	2	80.	3	100.	1

SAMPLE QUESTIONS

1.	4	11.	1	21.	4	31.	4	41.	4
2.	2	12.	3	22.	4	32.	4	42.	4
3.	1	13.	4	23.	3	33.	2	43.	4
4.	4	14.	4	24.	2	34.	3	44.	3
5.	4	15.	3	25.	2	35.	3	45.	2
6.	3	16.	1	26.	4	36.	1	46.	3
7.	3	17.	4	27.	3	37.	4	47.	3
8.	4	18.	2	28.	1	38.	4	48.	2
9.	4	19.	4	29.	4	39.	3	49.	3
10.	4	20.	4	30.	1	40.	1	50.	3

WORK BOOK

Chapter 14

PRINCIPLES OF INHERITANCE AND VARIATION

INTRODUCTION AND MONOHYBRID CROSS

1. Through artificial selection and domestication from ancestral wild cows we have well known breed, example Sahiwal cows in

1) Utherpradesh 2) Hariyana

3) Punjab 4) Rajasthan

2. Gregor Mendel conducted experiments in Garden Peas in the period of

1) 1822 - 1829 2) 1856 - 1863

3) 1865 - 1872 4) 1893 - 1900

3. Mendel selected how many pairs of contrasting traits in garden pea?

1) 3 pairs 2) 14 pairs

3) 7 pairs 4) 5 pairs

4. Emasculation is an unavoidable process in hybridisation. It is the,

1) Removal of ovary from the bisexual flower

2) Removal of stigma from the bisexual flower

3) Removal of petals from the bisexual flower

4) Removal of anthers from the bisexual flower

5. Find out the dominant trait in Garden Pea from the following options

1) Inflated pod 2) Wrinkled seed

3) Green seed 4) White flower

6. From the Genotype "Aa", the alleles 'A' and "a" are separating into two different gametes without any blending. This concept is explained by,

1) law of Dominance

2) law of Segregation

3) law of Independent Assortment

4) Multiple allelism

7. In Mendel's experiments he used a notation "F_1" after crossing the parents. Here F_1 means

1) First progeny 2) Filial_1 progeny

3) Fourth progeny 4) First Finding

8. In a cross pollination between pure violet flowered graden pea and white flowered garden pea, about 200 offsprings are obtained in F_2 generation. What should be the proportion of violet and white flowered pea plants?

1) 50 violet and 150 white

2) 150 violet and 50 white

3) 100 violet and 100 white

4) 200 violet

9. How many alleles are there to control the character "pod shape" in Garden Pea?

1) 2 2) 3

3) 1 4) 4

10. The graphical representation to calculate the probability of all possible genotypes of offsprings in a genetic cross is developed by

1) Carl Correns

2) Gregor Mendel

3) T.H Morgan

4) Reginald C. Punnett

11. One of the scientist is not related with the rediscovery of Mendel's experiments in 1900. Find out his name from the following options.

1) Hugo de Vries

2) Von Tschermak

3) Carl Correns

4) T. H. Morgan

12. **Statement A**: The law of Dominance is used to explain the expression of only one of the parental characters in monohybrid cross F_1 and the expression of both in the F_2

Statement B: It also explains the proportion of 3:1 obtained at the F_2

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

13. In a cross between pure tall garden pea and recessive dwarf pea, what should be the percentage of pure homozygous offsprings in F_2 generation?

1) 25% 2) 50%

3) 75% 4) 12.5%

14. In a typical Mendelian monohybrid cross ; the F_1 progeny are

Where the diagonal "X" is passing through two boxes, which are containing

1) Homozygous dominant offsprings

2)Heterozygous dominant offsprings

3) Recessive offsprings

4) One dominant and One recessive

INCOMPLETE DOMINANCE, CO-DOMINANCE AND MULTIPLE ALLELISM

15 In Antirrhinum sp. the F_1 generation resembles which parent?

1) Dominant Parent

2) Recessive parent

3) Both the parent

4) None of the parent

16. In the given example Antirrhinum, the recessive trait, that is white flower is due to the production of

1) Non-functional enzyme or No enzyme by modified allele

2) Normal enzyme by modified allele

3) Normal enzyme by unmodified allele

4) No enzyme by unmodified allele

17. How many alleles for " I " gene controlling ABO blood group system

1) Three 2) Four

3) Five 4) Six

18. A gene has six alleles in a population for a character. What should be the number of alleles in a gamete?

1) One 2) Two

3) Three 4) Six

19. In case of Multiple allelism, a population contains many alleles of a single gene. In Person "A" and "B" of the population,

1) Contains 2 alleles of a gene

2) Gamete contains only one allele

3) Alleles are placed on same homologous chromosomes

4) All the above options are true

20. In a family, there are four children. Their blood groups are A, B, AB and O groups respectively. What would be the possible blood groups of their parents?

1) AB and AB

2) AB and O

3) heterozygous A and heterozygous B

4) heterozygous A and AB

21. In which of the following genotype, the two alleles are producing their own sugars?

1) $I^{A}i$ 2) $I^{B}i$

3) $I^{A}I^{B}$ 4) ii

Assertion and Reason Type Question

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

22. **Assertion** : AB blood group is heterozygous and contains both the antigens A and B. This group is co-dominant group.

Reason : In the genotype of AB group, both the antigens are expressing and producing their own sugars.

23. In Garden Pea, the starch synthesis is controlled by

1) One gene with one allele

2) One gene with two alleles

3) One gene with three allele

4) Two genes and each has two alleles

DIHYBRID CROSS (INHERITANCE OF TWO GENES) & CHROMOSOME THEORY

24. In which of the following case, Law of Independent assortment is applicable during gamete formation?

1) Tt 2) $I^{A}i$

3) RrYy 4) Rr

25. "When two pairs of traits are combined in a hybrid, Segregation of one pair of characters is independent of the other pair of characters". This concept of Mendel is best explained by

1) Law of Dominance

2) Law of Segregation

3) Law of Independent assortment

4) Incomplete dominance

26. The genotype ratio of a dihybrid cross is

1) 1: 2 : 1 2) 9 : 3: 3:1

3) 1:2:1:2:4:2:1:2:1 4) 3:1

27. How many different types of genotypes and phenotypes are present in a normal Mendelian Dihybrid cross F_2?

1) 9 and 4 respectively

2) 4 and 9 respectively

3) 3 and 4 respectively

4) 6 and 4 respectively

28. What should be the number of different types of phenotypes that may appear in a Hexa hybrid cross F_2?

1) 3^2 2) 2^6

3) 3^6 4) 36

29. What should be the percentage of homozygous offsprings in the F_2 generation of a normal dihybrid F_2 Punnets square?

1) 75% 2) 50%

3) 25% 4) 12.5%

30. Read the following statements and identify the correct ones.

i) In a normal Mendelian Dihybrid cross, F_1 generation contains only heterozygous offsprings

ii) F_1 dihybrid shows independent selection and segregation of alleles during gamete formation

iii) The test cross of dihybrid produces four different phenotypes in equal numbers

iv) The F_2 Punnet square of a dihybrid cross contains nine different types of genotypes

v) The F_2 Punnet square of a dihybrid cross contains four different types of phenotypes

1) Two 2) Three

3) Four 4) Five

31. How many different types of Phenotypes and Genotypes are producing in a Dihybrid test cross?

1) Two and Four respectively

2) Four and Two respectively

3) Two and Two respectively

4) Four and Four respectively

32. In the typical dihybrid cross based on seed shape and seed colour . A Homozygous round yellow (RRYY) pea plant is crossed with a recessive wrinkled green (rryy) pea plant. In F_2 generation, the recombinant offsprings are produced in which ratio?

1) 9:3:3:1 2) 3:1

3) 1:1 4) 1:1:1:1

33. The cross between AaBBmmTt × aaBbMmTt, the resultant Punnet's square contains how many boxes?

1) 4 2) 8

3) 16 4) 32

34. Match the following and find out the correct option

Column I		Column II	
A)	Co-dominance	1)	Antirrhinum
B)	Incomplete dominance	2)	O blood group
C)	Complete dominance	3)	heterozygous B group
D)	Recessive phenotype	4)	AB group

1) $\frac{ABCD}{4123}$

2) $\frac{ABCD}{4132}$

3) $\frac{ABCD}{4321}$

4) $\frac{ABCD}{4231}$

35. **Statement A**: If there are more than one pair of factors, then Law of Independent assortment is applicable.

Statement B: Law of Independent assortment is a universal law.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

36. Chromosome theory of Inheritance is proposed in the year

1) 1900 2) 1856

3) 1902 4) 1928

37. Chromosome theory is proposed by

1) Correns and Tschermak

2) Hugo de Vries

3) Sutton and Boveri

4) T. H Morgan

38. Homologous pair of Chromosomes mean

1) A pair of similar chromosomes which is inherited from same parent

2) A pair of chromosome, which are containing different genes for different characters in same loci

3) A pair of similar chromosomes, which are inheritance from two parents and are containing similar genes at same loci

4) A pair of dissimilar chromosomes

39. In a human meiocyte the homologous chromosomes can segregate in how many different ways?

1) 2^{23} 2) 23^{2}

3) 2^{46} 4) 3^{23}

40. Select the correct statement

1) Chromosomes and genes are occur in pairs

2) Chromosomes and genes are reduced to half during gamete formation

3) Two alleles of a gene pair are located on homologous sites of homologous chromosomes

4) All are correct statements

41. **Statement I** : Walter. S.Sutton and Theodore Boveri noted that the behaviour of chromosomes was parallel to the behaviour of genes and used chromosome movement to explain Mendel's laws.

Statement II : By 1902 the chromosome movement during Meiosis had been worked out and Sutton and Boveri proposed chromosomes theory

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

42. The stable discrete units that controlled the expression of traits, and a pair of such units did not blend with each other, was the concept given by

1) Gregor Mendel 2) Hugo de Vries

3) Sutton and Boveri 4) T.H. Morgan

43. Mendel published his work on inheritance of characters in 1865 but for several reasons, it remained unrecognised till

1) 1884 2) 1900

3) 1902 4) 1928

44. **Statement I** : Sutton and Boveri argued that the pairing and segregation of a pair of chromosomes would lead to segregation of a pair of factors they carried.

Statement II : Sutton united the knowledge of chromosomal segregation with Mendelian principles and called it the chromosome theory

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

45. The experimental verification of chromosomal theory of inheritance was conducted by

1) Alfred.H. Sturtevant 2) T.H.Morgan

3) Walter S.Sutton 4) Theodore Boveri

LINKAGE AND RECOMBINATION

46. Morgan selected Drosophila, and conducted many dihybrid crosses. The meiocyte of this fly contains:-

1) 2 pairs of autosomes and 1 pair of sexchromosomes

2) 3 pairs of autosomes and 1 pair of sex chromosomes

3) 4 pairs of autosomes and 1 pair of XX|XY chromosomes

4) 8 pair of chromosomes including XX|XY chromosomes

47. Read the following statements and find out the correct statement

1) Morgan carried several dihybrid crosses that were sex linked.

2) The crosses conducted by Morgan were similar to the dihybrid crosses carried out by Mendel in Peas

3) Morgan observed that two genes did not segregate independently of each other and the F2 ratio deviated very significantly by from the 9 :3:3:1 ratio expected

4) All the statements are true

48. The wild character Brown body in Drosophila is controlled by a gene that is located on

1) 1st autosome

2) 2nd autosome

3) Y chromosome

4) X chromosome

Assertion and Reason Type Question

1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

3) Assertion is true statement but Reason is false

4) Both Assertion and Reason are false

49. **Assertion** : In cross-B, Morgan observed that parentals are more and recombinants are nearly 37.2% in F_2 generation.

Reason : Genes for eye colour and wing size are loosely linked on 'X' chromosome

50. In the dihybrid cross between two Drosophila having Brown body with red eye and yellow body with white eye, T.H. Morgan observed how much percentage of same characters Brown body with red eye and yellow body with white eye in F_2 generation?

1) 1.3% 2) 37.2%

3) 62.8% 4) 98.7%

51. A cross based on sex linked (X- linked) characters is given below, a^+ and b^+ are wild alleles and a and b are recessive alleles.

$$\frac{a^+ \quad b^+}{a \quad b} \times \frac{a \quad b}{\quad}$$

The possible gametes are given as options. Find out a recombinant gamete?

1) $\frac{a^+ \quad b^+}{\quad}$ 2) $\frac{a \quad b}{\quad}$

3) $\frac{a^+ \quad b}{\quad}$ 4) $\frac{\quad}{\quad}$

52. Some of the F_2 genotypes in Morgan's Cross B are given below. Find out the recombinant genotype?

1) $\frac{w^+ \quad m+}{w \quad m}$ 2) $\frac{w \quad m+}{\quad}$

3) $\frac{w \quad m}{\quad}$ 4) $\frac{w \quad m}{w \quad m}$

53. The frequency of recombination between gene pairs on the same chromosome was taken as a distance between genes and represented their positions on the chromosome. This method is proposed by

1) T.H. Morgan

2) Alfred Sturtevant

3) Theodore Boveri

4) Hugo de Vries

54. Which of the following is incorrect about Morgan's concept?

1) Strength of linkage $\propto \frac{1}{\text{Distance between genes}}$

2) Strength of Linkage $\propto$ crossing over

3) Crossing over $\propto$ Recombinants

4) Strength of Linkage $\propto \frac{1}{\text{Recombinants}}$

55. Among the following, which one is a recessive trait in Drosophila?

1) Brown body

2) Red eye

3) Large wing

4) Yellow body

56. A chromosome contains three genes, a,b and c. The recombination frequency between them is

a - b = 3%

b - c = 2%

c - a = 5%

The order of arrangements of genes on the chromosome can be represented as

1) b a c 2) a c b

3) a b c 4) c a b

57. In Cross A, Morgan considered which characters in Drosophila?

1) Eye colour and wing size

2) Body colour and wing size

3) Body colour and eye colour

4) Only wing size

POLYGENIC INHERITANCE AND PLEIOTROPY

58. Many traits in human population are not so distinct in their occurance and are spread across a gradient. This phenomena is called as

1) Pleiotropism

2) Multiple allelism

3) Quantitative Inheritance

4) Biallelic Inheritance

59. Among the following which one is an example for polygenic character?

1) Skin colour in Human

2) Petal colour in Garden Pea

3) ABO blood groups

4) Wing size in Drosophila

60. Which genotype shows darkest skin colour in human population?

1) AABbCc 2) AaBbCc

3) aabbcc 4) AABBCC

61. A single gene exhibiting multiple phenotypic effects is true in case of

1) AB blood group

2) Height in human population

3) The disease phenylketonuria

4) Flower colour in Antirrhinum

62. The single gene mutation in phenylketonuria causes the following symptoms except

1) Mental retardation 2) Skin pigmentation

3) Reducion in hair 4) Gynaecomastia

SEX DETERMINATION

63. Henking (1891) traced out a specific structure in insect cell while studying the spermatogenesis. It is

1) An autosome 2) Nucleolus

3) X-body 4) Y- chromosome

64. Majority insects are showing which mechanism of sex determination?

1) XX-XY mechanism

2) XX - XO mechanism

3) ZZ - ZW mechanism

4) Haplo-diplontic method

65. Males have one allosome less in

1) Honey bee

2) Drosophila

3) Grass hopper

4) Bird

66. In human beings the sex of the child is decided by the male parent. The probability for a male or female offspring in a fertilisation should be

1) 25%

2) 50%

3) 75%

4) Cannot be predictable

67. If AA is the autosome pair and 'X' chromosome is the sex chromosome in Grasshopper, then which of the following is the karyotype in male grasshopper?

1) AA+XX 2) AA+XY

3) AA+XO 4) AA+ZW

68. Female heterogamety is present in

1) Human beings 2) Drosophila

3) Grasshopper 4) Domestic Fowl

69. The chromosome number in the male of Apis (Honeybee) is ;

1) 32 2) 8

3) 16 4) 23

70. Read the following statement and find out the incorrect statement.

1) In honey bees males have no father or son but have grand father and grandson

2) The Queen bee has 32 chromosomes and she is fertile

3) The worker bee has 32 chromosome and worker is fertile

4) The sex determination in Apis is based on the sets of chromosome

71. Parthenogenesis produces

1) Male Drosophila

2) Female Drosophila

3) Male honey bee

4) Female honey bee

72. **Statement I** : In human beings males are producing two types of gametes and are known as heterogametic.

Statement II : In Peacock, males are heterogametic

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

MUTATIONS, GENETIC DISORDERS & CHROMOSOMAL DISORDERS

73. Chromosomal aberrations are heritable if they are occuring in

1) Somatic cells

2) Germ cells

3) Both somatic and Germ cells

4) Non-reproductive cells

74. Point mutation is occuring by

1) Change on a single basepair of DNA

2) Deletions at base pairs in DNA

3) Insertions at base pairs in DNA

4) Duplication of a segment of DNA

75. Nicotine is a

1) Chemical mutagen

2) Physical mutagen

3) Biological carcinogen

4) A non mutagenic substance

76. Read the following statements and find out the incorrect?

1) In addition to recombination, mutation is another phenomenon that lead to variation in DNA

2) Alterations in chromosome results in abnormalities or aberrations

3) Chromosomal aberrations are commonly observed in cancer cells

4) A classical example for point mutation is Haemophilia

77. Rudimentary ovaries are seen in

1) Klinefelter's syndrome

2) Turner's syndrome

3) Down's syndrome

4) Thalassemia

78. A disorder that is caused by the absence of one of the "X" chromosome is

1) Sickle cell anaemia

2) Klinefelter's syndrome

3) Turner's syndrome

4) Down's syndrome

79. Broad palm with characteristic palm crease, physical, psychomotor and mental development is retarded. This diagnostic feature is seen in

1) Haemophilia

2) Myotonic dystrophy

3) Turner's syndrome

4) Down's syndrome

80. The disorder caused by autosomal non disjunction is

1) Turner's syndrome

2) Down's syndrome

3) Klinefelter's syndrome

4) Cystic fibrosis

81. Match column I with column II and find out the correct option

Column I		Column II	
A)	2n+1	1)	Nullisomy
B)	2n+2	2)	Monosomy
C)	2n-1	3)	Tetrasomy
D)	2n-2	4)	Trisomy

1) $\frac{ABCD}{1234}$ 2) $\frac{ABCD}{4312}$

3) $\frac{ABCD}{4321}$ 4) $\frac{ABCD}{4213}$

82. A plant with 4n genomic number is known as

1) Tetrasomic plant 2) Tetraploid plant

3) Aneuploid plant 4) Nullisomic plant

83. An individual with overall musculine development, however the feminine development that is gynaecomastia is the symptom of

1) Turner's syndrome

2) Down's syndrome

3) Klinefelter's syndrome

4) Phenylketonuria

84. The karyotype of klinefelter's syndrome is

1) 44A+ XO 2) 44A+XXY

3) 45A+XX 4) 45A+XY

85. Sickle cell anemia affects

1) Haem part of Hb

2) α_1 chain of globin protein

3) α_2 chain of globin protein

4) 2β chains of globin protein

86. A point mutation can affect

1) an entire protein structure

2) the remaining length of protein chain from the affected position

3) only one aminoacid in a protein chain

4) Three aminoacids in a protein chain due to change in a triplet codon

87. In sickle cell anemia, at which position of 2β chains are affected

1) 2nd position 2) 5th position

3) 6th position 4) 7th position

88. If a husband and wife are sickle cell anemia carriers, then what would be the probability of disease in their children?

1) 25% 2) 50%

3) 75% 4) 100%

89. In sickle cell anemia, the sixth triplet base is changed in gene. It is a recessive mutation. Identify the change.

1) CAC changed as CTC

2) CTC changed as CAC

3) GUG changed as GAG

4) GAG changed as GUG

90. Which of the following disease is an inborn error in aminoacid metabolism

1) Thalassemia

2) Phenylketonuria

3) Sickle cell anemia

4) Colour blindness

91. Among the following one of the disease is autosomal dominant . Identify it

1) Sickel cell anemia

2) Cystic fibrosis

3) Thalassemia

4) Myotonic dystrophy

92. $\beta-$thalassemia is an inborn genetical disease. It is caused by a mutation in gene that is located on

1) 11th autosome 2) 12th autosome

3) 16th autosome 4) X-chromosome

93. Deletion or mutation of the genes located on 16th autosome causes

1) $\beta-$thalassemia

2) $\alpha-$thalassemia

3) Sickle cell anemia

4) Myotonic dystrophy

94. A quantitative problem of synthesising too few globin molecules is

1) Sickle cell anemia 2) Phenylketonuria

3) Cystic fibrosis 4) Thalassemia

95. A number of descendents in the family of queen victoria were carriers of a recessive disorder which is known as

1) Colour blindness

2) Klinefelter's syndrome

3) Haemophilia

4) Sickle cell anemia

Assertion and Reason Type Question

A) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

B) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

C) Assertion is true statement but Reason is false

D) Both Assertion and Reason are false

96. **Assertion** : The possibility of a female becoming haemophilic is extremely rare.

Reason : Mother of such a female has to be atleast carrier and the father should be haemophilic (unviable in the later stage of life)

97. The disease that is occuring in 8% of the males and only about 0.4% of females is

1) Colour blindness

2) Thalassemia

3) Phenyl ketonuria

4) Turner's syndrome

98. A single protein that is a part of the cascade of proteins involved iin the clotting of blood is affected. This is in case of

1) Sickle cell anaemia, an allosome linked recessive disease

2) Thalassemia an autosome linked dominant disease

3) Haemophilia, an allosome linked recessive disease

4) Thalassemia an autosome linked recessive disease

99. Match column I with column II and find out the correct option

Column I		Column II	
A)	Thalassemia	1)	Sex linked recessive
B)	Sickle cell anemia	2)	Autosomal dominant
C)	Haemophilia	3)	Quantitative problem
D)	Myotonic dystrophy	4)	Qualitative problem

1) $\frac{ABCD}{3124}$ 2) $\frac{ABCD}{3214}$

3) $\frac{ABCD}{3421}$ 4) $\frac{ABCD}{3412}$

PEDIGREE ANALYSIS

100. Which of the following is/are correct about pedigree analysis

1) It is the analysis of traits in a several generations of a family

2) In human genetics pedigree study provides a strong tool

3) It is utilised to trace the inheritance of a trait or abnormality or disease

4) All are true

101. In a pedigree chart the symbol

indicates

1) 5 affected boys

2) 5 affected girls

3) 5 unaffected offsprings

4) 5 affected offsprings

102. The symbol indicates

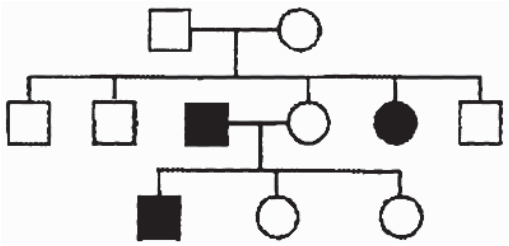
1) A normal mathing or marriage

2) A mating between two unrelated affected individuals

3) Consanguiness mating or marriange between affected individuals

4) Consanguiness mating or marriage between two unaffected individuals

103. Observe the following Pedigree chart and identify the type of disease



1) Autosomal dominant

2) Sex linked recessive

3) Autosomal recessive

4) Sex linked dominant

SAMPLE QUESTIONS

1. In a heterozygous condition like "Aa", the allele, 'A' and 'a' are seperated into two different gametes without any blending. This can be explained by

1) Multiple allelism

2) Law of dominance

3) Law of purity of gametes

4) Law of independent assortment

2. The genotype AA tt Xx YY can produce how many different types of gametes?

1) 16 2) 8

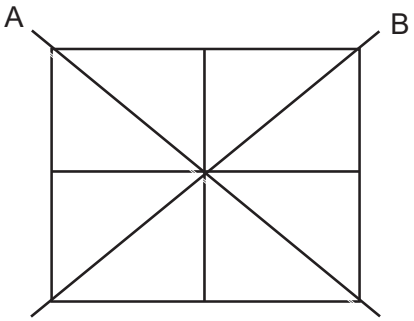
3) 2 4) 4

3. A punnet's square contains 16 boxes. Total no of male gamete and female gamete participated in the cross will be

1) 8 2) 10

3) 16 4) Either 1 or 2

4. In a normal monohybrid cross, the F_2 punnet's square is shown as below



the diagonals A and B are

1) Homozygous offsprings

2) Heterozygous offsprings

3) A is homozygous and B is heterozygous

4) Both are parentals

5. Among the following, the recessive characters in Garden pea plant is

1) Axial flower 2) Green pod

3) Yellow seed 4) Terminal flower

6. A punnets square of normal Mendelian dihybrid cross is given below

K	L	M	N
O	P	Q	R
S	T	U	V
W	X	Y	Z

Where the genotype 'S" is exactly similar to

1) L 2) M

3) X 4) Y

7. Which of the following disease is an example for pleiotropism?

1) Phenyl ketonuria

2) Sickle cell anaemia

3) Klinefelter's syndrome

4) Both 1 and 2

8. Mendel crossed a tall plant from F_2 with dwarf parent plant. Then cross is known as

1) Dihybrid cross 2) Back cross

3) Test cross 4) Both 2 and 3

9. The phenotypes and genotypes of blood group system and how many times greater than the phenotypes and genotypes of a normal Mendelism character?

1) 2 times 2) 3 times

3) 5 times 4) 4 times

10. A man with AB group marries a heterozygous woman with B group. What would be the probability for an AB grouped child?

1) 12,5% 2) 25%

3) 50% 4) 75%

11. What would be the probability for a codominant child in a marriage between AB grouped man and AB grouped woman?

1) 100% 2) 25%

3) 50% 4) 75%

12. The ABO blood group system in human is dependent on

1) A type of sugar in plasma

2) A type of sugar on RBC membrane

3) A type of protein in plasma

4) A type of sugar in cytoplasm of RBC

13. Incomplete dominance is discovered by

1) Hugo de Vries 2) Carl Correns

3) Von Tschermak 4) Gregor Mendel

14. A red flowered Mirabilis is crossed with white flowered one. What should be the percentage of Red plants in F_2?

1) 100% 2) 50%

3) 25% `4) 75%

15. In normal Mendelian dihybrid cross, the percentage of parental phenotypes in F_2 generation should be

1) 62.5% 2) 37.5%

3) 1.3% 4) 50%

Assertion and Reason Type Question

A) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

B) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

C) Assertion is true statement but Reason is false

D) Both Assertion and Reason are false

16. **Assertion** : Mendel was successful in his hybridisation experiments.

Reason : Garden pea is proved as an ideal experimental material

17. An exception to the law of Independent assortment is

1) Dominance

2) Incomplete dominance

3) Segregation

4) Linkage

18. X-linked recessive gene easily express in

1) Male

2) Female

3) Equal in male and female

4) Not easily express

19. The mechanism of sex determination in birds show

1) Male heterogamety

2) Both male and female homogamety

3) Female heterogamety

4) Both male and female heterogamety

20. The cross between recessive parent to its hybrid or its F_1 plant is called

1) Trihybrid cross 2) Test cross

3) Mononhybrid cross 4) Dihybrid cross

21. When a plant have two different alleles of a gene, it is called

1) Homozygous 2) Heterozygous

3) Monoecious 4) Dioecious

22. A trihybrid cross is made between two plants with genotypes AaBbCc. How many offsprings of such cross will have a genotype aabbcc?

1) 1/64 2) 1/4

3) 1/16 4) 1/32

23. What is the inheritance of colourblindness of both parents having a normal vision but mother has a recessive gene for colour blindness

	Son	Daughter
1)	50%	Nil
2)	100%	Nil
3)	Nil	100%
4)	Nil	Nil

24. There are three genes a,b,c are placed on a chromosome. Percentage of crossing over between a and b is 20%, b and c is 28% and a and c is 8%. What is the sequence of genes on chromosome?

1) b,a,c 2) b,c,a

3) a,c,b 4) a,b,c

25. Two alleles of one genes are located on

1) The same chromosome

2) Homologous chromosomes

3) Non-homologous chromosomes

4) Any two chromosomes

26. Human male cannot be heterozygous for

1) Phenylketonuria

2) Cystic fibrosis

3) Colour blindness

4) Sickle cell anaemia

27. In which disease change of a single base pair in the gene for β- chain of haemoglobin results in change of glutamic acid to valine

1) Thalassemia

2) Sickle cell anaemia

3) Haemophilia

4) Phenyl ketonuria

Assertion and Reason Type Question

A) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion

B) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

C) Assertion is true statement but Reason is false

D) Both Assertion and Reason are false

28. **Assertion** : The genotype of darkest skin colour will have all dominant alleles..

Reason : The effect of dominanat allele in a polygenic trait is additive

29. Select the incorrect match

1) 45A+ XX; broad Palm with crease

2) 44A + XXY; rudimentory ovaries

3) 44A+ XO; sterile female

4) 44A+ XY; normal male

30. What is the probability, if female child to be colourblind if father is colour blind and mother is carrier for colourblindness?

1) 25% 2) 50%

3) 75% 4) 100%

31. A man of blood group A, whose mother have 'O' blood group marry with 'B' blood group woman, whose father have 'O' blood group. Then find out the possible blood group in their children.

1) Only A 2) Only B

3) Only O 4) A, B, AB and O

32. Identify the set of allosomal Mendelian disorders from the following

A) Cystic fibrosis

B) Phenylketonuria

C) Haemophilia

D) Colour blindness

E) Klinefelter's syndrome

F) Thalassemia

G) Sickle cell anaemia

1) A,E, G 2) C, D, E

3) C and D 4) D, E, F

33. In Drosophila melanogaster

1) 2 pairs of autosomes and 1 pair of sex chromosomes

2) 3 pairs of autosomes and 3 pairs of sex chromosomes

3) 1 pair of autosomes and 3 pairs of sex chromosomes

4) 3 pairs of autosomes and 1 pair of sex chromosomes

34. If a colour blind man marries a girl who is normal (homozygous) for this character, then genotypically

1) Sons is normal and daughter is colourblind

2) Sons will be colourblind and daughters will be normal

3) Sons will be normal, daughter's will be carrier

4) Both sons and daughters will be colour blind

35. **Statement A**: Klinefelter's syndrome is caused due to an additional copy of x-chromosome.

Statement B: Individuals with above syndrome are sterile

1) Both Statement I and Statement II are

correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

36. Which of the following symbols are used for representing sex chromosome of birds.

1) zz - zw 2) xx-xy

3) xo- xx 4) zz-ww

37. Probability for four sons to a couple is

1) 1/4 2) 1/8

3) 1/16 4) 1/32

38. Male heterogamety and female heterogamety respectively found in

1) Human and Honey bee

2) Reptiles and Birds

3) Drosophila and Birds

4) Honey bee and Human

39. Select the incorrect option regarding Turner's syndrome

1) Monosomy of X - chromosome

2) 45 A + XO

3) Sterile female

4) Lack of secondary sexual characters

40. Select the incorrect statement

1) Failure of segregation of chromatids during cell division results in aneuploidy

2) β- Thalassemia is controlled by single gene HbB on chromosome -16

3) Down's syndrome was first describe by Langdon Down in 1866

4) Turner's syndrome is caused due to the absence of one X- chromosome in female

41. A disease caused by an autosomal primary non disjunction is

1) Down's syndrome

2) Klinefelter's syndrome

3) Turner's syndrome

4) Sickle cell anaemia

42. Which of the following muscular disorder is inherited?

1) Royal disease

2) Bleeder's disease

3) Tetany

4) Muscular dystrophy

43. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by

1) T.H. Morgan

2) Gregor Mendel

3) Alfred Sturtevant

4) Sutton and Boveri

44. In human genetics, pedigree study provides a strong tool, which is utilised to trace the

1) Inheritance of a specific trait

2) Abnormality in gene

3) Genetic diseases

4) All listed

45. Match column I with column II

a)	xx-xo method	1)	Turner's syndrome
b)	xx- xy method	2)	Female heterogamety
c)	karyotype 45	3)	Grasshopper
d)	zw-zz method	4)	Female homogamety

1) $\frac{abcd}{1234}$ 2) $\frac{abcd}{3412}$

3) $\frac{abcd}{3421}$ 4) $\frac{abcd}{4321}$

ANSWER KEY

1.	3	22.	1	43.	2	64.	2	85.	4
2.	2	23.	2	44.	1	65.	3	86.	3
3.	3	24.	3	45.	2	66.	2	87.	3
4.	4	25.	3	46.	2	67.	3	88.	1
5.	1	26.	3	47.	4	68.	4	89.	2
6.	2	27.	1	48.	4	69.	3	90.	2
7.	2	28.	2	49.	1	70.	3	91.	4
8.	2	29.	3	50.	4	71.	3	92.	1
9.	1	30.	4	51.	3	72.	3	93.	2
10.	4	31.	4	52.	2	73.	2	94.	4
11.	4	32.	3	53.	2	74.	1	95.	3
12.	1	33.	4	54.	2	75.	1	96.	1
13.	2	34.	2	55.	4	76.	4	97.	1
14.	2	35.	3	56.	3	77.	2	98.	3
15.	4	36.	3	57.	3	78.	3	99.	4
16.	1	37.	3	58.	3	79.	4	100.	4
17.	1	38.	3	59.	1	80.	3	101.	3
18.	1	39.	1	60.	4	81.	3	102.	4
19.	4	40.	4	61.	3	82.	2	103.	3
20.	3	41.	1	62.	4	83.	3		
21.	3	42.	1	63.	3	84.	2		

SAMPLE QUESTIONS

1.	3	10.	2	19.	3	28.	1	37.	3
2.	3	11.	3	20.	1	29.	2	38.	3
3.	1	12.	2	21.	2	30.	2	39.	2
4.	3	13.	2	22.	1	31.	4	40.	2
5.	4	14.	3	23.	1	32.	3	41.	1
6.	2	15.	1	24.	1	33.	4	42.	4
7.	4	16.	1	25.	2	34.	3	43.	3
8.	4	17.	4	26.	3	35.	1	44.	4
9.	1	18.	1	27.	2	36.	1	45.	2

WORK BOOK

Chapter 15

MOLECULAR BASIS OF INHERITANCE

QUESTIONS

1. The length of DNA usually depends on

1) position of nucleotides

2) number of nucleotides

3) Both 1and 2

4) None of the above

2. Which of the following are all nucleotides ?

1) Adenosine, cytidylic acid, cytosine

2) Adenylic acid, cytidylic acid, guanylic acid

3) Cytidine, adenine, adenylic acid

4) Uracil, thymidine, thymidylic acid

3. The negative charge of DNA is due to

1) Phosphate

2) Sugar

3) Nitrogen bases

4) All of these

4. Match the following.

Column I		Column II	
1.	Diploid DNA content of human cell	a.	4.6×10^6 bp
2.	$\phi \times 174$	b.	48,502 bp
3.	λ phage	c.	6.6×10^9 bp
4.	E.coli	d.	5386 bases

1) 1 - c ; 2 - d ; 3 - b ; 4 - a

2) 1 - d ; 2 - c ; 3 - a ; 4 - b

3) 1 - a ; 2 - b ; 3 - c ; 4 - d

4) 1 - b ; 2 - c ; 3 - a ; 4 - d

5. From the given mentioned features identify the correct match

Column I		Column II
1.	Diameter of DNA	2nm / 20 Å
2.	Space between two base pairs	3.4nm / 34 Å
3.	Length of one helical turn or pitch	0.34nm / 3.4 Å
4.	Angle of each helical turn or pitch	360^0
5.	Ascent angle of each base pair	36^0

1) 1, 2, 4 and 5 are correct

2) 1, 2, 3 and 5 are correct

3) 1, 4 and 5 are correct

4) 1, 3, 4 and 5 are correct

6. Which of the following is not the correct salient features of double-helix structure of DNA?

1) Two polynucleotide chains have backbone of sugar and phosphate and bases project inside.

2) Two chains have antiparallel polarity, i.e, one is $5' \rightarrow 3'$ and other is $3' \rightarrow 5'$

3) Adenine forms three hydrogen bonds with the thymine and guanine forms two hydrogen bonds with cytosine

4) The plane of one base pair stacks over the other in double helix in addition to H-bond, confers extra stability to helical structure.

7. Choose the incorrect option

1) Friedrich Meischer in 1869 identified DNA as an acidic substance and named it nuclein

2) Erwin Chargaff said, the ratio between A and T and G and C of dsDNA are constant and equals one

3) The two strands of dsDNA are complementary to each other

4) None of the above

8. In a given sample of t-RNA, the percentage of Adenine is 15%, what will be the percentage of Guanine in the same sample of t-RNA :

1) 85%

2) 35%

3) 15%

4) Cannot be predicted

9. Which of the following does not follow the Central Dogma of Molecular Biology :

1) E. coli 2) Human

3) Drosophila 4) Retrovirus

10. **Statement I** : In some viruses the flow of information is from RNA to DNA

Statement II : Unidirectional flow of information from RNA to DNA to protein is named as central dogma of molecular biology.

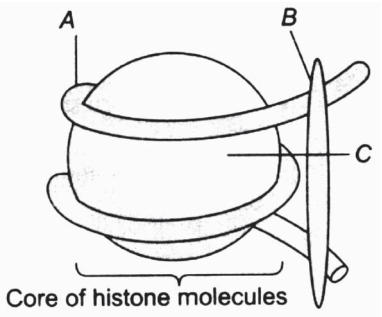
1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

11. In the diagram, identify A, B and C.



1) A- DNA, B-H1 histone, C-Histone octamer

2) A-RNA, B-H1 histone, C- Histone octamer

3) A- DNA, B-H1 histone, C-Histone tetramer

4) A- RNA, B-H1 histone, C-Histone pentamer

12. A diploid cell contains approximately 6.4 billion base pairs of DNA. How many nucleosomes are present in such cell and how many histone proteins are complexed to this DNA?

1) 4.2×10^7 and 3.9×10^8

2) 5.2×10^7 and 4.9×10^8

3) 3.2×10^7 and 2.9×10^8

4) 2.2×10^7 and 5.9×10^8

13. In Griffith experiment, what would be the effect of following conditions on mice ?

Form of Pneumococcus Injected		Effect of Mice
I.	Live R-strain	A
II.	Live S-strain	B
III.	Heat-killed S-strain	C
IV.	Heat-killed S-strain + live R-strain	D

Choose the correct option for effect on mice

1) A-Survived, B-Died, C-Died, D-Survived

2) A-Survived, B-Died, C-Survived, D-Died

3) A-Died, B-Survived, C-Survived, D-Died

4) A-Died, B-Survived, C-Died, D-Died

14. Hershey and Chase experiment was done in the year?

1) 1952 2) 1953

3) 1961 4) 1869

15. Bacteriophage protein coat was labelled by growing E.coli on

1) radioactive sulphur -35

2) radioactive sulphur-32

3) radiactive sulphur-30

4) radioactive phosphorus-32

16. What is / are the conclusion of Blender's experiment.

1) Protein is not the genetic material of T_2 phage

2) DNA is the genetic material of T_2 phage

3) Both protein and DNA are the genetic material of T_2 phage

4) Both 1 and 2

17. Identify the correct statements :

I. Nitrogen Base and sugar are linked by 3'→2' N-glycosidic bond

II. Phosphate is linked to sugar by phosphodiester bond

III. Phosphodiester bond link two polynucleotide together

IV. DNA is an acidic molecule

V. Hershey and Chase proved genetic material is DNA in bacteriophage

1) I and V only 2) I, IV and V only

3) IV and V only 4) IV only

18. A molecule that can act as a genetic material must fulfill the traits given below: except

1) it should be able to express itself in the form of Mendelian characters

2) it should be able to generate its replica

3) it should be unstable structurally and chemically

4) it should provide the scope for slow changes that are required for evolution.

19. Which among the following is correct statement

1) Only DNA is able to mutate

2) RNA is chemically and structurally stable

3) RNA is usually single stranded

4) DNA can directly code for protein

20. In Meselson and Stahl's experiment (1958), generation one showed $^{15}N/^{14}N$ hybrid DNA. Why?

1) Because the generation time of E.coli (culture) was about 20 minutes, in ^{14}N medium

2) Because it would take 20 minutes for RNA replication, in ^{14}N medium

3) Because it would take 20 minutes for replication of DNA to RNA (transcription), in ^{14}N medium.

4) Because it would take 20 minutes for translation RNA to protein in ^{14}N medium.

21. When *E.coli* with heavy isotope of nitrogen N_{15} in both the strands were allowed to multiply in a medium containing light isotope of nitrogen N^{14}, how many bands of DNA can be found in the test tube after two round of multiplication :

1) One band of DNA at the base of test tube

2) Two bands of DNA ie, one at the middle and one at the base of the test tube

3) One band at the supernatant and other band at the base of the test tube

4) One band at the supernatant and one band at the middle of the test tube

22. Taylor and collegues conducted experiments to prove semi-conservative mode of DNA replication in:

1) *E. coli* 2) λ phage

3) *Vicia faba* 4) *S. pneumoneae*

23. During DNA replication, okazaki fragments are used to elongate

1) The leading strand towards replication fork

2) The lagging strand towards replication fork

3) The leading strand away from replication fork

4) The lagging strand away from the replication fork

24. DNA polymerisation rate of DNA polymease in E.coli is

1) 1000 bp/s

2) 2000 bp/s

3) 3000 bp/s

4) 5000 bp/s

25. During DNA replication, Deoxyribonucleoside triphosphates serve dual purposes ie,

1) Act as substrate and provide energy

2) Act as catalyst and substrate

3) Act as substrate and ribozymes

4) Act as catalyst and ribonucleotides

26. Match the following enzymes with their function in DNA replication process

Column I		Column II	
1.	Helicase	a.	Joins the fragments of DNA
2.	Topoisomerase	b.	Synthesizes RNA primer
3.	DNA polymerase	c.	Polymerizes DNA
4.	RNA primase	d.	Relieves tension or strain
5.	DNA ligase	e.	Cleaves H-bonds between two strands for unwinding and uncoiling

1) 1 - a ; 2 - c ; 3 - d ; 4 - b ; 5 - e

2) 1 - a ; 2 - b ; 3 - c ; 4 - d ; 5 - e

3) 1 - e ; 2 - d ; 3 - c ; 4 - b ; 5 - a

4) 1 - b ; 2 - a ; 3 - d ; 4 - e ; 5 - c

27. During DNA replication, the leading strand is formed :

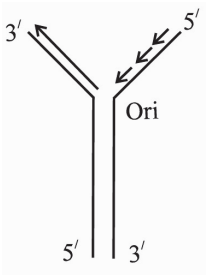
1) In $3' \rightarrow 5'$ direction towards *Ori* and away from replication fork

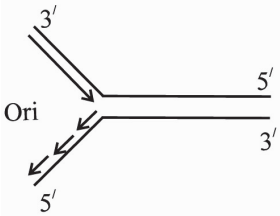
2) In $5' \rightarrow 3'$ direction towards *Ori* and away from replication fork

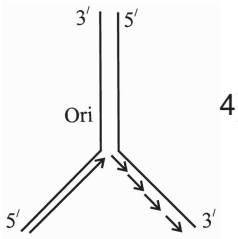
3) In $5' \rightarrow 3'$ direction towards replication fork and towards *Ori*

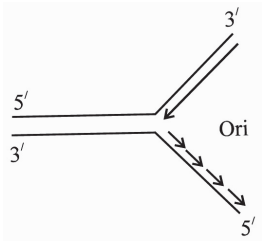
4) In $5' \rightarrow 3'$ direction towards replication fork and away from *Ori*

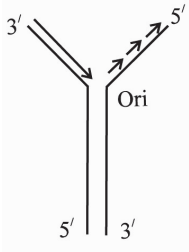
28. Which diagram correctly represent DNA replication :

1)


2)


3)


4)


5)


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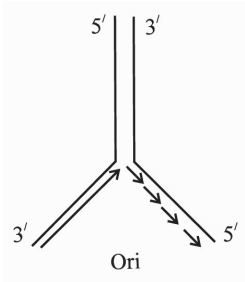


1) 2, 4 and 6 are correct

2) 1, 2, 4 and 6 are correct

3) 4 and 6 are correct

4) 3, 4 and 5 are correct

29. Polycistronic mRNA refers to :

1) Multiple mRNA to produce multiple proteins

2) Single mRNA to produce multiple proteins

3) Multiple proteins formed from one gene

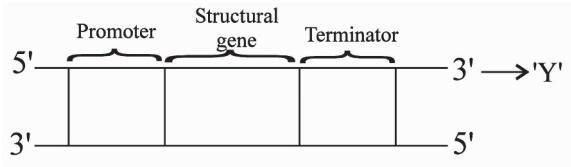
4) Single protein formed from single mRNA

30. Functional part of gene [ie, equivalent to structural gene] which can code for a polypeptide chain or protein is:

1) Operon 2) Intron

3) Cistron 4) All of these

31. Observe the diagram of a transcription unit :



Select the sentence or sentences which are correct about the strand labeled as 'Y'.

1. It is the strand of DNA which is not transcribed into RNA at a time, it is also called coding strand

2. Since it never code for an mRNA, it is also called as template strand

3. This strand is always complementary to the RNA and is called coding strand

4. The position of promoter and terminator are explained in terms of this strand

5. This strand has base sequences similar to RNA formed (except for Uracil in RNA and Thymine in strand 'Y').

6. All the reference points while defining a transcription unit is with respect to this strand

1) 1 and 2 only

2) 2 and 3 only

3) 1, 4, 5 and 6 only

4) 1, 2, and 4 only

32. The arrangement of the coding strand of transcription unit from which the mRNA with the sequence 5/ AUG CGG AGU CAG UAG - 3/ formed is :

1) 5/ - ATGCGGAGTCAGTAG - 3/

2) 3/ - TACGCCTCAGTCATC - 5/

3) 5/ - UACGCCUCAGUCAUC - 3/

4) 5/ - AUGCGGAGUCAGUAG - 3/

33. Which statement is correct with respect of RNA polymerases in eukaryotes :

1) RNA polymerase - I transcribe to form hnRNA

2) RNA polymerase - II transcribe to form rRNA [5.8s, 18s and 28s]

3) RNA polymerase - III transcribe to form precursor mRNA

4) RNA polymerase - II transcribe to form hnRNA

34. Transcription and Translation occur simultaneously in :

1) Prokaryotes

2) Eukaryotes

3) Viruses

4) None of these

35. $5' - AUGCAUGCAUGCAUG - 3'$ tail end of mRNA of eukaryote has :

1) About 400 - 500 Adenosine nucleotides

2) About 500 - 600 Adenosine nucleotides

3) About 200 - 300 Adenosine nucleotides

4) About 100 - 300 Adenosine nucleotides

36. Which is incorrect statement :

1) Capping is unusual linkage [ie, having Methyl guanylate] at 5′ end

2) Tailing of eukaryotic hnRNA shows addition of about 200 - 300 Adenine nucleotides added at 3′ end in a template independent manner.

3) RNA processing occur outside nucleus [ie, only in eukaryotes]

4) Prokaryotes have homogenous cistron; transcription and translation occuring simultaneously

37. RNA processing occurs :

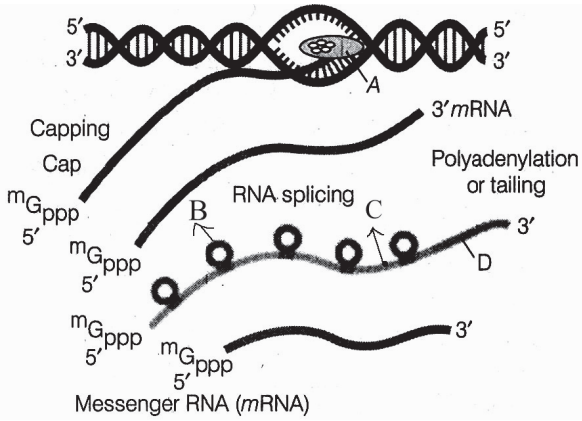
1) Inside nucleus, after translation of mRNA

2) In cytoplasm, after transcription on mRNA

3) Inside nucleus, after transcription

4) In cytoplasm, after transcription on hnRNA

38. The following diagram refers to the process of transcription in eukaryotes. Identify A, B, C and D.



1) A -RNA polymerase-II, B - Exon -

C - Intron, D - Poly-A tail

2) A -RNA polymerase-III, B - Intron -

C - Exon, D - Poly-A tail

3) A -RNA polymerase-II, B - Intron -

C - Exon, D - Poly-A tail

4) A -RNA polymerase-III, B - Intron - C - Exon, D - Poly-G tail

39. Choose the correct option

1) Splicing represent the dominance of RNA world

2) The presence of introns is reminiscent of antiquity

3) Split gene arrangements represent an ancient feature of the genome

4) All of the above

40. Untranslated regions [ie, UTR - I and II] are present at both 5′ -end (before start codon) and 3′ - end (after stop codon). They are required for :

1) Efficient transcription

2) Efficient translation

3) Efficient DNA replication

4) Efficient reverse transcription

41. Which is insoluble and most abundant RNA :

1) mRNA 2) t RNA

3) r RNA 4) All of these

42. Which statement is correct.

1) Eukaryotes have polycistronic mRNA and prokaryotes have monocistronic mRNA

2) RNA processing occur in both prokaryotes and eukaryotes

3) Dominance of RNA world is due to splicing

4) Mature mRNA has exons and introns

43. The sequence of events taking place in eukaryotes during mature or mRNA formation occur inside/at:

1) Cytoplasm

2) Nucleus

3) Ribosomes

4) None of these

44. Ribozyme (ie, Peptidyl transferase) - 23s rRNA or 28s rRNA is located in :

1) Larger subunit of ribosome

2) Smaller subunit of ribosome

3) Both larger and smaller subunit of ribosome

4) Only in smaller subunit of ribosome

45. Which among the following is smallest RNA :

1) mRNA

2) tRNA

3) rRNA

4) All of these

46. Which statement is wrong about tRNA.

1) Smallest, lightest, soluble and clover leaf shape structure RNA

2) tRNA is amino acid specific and amino acid is not tRNA specific (except methionine and tryptophan)

3) tRNA is double stranded molecule and 2° structure is biologically active

4) Reads codon on mRNA

47. Choose the incorrect pair

1)	Untranslated regions	Required for efficient translation process
2)	Release factor	Bind to stop codon for termination of translation
3)	Translational unit	Sequence of RNA with start codon only
4)	Elongation phase	Ribosome moves from codons to codons along mRNA

48. Identify the wrongly matched pair regarding tRNA.

1) Aminoacid Acceptor arm	5′ end of tRNA
2) Anticodon	Triplet of bases on tRNA
3) Actual structure	Inverted 'L' shaped
4) Charged tRNA	tRNA with amino-acid

49. In bacteria, which enzyme catalyses the transcription of all types of RNA (mRNA, tRNA and rRNA)?

1) DNA- dependent RNA polymerase

2) DNA- dependent DNA polymerase

3) RNA - dependent RNA polymerase

4) RNA - dependent DNA polymerase

50. Spliceosomes are not found in cells of

1) Plants 2) Fungi

3) Animals 4) Bacteria

51. Adapter RNA with anticodon is :

1) tRNA 2) rRNA

3) mRNA 4) All of these

52. Which one of the following also act as a catalyst in a Bacterial cell :

1) 5s rRNA 2) snRNA

3) hn RNA 4) 23s rRNA

53. The template independent nucleic acid synthesizing enzyme discovered was :

1) Polynucleotide phosphorylase

2) DNA polymerase

3) RNA polymerase

4) DNA ligase

54. Degeneracy refers to

1) one amino acid has more than one code triplet

2) one amiono acid has only one code triplet

3) codons which specify the same acids differ only in the third base of the triplet

4) Both 1 and 3

55. Which among the following have no corresponding anticodon?

1) UAG, UGA, UAA

2) UUU, CCC, GGG

3) AUG, UGG, UAC

4) ACC, UAC, AAA

56. A ribozyme is/an

1) Exception to the one gene - one RNA molecule hypothesis

2) Enzyme that adds poly A - tail to $3^{/}$ end of mRNA

3) Example of re-arrangement of protein domains caused by RNA splicing

4) RNA molecule that functions as catalyst or has enzymatic activity

57. Termination of protein synthesis or translation requires

1) Both stop signal and start codon

2) Both start codon and release factor

3) Both release factor and stop codon

4) GUG and AUG codon

58. The cellular factory responsible for the synthesis of proteins is

1) Mitochondria

2) Endoplasmic reticulum

3) Golgi body

4) Ribosome

59. The synthesis of a chain of polypeptide by mRNA is called

1) Translation 2) Transcription

3) Transition 4) Transversion

60. Which one of the following statement is true for protein synthesis (translation) :

1) Amino acids are directly recognized by m-RNA

2) There are 64 types of tRNA

3) Amino acyl tRNA synthetase is involved in translation

4) Every t-RNA molecule has more than one amino acid attachment site

61. UTRs present on mRNA refer to

1) Untranscribed regions at both $5'$ end and $3'$ end

2) Untranslated regions of $5'$ end after start codon

3) Untranslated regions at both $5'$ end and $3'$ end

4) Untranslated regions of $3'$ end before stop codon

62. Identify the wrong statement about termination step of translation.

1) Once ribosome reach the $3'$ end of mRNA stop codon arrive at 'A' site of ribosome.

2) There is no tRNA to read stop codons

3) Releasing Factors (RF) recognise initiation codon and do termination

4) Polypeptide is released and Ribosome dissociates into larger and smaller subunit

63. A non-sense mutation has taken place in 49th codon of an mRNA coding a polypeptide of 100 aminoacid. How many amino acids will be incorporated in the new protein

1) 2 separate polypeptide formed with 48 and 52 amino acids

2) Only one polypeptide formed with 100 aminoacid

3) Only one polypeptide formed with 48 aminoacid

4) Only one polypeptide formed with 52 aminoacid

64. Which enzyme catalyses peptide bond formation during translation :

1) Peptidyl transferase

2) Peptidase

3) DNA polymerase

4) RNA polymerase

65. The sythesis of polypeptide chain during translation occur in :

1) Cytoplasm

2) Nucleus

3) Both cytoplasm and nucleus

4) Only in nucleus

66. Which one of the following statement is true for protein synthesis (translation)

1) Larger subunit of ribosome has no function

2) Uncharged tRNA attach to mRNA

3) Occurs before transcription

4) Involves mRNA, charged tRNA and rRNA

67. How many of the following statements are correct

A) According to operon model, every metabolic pathway is regulated as single unit

B) In Lac operon, four genes are transcriptionally active but three genes are translationally active

C) Lac operon is an anabolic operon which is under positive regulation

D) In Lac operon, there are three genes functioning as controlling elements

E) The three enzymes coded by the three cistrons of Lac operon are galactosidase, polymerase and transphosphatase

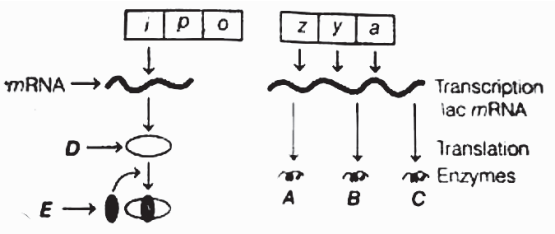
F) According to operon model, gene regulation is operating at transcriptional level

G) An operon is said to be on when the repressor protein is away from the operator gene

1) 7 2) 6

3) 5 4) 4

68. The given diagram of the lac operon showing an operon of inducible enzymes. Identify components and enzymes (A, B, C, D and E).



1) A- Galactosidase, B - Permease,

C- Transacetylase, D-Repressor protein, E-Inducer (lactose)

2) A- Galactosidase, B-Permease, C- Transacetylase, D-Inducer (lactose), E- Repressor protein

3) A- Galactosidase, B - Transacetylase, C-Permease, D- Repressor protein, E- Inducer (lactose)

4) A- Permease, B-Transcetylase, C-Galactosidase, D-Repressor protein, E- Inducer (lactose)

69. Match the following :

a.	Robert Holley	1.	Blender's experiment
b.	Neirenberg	2.	Gene regulation
c.	Severo ochoa	3.	Polynucleotide phosphorylase
d.	Jacob and Monod	4.	Proved Genetic Code is Triplet
e.	Hershey and Chase	5.	Clover leaf structure

1) a-5; b-3; c-4; d-2; e-1

2) a-5; b-4; c-1; d-2; e-3

3) a-5; b-4; c-3; d-2; e-1

4) a-5; b-4; c-2; d-3; e-1

70. How many genes in lac-operon produce enzymes :

1) 1 2) 2

3) 3 4) 4

71. In Lac operon gene regulation governing the lac 1 gene product is

1) Inducer which prevent transcription

2) Repressor which prevent transcription

3) Activator which prevent transcription

4) Inactive repressor which bind with operator

72. Identify the wrongly matched pair :

1) Operator site - Binding site for repressor molecule

2) Promoter site - Binding site for RNA polymerase

3) Structural gene - Polycistronic mRNA for 3 enzymes

4) Regulator gene - Code for inactive repressor

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

73. **Assertion** : Different proteins can be synthesised from a single molecule of mRNA in prokaryotes.

Reason : Prokaryotic structural gene is polycistronic.

74. **Assertion** : The tRNA can act as an adaptor molecule.

Reason : The tRNA can read the codon and bind to specific aminoacids.

75. Identify the incorrect option regarding human genome project.

1) It was completed in 1990

2) It aims to determine the sequence of 3 billion chemical base pairs and store it in data bases

3) It associated ethical, legal and social issues arising from the project

4) It is associated with non human organisms DNA sequences.

76. Which of the following was not the goal of Human Genome Project

1) Identify all the genes in human DNA

2) Determine the sequences of chemical base pairs that make up human DNA

3) Improve manpower for data analysis

4) Transfer related technologies to other sectors, such as industries:

77. Identify the incorrect pair

1)	Expressed sequence tags	Genes that are expressed as RNA
2)	Sequence annotation	Sequencing genome with coding sequences
3)	Automated DNA sequences	Work on the principle developed by Frederick Sanger
4)	Human model	Arabidopsis

78. The full form of ELSI is:

1) Embedded Low Software Index

2) Enzyme linked immuno Sorbent Assay

3) Ethical Legal and Social Issue

4) Endonuclease Ligase Surface Immunity

79. The major approaches used in HGP for identifying genes were

1) Enzyme Linked Immunosorbent Assay

2) Expressed Sequence Tags

3) Sequence annotation

4) 2 and 3

80. Following statements are true, Except

1) The human genome contains 3164.7 million bps

2) The average gene consists of 3000 bases, but sizes vary greatly, with the largest known human gene being Dystrophin at 2.4 million bases

3) Chromosome 1 has most genes (2968), and the X has the fewest (231).

4) The total number of genes is estimated at 30,000-much lower than previous estimates of 80,000 to 1,40.000 genes. Almost all (99.9 per cent) nucleotide bases are exactly same in all people.

81. SNPs can be used for

1) finding chromosome locations for disease associated sequences

2) tracing human history

3) evolution

4) All of the above

82. In the human being, chromosome 1 has A- genes and chromosome Y has B genes. Select the option which correctly fills A and B.

1) A - 2968, B - 231 2) A - 231, B - 2968

3) A - 2168, B - 321 4) A - 321, B - 2168

83. Which of the following statement is false?

1) Less than 2% of the human genome codes for proteins.

2) Chromosome Y has the most genes.

3) An average gene in the human Genome has 3000 bases.

4) Repeated sequences make up a large portion of the human genome.

84. Match the following using salient features of Human genome project

P.	Less than 2% genome	i.	About 3 billion nucleotide base pairs
Q.	Chromosome 1	ii.	231genes
R.	Y chromosome	iii.	2968 genes
S.	Human genome	iv.	codes for protein

1) (P-iv)(Q – iii)(R-ii)(S-i)

2) (P-iv)(Q – ii)(R-iii)(S-i)

3) (P-iv)(Q – i)(R-ii)(S-iii)

4) (P-1)(Q – iii)(R-iv)(S-ii)

85. How genetic and physical maps were generated in HGP?

1) By using DNase 2) Microsatellite

3) Recognition sites 4) Both 2 and 3

86. VNTR are useful in DNA profiling because they:

I. Are hypervariable

II. Are inherited

III. Synthesize constitutive enzymes

1) I, II, III are correct

2) I and III are correct

3) I and II are correct

4) II and III are correct

87. Satellite DNA is important because it

1) Codes for proteins needed in cell cycle

2) Shows high degree of polymorphism in population and also the same degree of Polymorphism in an individual, which is heritable from parents to children

3) Does not code for proteins and is same in all members of the population

4) Codes for enzymes needed for DNA replication.

88. The bulk of DNA (other than repetitives) forms that major peaks during density gradient contrifugation. The other small peaks are referred to as

1) Satellite DNA 2) Non-satellite DNA

3) Genomic DNA 4) Exonic DNA

89. Some of the steps of DNA fingerprinting are given below. Identify their correct sequence from the options given.

A) Electrophoresis of DNA fragments

B) Hybridisation with DNA probe

C) Digestion of DNA by restriction endonucleases

D) Autoradiography

E) Blotting of DNA fragments to nitrocellulose membrane

1) C-A-B-E-D 2) C-A-E-B-D

3) A E-C-B-D 4) A-C-E-D-B

90. VNTR belongs to the class of satellite DNA referred to as

1) microsatellite DNA 2) minisatellite DNA

3) megasatellite DNA 4) repetitive DNA

91. The existence of polymorphism is due to

1) Crossing over 2) Migration

3) Mutation 4) Both 1 & 2

92. Basis of DNA fingerprinting

1) high degree of polymorphism in sequences

2) low degree of polymorphism in sequences

3) intermediate degree of polymorphism in sequences

4) sequences show no polymorphism

93. The DNA fingerprinting is same for

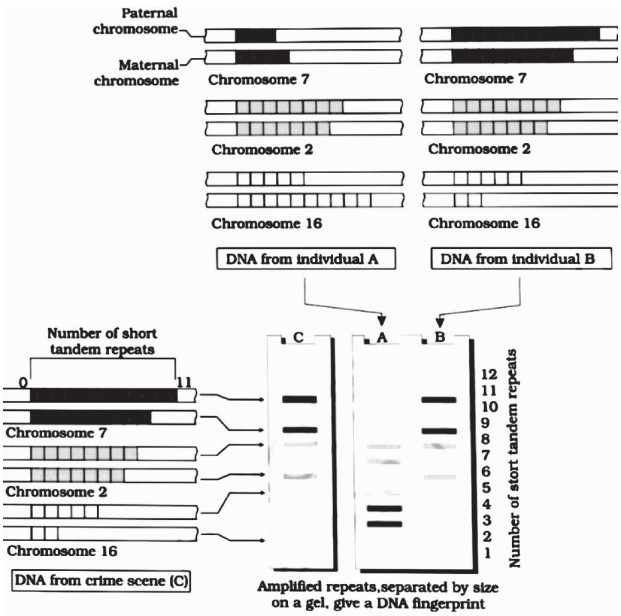
1) Monozygotic twins

2) Dizygotic twins

3) Siblings

4) Both 1 & 2

94. Which of the following cannot be inferred from the information given in the following diagram



1) The DNA from the crime scene matches Individual B

2) VNTRS are hypervariable

3) The larger fragments remain near the point on introduction in the gel electrophoresis

4) The smaller chromosomes in the human genome have smaller repeats of VNTR

95. DNA or RNA segment tagged with a radioactive molecule is called

1) Vector 2) Probe

3) Clone 4) Plasmid

96. Which is the basis of genetic mapping of the human genome as well as DNA fingerprinting?

1) Polymorphism in the DNA sequence

2) Single nucleotide polymorphism

3) Polymorphism in hnRNA sequence

4) Polymorphism in the RNA sequence

97. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence, called as

1) Single nucleotides

2) Polymorphic DNA

3) Bulk DNA

4) Repetitive DNA

98. Repetitive sequences are stretches of DNA with repeated bases many times in a genome, but

a) These sequences are of no transcriptional Function

b) These are associated with euchromatin region

c) These helps to identify a person on the basis of its DNA specificity

1) Only (b) is incorrect

2) Both (b) & (c) are incorrect

3) All are correct

4) Both (a) & (b) are correct

99. What is it that forms the basis of DNA fingerprinting?

1) Satellite DNA occurring as highly repeated Short DNA segments

2) The relative proportions of purines and pyrimidines in DNA

3) The relative difference in the DNA occurrence blood, skin and saliva

4) The relative amount of DNA in the ridges and grooves of the fingerprints

100. Choose the incorrect statement about Human Genome Project (HGP)

1) Commonly used host for cloning in HGP were BAC (Bacterial Artificial Chromosome) and GMO (Genetically Modified Organisms)

2) The alignment of sequences obtained was done by computer based programs

3) The developed sequences were annotated and were assigned to each chromosome

4) The human genome has 22 autosomes X and Y

SAMPLE QUESTIONS

1. DNA as an acidic substance present in nucleus was first identified by Friedrich Meischer in

1) 1868

2) 1869

3) 1867

4) 1926

2. In some viruses the flow of information is in reverse direction, that is, from RNA to DNA. The example include

1) Lambda phage 2) HIV

3) T_2 bacteriophage 4) All of these

3. A molecule that can act as a genetic material must fulfill the following criteria:

1) It should not be able to generate its replica (Replication).

2) It should be unstable chemically and structurally.

3) It should provide the scope for slow changes (mutation) that are required for evolution.

4) It should not be able to express itself in the form of 'Mendelian Characters'

4. Experiments involving use of radioactive thymidine to detect distribution of newly synthesised DNA in the chromosomes was performed on Vicia faba (faba beans) by Taylor and colleagues in

1) 1926 2) 1958

3) 1953 4) 1952

5. E. coli that has only 4.6×10^6 bp completes the process of replication within 18 minutes; that means the average rate of polymerisation has to be approximately

1) 200 bp per second

2) 20 bp per second

3) 2000 bp per second

4) 2200 bp per second

6. The human chromosome with the highest and least number of genes in them are Respectively

1) Chromosome 21 and Y

2) Chromosome 1 and X

3) chromosome 1 and Y

4) Chromosome X and Y

7. In E. Coli, the lac operon gets switched on when

1) lactose is present and it binds to the Repressor

2) repressor binds to operator

3) RNA polymerase binds to the operator

4) lactose is present and it binds to RNA Polymerase

8. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?

1) 20% 2) 40%

3) 30% 4) 60%

9. How far is each base pair from the next one in DNA double helix model ?

1) 2 nm 2) 3.4 nm

3) 34 nm 4) 0.34 nm

10. Which one of the following is correct?

1) Introns are present in mRNA and exons are present in tRNA.

2) Codons are present in mRNA and anticodons in tRNA.

3) Every intron is a set of three terminator codons.

4) Exons are present in eukaryotes while introns are present in prokaryotes

11. The process of splicing in eukaryotes :

1) Is reminiscent of antiquity

2) Represents dominance of RNA world

3) Is removal of exons and joining of introns

4) Is a legacy of organic evolution

12. In Hershey and Chase experiment, what finding led to the conclusion that DNA is the genetic material?

1) The presence of radioactivity in the bacteria when ^{35}S was used.

2) The presence of radioactivity in the supernatant when ^{35}S was used.

3) The presence of radioactivity in the bacteria when ^{32}P was used.

4) The presence of radioactivity in the supernatant when ^{32}P was used

13. Which one of the following is dual function codon?

1) AUG 2) UGA

3) UAA 4) UAG

14. Human genome consists of approximately

1) 3×10^9bp

2) 6×10^9bp

3) 20,000 -25,000bp

4) 2.2×10^4 bp

15. The function of the rho protein is

1) To help terminate translation

2) To help RNA polymerase bind to the DNA

3) To help RNA polymerase find a promoter

4) To help terminate transcription

16. Consider the following statements:

I. The largest known human gene is dystrophin at 2.4 million bases is located on X-chromosome

II. Repeated sequences make up very large portion of the human genome

III. Lac operon work exhibit positive regulation only

Which of the above statements are true?

1) I and II only 2) I and III only

3) II and III only 4) I, II and III only

17. Reverse transcriptase is a:

1) DNA dependent RNA polymerase

2) RNA dependent DNA polymerase

3) RNA dependent RNA polymerase

4) DNA dependent DNA polymerase

18. **Assertion** : In Griffith's experiment mice were injected by a mixture of heat killed Smooth type bacteria and live Rough type bacteria. Some mice died of pneumonia and their blood contained both live Rough type bacteria and live Smooth type bacteria

Reason : The dead Smooth type bacteria became alive and caused pneumonia. Griffith named it as transforming principle.

1) Both Assertion and Reason are true and the reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the reason is not the correct explanation of The assertion

3) Assertion is true but Reason are false

4) Both Assertion and Reason are false

19. The process where DNA fragments are transferred to nylon sheet on the gel for soaking is called as

1) Southern blotting 2) Northern blotting

3) Western blotting 4) Sanger method

20. In Streptococcus pneumoniae

1) virulent form is smooth.

2) virulent form is rough.

3) Nonvirulent form is capsulated.

4) all forms are rough

21. The promoter site and the terminator site for transcription are located at

1) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit.

2) the 5' (upstream) end only

3) The 3' (downstream) end only

4) 3' (downstream) end and 5' (upstream) end Respectively of the transcription unit

22. Select the two correct statement out of the four statement given below about " Lac operon"

I. Glucose or galactose may bind with the repressor and inactivate it

II. In the absence of lactose the repressor bind with the operator region

III. The Z-gene codes for permease

IV. This was elucidated by Francois Jacob and Jacques Monod

The correct statements are

1) II and III 2) I and III

3) II and IV 4) I and II

23. Which one of the following statement about Histone is wrong?

1) Histones are rich in amino acids – Lysine and Arginine.

2) Histones carry a positive charge in the side chain.

3) Histones are organized to form a unit of 8 molecules.

4) The pH of histones is slightly acidic

24. During density gradient centrifugation, major peaks are formed by

1) Bulk DNA 2) Repetitive DNA

3) Genomic DNA 4) Both 1 & 3

25. Two major methodologies used in HGP were

1) Expressed sequence tags or EST's

2) Sequence annotations

3) Southern blotting

4) Both 1 and 2

26. VNTR is similar for

1) Monozygotic twins 2) Dizygotic twins

3) Any two individuals 4) All of these

27. **Statement I** : Methionine and Tryptophan are the only two amino acids that does not show degeneracy

Statement II : Degeneracy is the property whereby one codon always code for one particular specific amino acid only.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

28. **Assertion** : Nucleosomes are present only in prokaryotic DNA

Reason : DNA of the prokaryote is packed with histones.

1) Both Assertion and Reason are true and the reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the reason is not the correct explanation of The assertion

3) Assertion is true but Reason are false

4) Both Assertion and Reason are false

29. Whose method was used for automated DNA sequencing in HGP

1) Alec Jeffreys 2) F. Sanger

3) Hugo De Vries 4) Watson and Crick

30. Father of DNA fingerprinting is

1) Alec Jeffreys 2) Mendel

3) Hugo De Vries 4) Ochoa

31. **Statement I** : In Prokaryotes, transcription and translation occurs simultaneously in cytoplasm

Statement II : In eukaryotes, translation occurs in nucleus and transcription in cytoplasm.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

32. **Assertion** : DNA polymerase synthesizes DNA in 5'→3' direction

Reason : DNA is negatively charged due to the presence of phosphate.

1) Both Assertion and Reason are true and the reason is the correct explanation of the Assertion

2) Both Assertion and Reason are true but the reason is not the correct explanation of The assertion

3) Assertion is true but Reason are false

4) Both Assertion and Reason are false

33. Inducer in Lac operon is

1) Lactose 2) allolactose

3) beta galactosidase 4) both 1 and 2

34. How DNA can be as a useful tool in the forensic applications?

1) Showing the same degree of DNA polymorphism with hair follicles saliva, skin etc of an individual

2) Showing different degrees of DNA polymorphism in saliva of an individual

3) Showing same degrees of DNA polymorphism with RBC of blood of an individual

4) Showing different degrees of DNA polymorphism in hair follicles of an individual

35. There was research going on using mRNA codon sequence to find out the approximate amino acid sequence of the protein. The mRNA sequence is 5'AGUAGACAUGAUCAGGGCGCC3'. From the given polypeptide chain, which amino acid sequence will be obtained in the polypeptide, from the given mRNA, after translation?

1) Ser-Arg-His-Gln-Glu-Gly-Ala

2) Ser-Arg-His-Glu-Gln-Ala-Gly

3) Ser-Arg-Glu-His-Gln-Gly-Ala

4) Ser-Arg-His-Asp-Gln-Gly-Ala

36. Find the incorrect match.

	Column I	Column II
1)	Meischer' experiment	1869
2)	Avery, Mccarthy and Macleod experiment	1933-1949
3)	Hershey and Chase experiment	1952
4)	Meselson and Stahl experiment	1958

37. A student of biochemistry wanted to synthesize RNA without the aid of DNA in vitro, with defined combination of the bases. The enzyme that can be used is

1) DNA polymerase

2) Polynucleotide phosphorylase

3) RNA polymerase II

4) Peptidyl transferase

38. The enzyme that unwinds DNA during transcription is

1) DNA helicase 2) DNA polymerase

3) RNA Polymerase 4) DNA Gyrase

39. Human genome contains

1) 3614.7 million base pairs

2) 3617.4 million base pairs

3) 3146.7 million base pairs

4) 3164.7 million base pairs

40. Find the correct match

	Column I	Column II
1)	Prokaryotes	Mostly monocistronic
2)	Eukaryotes	Mostly polycistronic
3)	Dominance of RNA world	Introns
4)	Cistron	Code for polypeptide chain

41. Find the incorrect match

	Column I	Column II
1)	Severo Ochoa	DNA Independent RNA polymerase
2)	Nirenberg	Cell free system
3)	Har Gobind Khorana	Deciphered Codon
4)	Sanger	Automated DNA sequencers

42. During the DNA replication process, leading strand is formed in

1) towards Ori and away from replication fork

2) towards Ori and towards replication fork

3) away from Ori and towards replication fork

4) towards Ori and towards replication fork

43. Find the incorrect statement

1) Repeated sequences make up very large portion of the human genome.

2) Repetitive sequences are stretches of DNA sequences that are repeated many times, sometimes hundred to thousand times. They are thought to have direct coding functions, but they shed light on chromosome structure, dynamics and revolution.

3) Chromosome 1 has most genes (2968), and the Y has the fewest (231).

4) Scientists have identified about 1.4 million locations where single base DNA differences (SNPs – single nucleotide polymorphism, pronounced as 'snips') occur in humans. This information promises to revolutionise the processes of finding chromosomal locations for disease-associated sequences and tracing human history

44. Read the following statements and find the incorrect one

1) Allelic sequence variation has traditionally been described as a DNA polymorphism if more than one variant (allele) at a locus occurs in human population with a frequency greater than 0.1.

2) If an inheritable mutation is observed in a population at high frequency, it is referred to as DNA polymorphism.

3) There is a variety of different types of polymorphisms ranging from single nucleotide change to very large scale changes.

4) The technique of DNA fingerprinting was initially developed by Alec Jeffreys

ANSWER KEY

1.	2	21.	4	41.	3	61.	3	81.	4
2.	2	22.	3	42.	3	62.	3	82.	1
3.	1	23.	4	43.	2	63.	3	83.	2
4.	1	24.	2	44.	1	64.	1	84.	1
5.	3	25.	1	45.	2	65.	1	85.	4
6.	3	26.	3	46.	3	66.	4	86.	3
7.	4	27.	4	47.	3	67.	4	87.	2
8.	4	28.	1	48.	1	68.	1	88.	1
9.	4	29.	2	49.	1	69.	3	89.	2
10.	3	30.	3	50.	4	70.	3	90.	2
11.	1	31.	3	51.	1	71.	2	91.	3
12.	3	32.	1	52.	4	72.	4	92.	1
13.	2	33.	4	53.	1	73.	1	93.	1
14.	1	34.	1	54.	4	74.	1	94.	4
15.	1	35.	3	55.	1	75.	1	95.	2
16.	4	36.	3	56.	4	76.	3	96.	1
17.	3	37.	3	57.	3	77.	2	97.	4
18.	3	38.	3	58.	4	78.	3	98.	1
19.	3	39.	4	59.	1	79.	4	99.	1
20.	1	40.	2	60.	3	80.	3	100.	1

SAMPLE QUESTIONS

1.	2	10.	2	19.	1	28.	4	37.	2
2.	2	11.	2	20.	1	29.	2	38.	3
3.	3	12.	3	21.	1	30.	1	39.	4
4.	2	13.	1	22.	3	31.	3	40.	4
5.	3	14.	1	23.	4	32.	2	41.	3
6.	3	15.	4	24.	4	33.	4	42.	3
7.	1	16.	1	25.	4	34.	1	43.	2
8.	3	17.	2	26.	1	35.	4	44.	1
9.	4	18.	3	27.	3	36.	2		

WORK BOOK

Chapter 16

EVOLUTION

UNIT- I : ORIGIN OF LIFE

1. Study of history of life forms on earth is:

1) Paleontology 2) Biogeography

3) Evolutionary Biology 4) Biodiversity

2. Stellar distances are measured in

1) years 2) light year

3) nanometers 4) nautical mile

3. The age of universe is

1) 20 million years 2) 20 trillion years

3) 2 million years 4) 20 billion years

4. The origin of universe is explained by

1) Origin of earth

2) Origin of life forms

3) Big - Bang theory

4) S.L. Miller Experiment

5. According to the Big-Bang theory the temperature came down due to

1) gravitational force

2) expansion of universe

3) the formation of helium

4) due to heavy rain

6. The gas that was absent in the primitive earth atmosphere

1) Ammonia 2) Methane

3) Carbondioxide 4) Oxygen

7. The present day atmosphere of earth was formed by-

1) UV rays from the sun brokeup water into H_2 and O_2

2) O_2 combine with ammonia and methane to form H_2O and CO_2

3) The ozone layer was formed

4) All the above

8. Life appeared on earth

1) 500 million years after the formation of earth

2) 4 billion years back

3) 4.5 million years back

4) both 1 and 2 are correct

9. According to early Greek thinkers, units of life is called

1) Sperms 2) Pollen grains

3) Spores 4) Capsules of life

10. Life comes only from pre-existing life. This was experimentally proved by

1) S.L.Miller 2) Louis Pasteur

3) Haldane 4) Oparin

11. The first form of life could have originated from pre-existing non-living organic molecules. This is called

1) Spontaneous generation

2) Panspermia

3) Chemical evolution

4) Biogensis

12. Life come out of decaying and rotting matter is called

1) Biogenesis

2) Spontaneous generation

3) Chemical evolution

4) Biological evolution

13. The theory of spontaneous generation was disproved by the experiment using

1) Closed flask containing gases and electric discharge

2) Pre sterilised and closed flask with killed yeast

3) Pre-sterilised flask open to air

4) Both 2 and 3

14. The theory that explain the origin of life with experimental proof is

1) Spontaneous generation

2) Panspermia

3) Chemical evolution

4) Louis Paster's theory of biogenesis

15. Match the columns with the name of scientist and his nationality

Scientist		Place	
1)	Oparin	A)	England
2)	Haldane	B)	America
3)	S.L.Miller	C)	Russia

1) 1-A, 2-B, 3-C 2) 1-C, 2-A, 3-B

3) 1-C, 2-B, 3-A 4) 1-A, 2-C, 3-B

16. The primitive earth conditions created by S.L. Miller in his experiment include

1) Electric discharge in a closed flask

2) The flask containing CH_4, H_2, NH_3 and water vapour

3) High temperature at 800^0C

4) all the above

17. S.L. Miller's experiment produced

1) Amino acids 2) Sugars

3) Pigments and fats 4) all the above

18. Which of the following is not present in Miller's apparatus ?

1) CH_4 2) NH_3

3) H_2 4) CO_2

19. The first non-cellular forms of life originated would have been

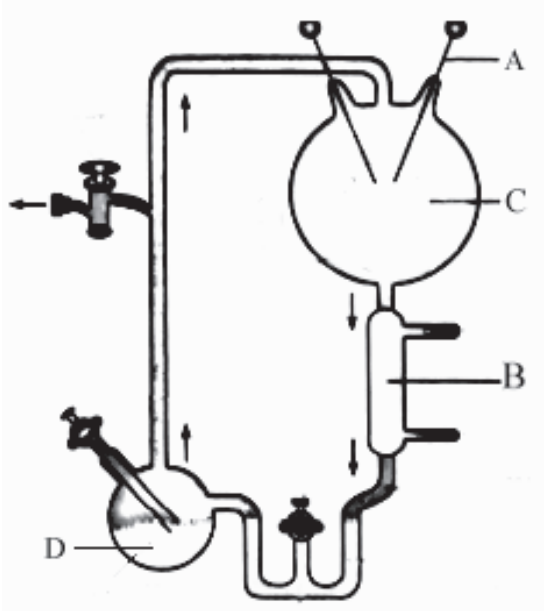
1) giant molecules like RNA, protein, polysaccharides

2) Prokaryotic forms

3) Unicellular forms

4) Eukaryotic forms

20. Identify and find the correct labels in the following sequences



1) A-Condenser, B- Electrode, C- boiling water, D- gases

2) A- electrode, B - condenser, C-gases, D- boiling water

3) A- Boiling water, B - electrode, C- gases, D- Condenser

4) A- electrode, B- Boiling water, C- gases, D- Condenser

UNIT- II
EVOLUTION OF LIFE FORMS- A THEORY

21. "All living organisms, that we see today were created as such". This statement belongs to

1) Spontaneous generation

2) Panspermia

3) Special creation

4) Chemical evolution

22. The connotation(s) of special creation is/ are

1) All organisms are created as such

2) The diversity was always same since creation and will be same in future also

3) Earth is around 4000 years old

4) All of the above

23. The voyage HMS Beagle used for exploring the diversity of living forms by

1) Alfred Wallace 2) Louis Pasteur

3) Charles Darwin 4) S.L. Miller

24. "Existing living forms share similarities to varying degrees not only among themselves, but also with life forms that existed million of years ago". This statement is the conclusion of the observations done by

1) Alfred Wallace 2) S.L. Miller

3) Louis Pasteur 4) Charles Darwin

25. The organisms with built in variations in characteristics, can survive better and out breed others in a population by enabling them to utilize

1) Climate 2) Food

3) Physical factors 4) All the above

26. According to Darwin, "fitness" refers to

1) Reproductive fitness

2) Physical health

3) Resource utilisation

4) All the above

27. Those who are better fit in an environment

1) leave more progeny than others

2) will survive more

3) are selected by nature

4) all the above

28. Alfred Wallace conducted his studies at

1) Galapago's Islands

2) Malay Archepelago

3) Ethiopia and Tansmania

4) African grass lands

29. Which of the following is with smallest duration

1) period 2) era

3) epoch 4) eon

30. **Statement I** : The geological history of earth closely correlates with the biological history of earth.

Statement II : Darwin implide natural selection as a mechanism of evolution

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

EVIDENCES FOR EVOLUTION

31. The remains of hard parts of life forms found in rocks are called

1) sedimentary rocks

2) fossils

3) palentology

4) living fossils

32. **Statement I** : Different aged rocks sediments contain fossils of different life forms who probably evolved after the formation of the particular sediment.

Statement II : Study of fossils in different sedimentary layers indicates the geological period in which they existed.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

33. Identify the wrong statement

1) Cross-section of earths crust indicates the arrangement of sediments one over the other

2) Different aged rock sediments contain fossils of life forms

3) All the fossils appear similar to modern organisms

4) Study of fossils in different sedimentary layers indicates the geological period in which they existed

34. The study of fossils is called

1) Evolutionary Biology

2) Paleontology

3) Morphology

4) Anatomy

35. Embryological support for evolution was proposed by

1) Thomas Malthus

2) Charls Darwin

3) Ernst Hackel

4) Alfred Wallace

36. **Statement I** : During embryonic stage contain features that are common to all vertebrates.

Statement II : Embryos never pass through the adult stages of other animals.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

37. Different structures evolving for the same function and hence having similarity are

1) Homologous organs

2) Vestigeal organs

3) Analogous organs

4) Divergent evolution

38. Same structure developed along different directions due to adaptations to different needs- it is called

1) Homologus organs

2) Analogous organs

3) Vestigial organs

4) Convergent evolution

39. Homology indicates

1) Convergent evolution

2) Analogous organs

3) Vestigial organs

4) Common ancestry

40. Homologus organs are formed as a result of

1) Convergent evolution

2) Divergent evolution

3) Parallel evolution

4) genetic drift

41. Anatomically different structures with same function are

1) Homologous organs

2) Divergent evolution

3) Analogous organs

4) Vestigial organs

42. Analogous organs are formed by

1) Convergent evolution

2) Divergent evolution

3) Parallel evolution

4) Speciation

43. Identify the odd one from the following

1) thorn and tendrils of Bougainvillea and Cucurbitta

2) Heart of vertebrates

3) fore limb of mammals

4) Potato and Sweet potato

44. Which of the following is not showing a common ancestry

1) Divergent evolution

2) Homologous organs

3) Vestigial organs

4) Analogous organs

45. Similarities in proteins and genes show

1) Common ancestry

2) Convergent evolution

3) Analogy

4) All the above

46. Studies on natural selection examplified by industrial melanism was the observations came from

1) Russia

2) America

3) England

4) Galapagos Islands

47. As per the observations, the type of moths dominated in the area before industrialisaion was

1) White winged

2) dark winged moths

3) melanised moths

4) equal proportion of white winged and melanised moths.

48. The domination of white winged and melanised moths before and after industrialisation was explained as

1) the predators can't observe the moths in contrasting background

2) the prey can merge with the contrasting background

3) the predators will spot a moth against a contrasting background

4) gene mutation results in the formation of melanised moth in the polluted environment

49. "In a mixed population those that can better adapt, survive and increase in population size". This statement is applicable to which of the following

1) Genetic drift

2) Industrial melanism

3) Convergent evolution

4) Embryological support for evolution

50. Identify the evolution by anthropogenic action

1) Development of drug resistant organisms

2) Development of antibiotic resistant bacteria

3) Development of pesticide resistant insects

4) All of the above

51. Identify the wrong statement

1) Evolution is a directed process in the sense of determinism

2) Evolution is a stochastic process based on chance events in nature

3) Evolution is a stochastic process based on chance mutation in organisms

4) Both 2 and 3

ADAPTIVE RADIATION

52. Darwin observed the small black birds later called Darwin finches in

1) Malay Archipelago

2) Ethiopic and Tangenta

3) Galapagos Islands

4) HMS Beagle

53. Darwin's finches represent one of the best examples of the phenomenon

1) Adaptive radiation

2) Convergent evolution

3) Analogy

4) Parthenogenesis

54. Identify the example for adaptive radiation

1) Darwin's finches

2) Australian marsupials

3) Australian placental mammals

4) All the above

55. When more than one adaptive radiation appeared to have occurred in an isolated geographical area with different habitats, it can be considered as

1) Divergent evolution

2) Convergent evolution

3) Natural selection

4) Industrial melanism

56. Match the following

1	Ant eater	A	Tansmanion tiger-cat
2	Lemur	B	Numbat
3	Bob cat	C	Marsupial mouse
4	Mouse	D	Spotted cuscus

1) 1-C, 2-D, 3-B, 4-A

2) 1-B, 2-D, 3-A, 4-C

3) 1-D, 2-B, 3-A, 4-C

4) 1-B, 2-A, 3-D, 4-C

57. Convergent evolution can be observed between

1) Bob cat and Tansmanian wolf

2) Mouse and Numbat

3) Mole and spotted cuscus

4) Flying squirrel and flying phalenger

BIOLOGICAL EVOLUTION

58. In true sense, evolution by natural selection was originated on earth, when

1) Photosynthetic forms are evolved

2) Heterotropic organisms are formed

3) Cellular forms with differences in metabolic capabilities are formed.

4) Organic molecules are formed

59. The essence of Darwinian theory about evolution is

1) Natural selection

2) Branching descent

3) Adaptive radiation

4) Mutation

60. The rate of appearance of new forms linked to

1) ability of multiplication

2) life span

3) life cycle

4) all the above

61. What is the basis of getting selected and to evolve

1) inheritance of characters

2) fitness of the organism

3) ability to adapt

4) all the above

62. The key concept of Darwinian theory of Evolution

1) Branching descent

2) Mutation

3) Natural selection

4) Both 1 and 3

63. "Use and diuse' theory of evolution was put forwarded by

1) Darwin 2) Lamark

3) Alfred Wallace 4) Louis Pasteur

64. Inheritance of acquired characters is the reason for evolution-was proposed by

1) Lamark 2) Alfred wallace

3) Thomas Malthus 4) Darwin

65. Elongation of neck in succeeding generations in Giraffes by attempting forage leaves on tall trees is an example for

1) Adaptive radiation

2) Divergent evolution

3) Inheritance of acquired character

4) Natural selection

66. **Statement I** : When we describe the story of this world, we describe evolution as a process

Statement II : When we describe the story of life on earth, evolution as a consequence of natural selection.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

67. Which of the following conditions, are factual that forms the basis of Natural selection

1) Limited natural resources

2) Populations are stable in size except for seasonal variations

3) Most of the variations are inherited

4) all of the above

68. **Statement I** : Theoritically population size grow exponentially if everybody reproduced maximally.

Statement II : In reality population size are limited due to competition for resources among them.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

69. The brilliant insight and novelty of Darwin's concept on evolution was

1) The variations should be heritable

2) The utilization of resources should be better

3) They must leave more progeny

4) All of the above

70. Darwin was influenced by the principles developed by .....on populations

1) Louis pasteur 2) Alfred Wallace

3) Gregor Mendel 4) Thomas Malthus

BIOLOGICAL EVOLUTION

71. The large difference arising suddenly in a population due to

1) Natural selection 2) Chemical evolution

3) Mutation 4) Abiogenesis

72. Theories on evolution based on mutation was put forwarded by

1) Charl's Darwin 2) Hugo de Vries

3) Gregor Mendel 4) Thomas Malthus

73. Statement I : Darwinian variations are random and directionless

Statement II : Mutations are small and directional and gradual.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

74. Single step large mutation that causes speciation are called

1) Mutation 2) Hybridisation

3) Transition 4) Saltation

HARDY WEINBERG PRINCIPLE

75. The allele frequency in a population are stable and is constant from generation to generations is

1) Chromosome theory of inheritance

2) Mutation theory of evolution

3) Hardy - Weinberg principle

4) Natural selection

76. According to Hardy- Weinberg principle, the total of all the allelic frequency of a particular trait is equal to

1) 0.5 2) 1

3) 1.5 4) 2

77. In Hardey - Weinberg equilibrium, $p^2 + 2pq + q^2 = 1$. 'p' and 'q' stands for

1) p represent the allelic frequency of dominant allele

2) q represent the allelic frequency of recessive allele

3) pq represent the heterozygous forms in the population

4) all the above statements are right.

78. Identify the factor that affect the Hardy-Weinberg equilibrium

1) gene flow and gene migration

2) genetic drift

3) gene mutation and recombination

4) all the above

79. The gene migration happens multiple times it is referred as

1) Genetic drift

2) Gene flow

3) Genetic recombination

4) Natural selection

80. Changes in allelic frequency may be so different in a new sample population and form a new species. In this the original drifted population is technically called

1) Mother species 2) Parental species

3) Founders 4) Ancestral species

81. During natural selection, if more individuals acquire mean character value if specifically called

1) Directional selection

2) Disruptive selection

3) Stabilizing selection

4) Natural selection

82. In a natural selection process, if more individuals acquire value other than the mean character value is specifically called

1) Directional selection

2) Disruptive selection

3) Stabilizing selection

4) Natural selection

83. In a population if more individuals acquire peripheral character values it is specifically called

1) Directional selection

2) Disruptive selection

3) Stabilizing selection

4) Natural selection

A BRIEF ACCOUNT OF EVOLUTION

84. The first cellular forms of life appeared on earth

1) 200 mya 2) 2000 mya

3) 200 bya 4) 2000 bya

85. Identify the correct sequence of events during the formation of different organisms.

a) Some cells acquire the ability to release O_2

b) Single celled organisms become multicellular forms

c) Non- cellular aggregates of macro molecules could evolve into cells with membraneous envelop

1) a,c,b 2) c,b,a

3) c,a,b 4) b,c,a

86. Match the following

Time period		Organism	
1)	500 mya	a)	Sea- weeds
2)	350 mya	b)	Extinction of Dinosaures
3)	320 mya	c)	Invertebrates
4)	100-200 mya	d)	Jawless fish
5)	65 mya	e)	Reptiles

1) 1-c, 2-a, 3-d, 4-e, 5-b

2) 1-c, 2-d, 3-a, 4-e, 5-b

3) 1-c, 2-c, 3-d, 4-a, 5-b

4) 1-d, 2-b, 3-c, 4-e, 5-d

87. The ancestors of modern day frogs are

1) lobe fins 2) reptiles

3) ichthyosaurus 4) tyranosaurus

88. The first organisms that were invaded into land are

1) amphibians 2) reptiles

3) plants 4) coelocanth

89. In South Africa, the fish caught in the year 1938,which was thought to be extinct was .....

1) Sauropsids 2) Therapsids

3) Pelycosaurs 4) Coelacanth

90. The fish like reptiles evolved are

1) Tyranosaurus 2) Stegosaurus

3) Ichthyosaurus 4) Branchiosaurus

91. South American fauna is overridden by N. American fauna due to

1) Genetic drift

2) Founder effect

3) Continental drift

4) Convergent evolution

ORIGIN AND EVOLUTION OF MAN

92. Dryopithecus and Ramapithecus were existing

1) 10 mya 2) 15 mya

3) 2 mya 4) 3-4 mya

93. Fossils of man-like bones were discovered in Ethiopia and Tansamia. They belongs to the period

1) 15 mya 2) 3-4 mya

3) 1-5mya 4) 75000- 10000 year

94. Identify the organism, with the following salient features.

a) Probably lived in East African Grasslands

b) Probably not taller than 4 feet but walked up right

c) Their bones were obtained from Ethiopia and Tanzania

1) Ramapithecus 2) Dryopithecus

3) Australopithecus 4) *Homo erectus*

95. The first human like being the hominid was

1) Australopithecus

2) *Homo erectus*

3) *Homo habilis*

4) Neanderthal man

96. The brain capacity of Neanderthal man is

1) 650-800 cc 2) 900 cc

3) 1000 cc 4) 1400 cc

97. Neanderthal man lived in

1) Ethiopia 2) Tanzania

3) Central Asia 4) Java

98. The fossils of *Homo erectus* was obtained from

1) Ethiopia 2) Tanzania

3) Central Asia 4) Java

99. Pre historic cave art developed about

1) 2 mya 2) 1.5 mya

3) 18000 years ago 4) 10000 years ago

100. Human settlements started and agriculture practices came around

1) 2 mya

2) 1.5 mya

3) 18000 years ago

4) 10000 years ago

SAMPLE QUESTIONS

1. Who proposed the theory of chemical evolution

1) Oparin and Haldane

2) Lamark

3) Darwin

4) Mendel

2. The first life form is believed to have appeared on earth about

1) 4.6 billion years ago

2) 4 billion years ago

3) 2 million years ago

4) 1 billion years ago

3. Which gas was absent in the primitive atmosphere of Earth

1) Oxygen

2) Carbondioxide

3) Methane

4) Hydrogen

4. S.L. Miller's experiment supported

1) Theory of special creation

2) Chemical origin of life

3) Big bang theory

4) Theory of spontaneous generation

5. Analogous organs evolved due to

1) Convergent evolution

2) Divergent evolution

3) Adaptive radiation

4) Mutation

6. Which of the following is an example of homologous organs

1) Wing of bat and wings of butterfly

2) Forelimbs of a whale and human arm

3) Wings of bird and wings of insect

4) Eye of octopus and eye of vertebrate

7. The presence of gill slits in human embryo suggests

1) adaptation of aquatic life

2) common ancestory with fishes

3) mutation in embryonic development

4) a vestigeal structure

8. Darwins theory of natural selection was based on

1) Use and disease of organs

2) Inheritance of acquired characters

3) Survival of the fittest

4) Mutation theory

9. Which of the following is NOT a principle of Darwins theory

1) Over production

2) Struggle for existence

3) Acquired traits are inherited

4) Survival of the fittest

10. Industrial melanism in peppered moths is an example of

1) Genetic drift

2) Natural selection

3) Artificial selection

4) Mutation

11. Hardy - Weinberg principle states that

1) Evolution is a continuous process

2) Allele frequencies remain constant in a population

3) New species arise suddenly

4) Genetic drift does not affect evolution

12. The founder effect is associated with

1) Migration of individuals

2) Natural selection

3) A small group establishing a new population

4) Large population size

13. Which type of selection favours individuals with intermediate traits

1) Stabilizing selection

2) Directional selection

3) Disruptive selection

4) Artificial selection

14. Evolutionary relationships are studied using

1) Palentology

2) DNA sequencing

3) Homologous structures

4) All the above

15. The idea of inheritance of acquired characters was proposed by

1) Darwin 2) Lamark

3) Wallace 4) Malthus

16. Which gas was most abundant in the primitive earth atmosphere

1) Hydrogen 2) Oxygen

3) Carbondioxide 4) Nitrogen

17. Fossils are generally found in

1) Igneous rocks 2) Sedimentary rocks

3) Metamorphic rocks 4) Sandy soil

18. Who proposed Mutation theory of Evolution

1) Lamark 2) Darwin

3) Hugo de Vries 4) Louis Pasteur

19. Which species is considered as the direct ancestor of modern man (*Homo sapiens*)

1) *Homo habilis*

2) *Dryopithecus*

3) *Homo erectus*

4) Australoprithecus

20. Hardy-Weinberg Equilibrium is disrupted by

1) Large population size

2) Random mating

3) Gene flow or gene migration

4) No natural selection

21. Which evolutionary process occurs due to chance rather than natural selection?

1) Gene flow

2) Genetic drift

3) Adaptive radiation

4) Natural selection

22. Which group of organisms dominated during mesozoic era

1) Mammals 2) Amphibians

3) Dinosaurs 4) Bacteria

23. Which of the following was the first genetic material

1) DNA 2) RNA

3) Proteins 4) Lipids

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

24. **Assertion** : The early atmosphere of earth lacked free oxygen

Reason : Molecular oxygen was produced later by cyanobacteria through photosynthesis.

25. **Assertion** : Homologous organs show common ancestry.

Reason : Homologous organs have similar structure with same origin but different functions.

26. **Statement I** : Gene flow between population increase genetic diversity

Statement II : Migration of individuals from one population to another can result in gene flow

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

27. **Statement I** : Evolution occurs through a process of natural selection, where individuals with beneficial traits survive and reproduce.

Statement II : According to Darwin individuals can pass on acquired traits to their offspring.

1) Both Statement I and Statement II are correct

2) Both Statement I and Statement II are incorrect

3) Statement I is correct but Statement II is incorrect

4) Statement I is incorrect but Statement II is correct

28. The first life forms were most likely

1) Aerobic and auto trophic

2) Anaerobic and hetero trophic

3) Aerobic and heterotrophic

4) Anaerobic and auto trophic

29. The presence of homologous organs in different species indicates

1) Convergent evolution

2) Divergent evolution

3) Mutation

4) Genetic drift

30. Archeopteryx is considered as a connecting link between

1) Amphibians and reptiles

2) Birds and Mammals

3) Reptiles and Birds

4) Fishes and Amphibians

31. The finches of Galapagos Islands provide Darwin, the evidence for

1) Convergent evolution

2) Adaptive radiation

3) Mutation

4) Artificial selection

32. Which of the following does not contribute to evolution.
1) Gene flow
2) Genetic drift
3) Random mating
4) Natural selection

33. Who disproved the theory of spontaneous generation?
1) Charls Darwin 2) Louis Pasteur
3) Alfered Wallace 4) Gregor Mendel

34. Which event is considered as the first step in chemical evolution
1) formation of prokaryotic cells
2) formation of complex organic molecules
3) formation of DNA
4) origin of eukaryotic cells

35. The Panspermia theory suggests that life originated from
1) deep sea hydrothermal vents
2) lightening induced chemical reactions
3) spores from outer space
4) volcanic activity

36. Which type of evolution results in similar traits in unrelated species
1) Divergent evolution
2) Convergent evolution
3) Adaptive radiation
4) Natural selection

37. Which of the following is an example for directional selection
1) Average sized individual are favoured
2) Both small and large sized individuals are favoured
3) One extreme types phenotype is favoured over the other
4) A random change is allele frequency

38. What does the phrase "survival of the fittest" mean
1) The strongest individuals survive
2) Organisms with the best adpatations survive and reproduce
3) Only the fastest growing organisms survive
4) Organisms evolve according to their needs

39. The Hardy -Weinberg equilibrium, states that allele frequencies in a population remains constant unless affected by
1) Gene flow 2) Genetic drift
3) Mutation 4) All the above

40. The reducing atmosphere of early earth favoured
1) Synthesis of complex organic molecules
2) Decomposition of life forms
3) Formation of oxygen rich environments
4) Rapid evolution of eukaryotic cells

41. The similarities of embryos of fish, amphibians, reptiles and mammals suggest
1) Common ancestry
2) Convergent evolution
3) Adaptive radiation
4) Parallel evolution

42. Which of the following statements best defines natural selection
1) survival of the strongest individuals
2) individuals with favourite traits reproduce more successfully
3) evolution happens within one generation
4) the environment has no role in evolution

43. Which of the following supports the idea of evolution through natural selection
1) antibiotic resistance in bacteria
2) production of hybrid crops
3) cloning of animals
4) genetic modification in plants

44. The first bipedal ancestor of modern man was
1) Australopithecus
2) *Homo habilis*
3) *Homo erectus*
4) Homo neanderthalensis

45. Which early human species had the largest brain capacity
1) *Homo habilis* 2) *Homo erectus*
3) Neanderthals 4) Australopithecus

ANSWER KEY

1.	3	21.	3	41.	3	61.	4	81.	3
2.	2	22.	4	42.	1	62.	4	82.	1
3.	4	23.	3	43.	4	63.	2	83.	2
4.	3	24.	4	44.	4	64.	1	84.	2
5.	2	25.	4	45.	1	65.	3	85.	3
6.	4	26.	1	46.	3	66.	1	86.	2
7.	4	27.	4	47.	1	67.	4	87.	1
8.	4	28.	2	48.	3	68.	1	88.	3
9.	3	29.	3	49.	2	69.	4	89.	4
10.	2	30.	1	50.	4	70.	4	90.	3
11.	3	31.	2	51.	1	71.	3	91.	3
12.	2	32.	4	52.	3	72.	2	92.	2
13.	4	33.	3	53.	1	73.	2	93.	2
14.	3	34.	2	54.	4	74.	4	94.	3
15.	2	35.	3	55.	2	75.	3	95.	3
16.	4	36.	1	56.	2	76.	2	96.	4
17.	1	37.	3	57.	4	77.	4	97.	3
18.	4	38.	1	58.	3	78.	4	98.	4
19.	1	39.	4	59.	1	79.	2	99.	3
20.	2	40.	2	60.	4	80.	3	100.	4

SAMPLE QUESTIONS

1.	1	10.	2	19.	3	28.	2	37.	3
2.	2	11.	2	20.	3	29.	2	38.	2
3.	1	12.	3	21.	2	30.	3	39.	4
4.	2	13.	1	22.	3	31.	2	40.	1
5.	1	14.	4	23.	2	32.	3	41.	1
6.	2	15.	2	24.	1	33.	2	42.	2
7.	2	16.	1	25.	1	34.	2	43.	1
8.	3	17.	2	26.	1	35.	3	44.	1
9.	3	18.	3	27.	3	36.	2	45.	3

WORK BOOK

Chapter 17

HUMAN HEALTH AND DISEASE

COMMON DISEASES IN HUMAN

1. What is the present concept of health?

1) Mind influences directly our immune system

2) Mind influences our immune system by means of neural system

3) Mind influences our immune system by means of endocrine system which controls health.

4) Mind influences our immune system by means of neural and endocrine system which controls health.

2. Good humor hypothesis of health was disproved by .

1) The discovery of blood circulation by William Harvey using experimental methods

2) Demonstration of normal body temperature in people with black bile using thermometer

3) Both 1 and 2

4) Observing vector born disease

3. According to good humor hypothesis, the person with black bile

1) Belonged to black pigmentation group

2) Belonged to hot personality having jaundice

3) Belonged to hot personality having fevers

4) Belonged to black pigmentation will be prone to fever

4. The assertion by Hippocrates about health was

1) Same as that of Indian Ayurveda system

2) Different from Indian Ayurveda System

3) Supported by some other early Greeks

4) More than one option

5. The earlier concept of Health was

1) A state of body and mind

2) Where there was a balance of certain humors

3) A state of mind, body and heart

4) More than one option

6. The term 'Health' is defined in many ways. According to WHO,

1) Health is the state of body and mind in a balanced condition

2) Health is the reflection of a smiling face

3) Health is a state of complete physical, mental and social well-being

4) Health is the symbol of economic prosperity.

7. Identify the correct statement regarding typhoid fever in human beings:

1) It is caused by a pathogenic protozoan Salmonella typhi

2) The pathogen remains confined to the small intestine

3) Widal test cannot confirm the infection very early in the disease

4) Intestinal perforation and death may occur in severe cases

8. Diseases which are easily transmitted from one person to another are called

1) Acute diseases

2) Chronic diseases

3) Non-contagious diseases

4) Infectious diseases

9. The name Mary Mallon is associated with:

1) Tuberculosis 2) Typhoid

3) Leprosy 4) Rabies

10. Rhinovirus does not affect:

1) Lungs 2) Nose

3) Pharynx 4) Larynx

11. Identity the incorrectly matched pair regarding Plasmodium, the protozoan responsible for causing malaria in humans:

1)	Cause of malignant malaria	Plasmodium falciparum
2)	Clinical feature of malaria	Release of haemozoin on rupture of RBCs
3)	Fertilisation during the life cycle	Gut of female anopheles
4)	Infective stage to human	Gametocytes

12. The active form of Entamoeba histolytica feed upon

1) Erythrocytes,mucosa and submucosa of colon

2) Mucosa and submucosa of oesophagus

3) Mucosa and submucosa of liver

4) Mucosa and submucosa of gall bladder

13. Motile zygote of Plasmodium occurs in

1) gut of female anopheles

2) salivary glands of anopheles

3) human RBCs

4) human liver

14. Common cold differs from pneumonia is that

1) pneumonia is a communicable disease, whereas the common cold is a nutritional deficiency disease

2) Common cold can be prevented by immunization whereas the Pneumonia has no effective vaccine

3) Pneumonia is caused by a virus, while the common cold is caused by the bacterium Haemophilus influenzae

4) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

15. Ringworm in humans is caused by

1) bacteria 2) fungi

3) nematodes 4) viruses

16. Ingestion of food and water contaminated with infective eggs is the primary route of infection for

1) Taenia solium

2) Wuchereria bancrofti

3) Ringworm species

4) Ascaris lumbricoides

17. Which one is correct?

1) Salmonella typhi and Haemophilus influenzae cause pneumonia

2) Widal test is done for malaria

3) Entamoeba histolytica causes amoebiasis.

4) Wuchereria causes enterobiasis.

18. Select the option where all columns are correctly matched:

	Disease	Causative organism	Feature
1	Malignant malaria	Plasmodium ovale	Cerebral involvement
2	Typhoid	Salmonella typhi	Confirmed by the VDRL test
3	Elephantiasis	Wuchereria bancrofti	Waterborne disease
4	Ringworm	Microsporum	Intense itching

19. Select the option that completes the given analogy

Pneumonia : Streptococcus pneumoniae :: Typhoid :

1) Plasmodium falciparum

2) Haemophilus influenzae

3) Salmonella typhi

4) Wuchereria bancrofti

20. Which of the following sets represent diseases communicated through contaminated food and water?

1) Typhoid and Tuberculosis

2) Typhoid and Cholera

3) Measles and Rabies

4) Tuberculosis and Measles

21. Intestinal perforation is the ultimate symptom of the extreme stage of which disorder?

1) Malaria 2) Filariasis

3) Typhoid 4) Pneumonia

22. Out of the following diseases which are caused due to bacterial infection?

a. Typhoid

b. Elephantiasis

c. Cholera

d. Tuberculosis

1) a & b only 2) b & c only

3) a, c & d only 4) a, b, c & d

23. Each of the following statements concerning pneumonia are correct,except

1) It is caused by Streptococcus pneumoniae and Hemophilus influenzae

2) Pneumonia causing bacteria grow better at 33°C than at 37°C, hence they tend to cause the disease in upper respiratory tract rather than the lower respiratory tract

3) Bacteria infects alveoli of lungs

4) In pneumonia, finger nails turn bluish in colour

24. The common cold is characterized by nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness, etc. which usually lasts for 3-7 days. Infection may occur through

1) Contaminated food and water

2) Vertical transmission

3) Droplet infection resulting from cough and sneezes

4) Bite of infected mosquito

25. Which of the following is not an intestinal parasite?

1) Entamoeba histolytica

2) Ascaris

3) Salmonella typhi

4) Plasmodium

IMMUNITY

26. Which cells are the first to phagocytize foreign particles like bacteria ?

1) fibroblasts 2) NK cells

3) neutrophils 4) mast cells

27. Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts, helps in trapping microbes entering our body. This is included in which of the following barriers?

1) Physical barriers

2) Physiological barriers

3) Cellular barriers

4) Cytokines barriers

28. Interferons are secreted by:

1) Liver 2) Spleen

3) Virus infected cells 4) Lymphocytes

29. The type of immunity responsible for graft rejection by a recipient body is

1) Innate immunity

2) Humoral immunity

3) Cell mediated immunity

4) Either 2 or 3

30. Anamnestic response is

1) First interaction of the pathogen with the body

2) More rapid and robust defense against previously encountered pathogens

3) Response against self cells

4) Response against not a potential antigen

31. Maturation of lymphocytes takes place in

1) thymus 2) Bone marrow

3) Liver 4) Both 1 and 2

32. The secretion of antibodies by B lymphocytes provides:

1) Passive immunity

2) Humoral immunity

3) Cell mediated immunity

4) Innate immunity

33. Primary lymphoid organs serve as the site for:

1) antibody formation

2) lymph formation

3) lymphocytes to encounter and bind to antigens

4) lymphocyte formation and maturation

34. In the structure of an antibody; which terminal has antigen-binding site?

1) N terminal

2) C terminal

3) N terminal of heavy chain and C terminal of light chain

4) C terminal of heavy chain and N terminal of light chain

35. Consider the following statements:

1: Innate immunity is a non-specific type of defense that is present at the time of birth.

II: Acquired immunity is pathogen-specific and is characterized by memory.

III: Memory-based acquired immunity developed in higher vertebrates based on the ability to distinguish self from non-self. cells.

Which of the above statements are true?

1) I and II only 2) I and III only

3) II and III only 4) I, II and III

36. What percent of the lymphoid tissue in human body is MALT?

1) 50% 2) 20%

3) 70 % 4) 10%

37. Antibodies present in colostrum

1) IgG 2) IgA

3) IgD 4) IgE

38. Mark the correct statement

1) MALT constitutes less than 25 percent of the Lymphoid tissue in the human body

2) In case of snake bites, the injection which is given to the victim contains preformed antibodies against the snake venom

3) Autoimmune diseases like insulin-dependent diabetes, Addison's disease, and rheumatoid arthritis can be treated by immuno therapy

4) Passive immunity provides relief only after long period and is long lasting

39. The cause of autoimmunity can be

1) Physical appearance

2) Genetic reasons

3) Reasons, which are still under research

4) Both 2 and 3

40. Which of the following statements is not correct about allergies?

1) Allergic tendency can be genetically passed on from parent to child

2) It is characterised by presence of large titre of IgE antibodies

3) Allergic response involves mast cells and basophils

4) Children living in metro cities are less sensitive to the allergens present in the environment

41. Which of the following drugs are used in the treatment of allergy and quickly reduce the symptoms of allergy?

A) Antihistamines B) Adrenaline

C) Steroids D) Chloroquine

1) A only 2) A&B

3) A, B & C 4) A, B, C & D

42. In large scale production of vaccine, recombinant DNA technology has allowed the production of 'A' of pathogen in bacteria or yeast. Here 'A' is:-

1) Pro-toxin

2) Anti-bodies

3) Antigenic polypeptide

4) Antigenic polysaccharide

43. In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to

1) graft rejection

2) auto-immune disease

3) activate immunity

4) allergic response

44. During an allergic reaction, the binding of antigens to IgE antibodies initiates a response, in which chemicals cause the dilation of blood vessels and host other physiological changes, such chemicals are

1) interterons 2) hormones

3) histamines 4) acetylamine

45. Mark the correct statement

a) MALT (Mucosa-associated lymphoid tissue) constitutes about 50% of the lymphoid tissue in the human body

b) Antigen trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause an immune response

c) B cells mediate humoral immunity

d) Secondary immune response is due to memory cells.

1) a & b are correct

2) c & d are correct

3) a, b & d are correct

4) all are correct

46. (i) Thymus (ii) Spleen (iii) Appendix (iv) MALT (v) Bone marrow

How many of the them are not secondary lymphoid organs?

1) i, iii, iv only 2) i, v only

3) i, ii, iii, iv, v 4) ii, iii, iv only

47. In the human body, cell-mediated immunity is carried out by

1) T-lymphocytes

2) B-lymphocytes

3) Erythrocytes

4) Thrombocytes

48. MALT (Mucosa-associated lymphoid tissue) constitutes:

1) 25 percent of the lymphoid tissue in the human body

2) 50 percent of the lymphoid tissue in the human body

3) 75 percent of the lymphoid tissue in the human body

4) 90 percent of the lymphoid tissue in the human body

49. A 25 year old female develops a runny nose after exposure to dust due to development of allergy. Which of the following antibodies is most likely to rise first in this condition?

1) IgG 2) IgM

3) IgE 4) IgD

50. In which of the following organ, immature lymphocytes differentiate into antigen sensitive lymphocytes?

1) Thymus 2) Spleen

3) Peyer's patches 4) Appendix

AIDS & CANCER

51. AIDS is caused by HIV, among the following, which one is not a mode of transmission of HIV?

1) Transfusion of contaminated blood

2) Sharing the infected needles

3) Shaking hands with infected persons

4) Sexual contact with infected persons

52. The early screening test for HIV infection is :

1) ELISA

2) Western Blot

3) Culture of HIV

4) Detection of opportunistic infections

53. Opportunistic infections appear in AIDS patients when the HIV has destroyed :

1) Macrophages 2) T cytotoxic cells

3) T helper cells 4) B cells

54. The immune-deficiency becomes marked once the HIV starts destroying

1) Macrophages 2) T helper cells

3) B lymphocytes 4) Natural killer cells

55. Which of the following about AIDS virus is **incorrect** ?

1) AIDS virus is RNA virus

2) The major cell infected by HIV is Helper T lymphocytes

3) The reverse transcriptase enzyme is not present in HIV.

4) The genome of HIV consists of two identical molecules of single stranded RNA

56. Select the **correct** pair representing the diagnostic test for AIDS and its treatment

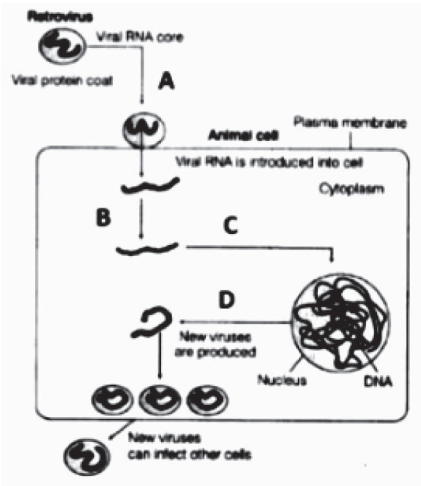
1) ELISA and Anti-retroviral drugs respectively

2) Widal test and antibiotics respectively

3) VDRL and antibiotics respectively

4) Widal test and anti-retroviral drugs respectively

57. Study the diagram given and choose the correct statement



1) A : Retrovirus replicates outside the cell

2) B : Viral DNA is produced by the host's enzyme - reverse transcriptase

3) C : Viral DNA incorporates into the host genome

4) D : New viral DNA is produced by the infected cell

58. The human immune deficiency virus is

1) an unenveloped, RNA genome containing retrovirus.

2) an enveloped, RNA genome containing retrovirus.

3) an enveloped, DNA genome containing retrovirus.

4) an enveloped, RNA genome containing rheovirus.

59. AIDS spreads due to

1) Unprotected sexual contact

2) Infected needles and syringes

3) Infected mother to foetus

4) All of these

60. Choose the incorrect statement with respect to AIDS

1) Viral RNA genome is converted into viral DNA by reverse transcriptase

2) It is caused by an enveloped retrovirus HIV

3) It is an immunodeficiency disease

4) HIV selectively infects and kills B-lymphocytes

61. AIDS was first reported in

1) USA(1981) 2) France (1981)

3) Denmark(1981) 4) India(1981)

62. Which one of the following statements is correct w.r.t. AIDS?

1) Drug addicts are least susceptible to HIV infection

2) AIDS patients are being fully cured with proper care and nutrition

3) HIV can be transmitted through eating food together with an infected person

4) Causative HIV retrovirus attacks helper T-lymphocytes thus reducing their numbers

63. Enzyme responsible for replication of HIV in macrophages is

1) RNA polymerase

2) phosphorylase

3) DNA polymerase

4) Reverse transcriptase

64. After entering T-cell, genetic material in HIV first forms

1) t RNA

2) Single stranded DNA

3) Double stranded DNA

4) Double stranded RNA

65. A cell:

I. Loses the property of contact inhibition

II. Shows uncontrolled proliferation

III. Invades the neighbouring tissues

This cell is probably:

1) Mutated cell 2) Cancerous cell

3) Dedifferentiated cell 4) Apoptotic cell

66. Which of the following statements is incorrect?

1) MALT constitutes about 50% of the lymphoid tissue in human body

2) The envelope of AIDS virus encloses RNA genome

3) Cancer cells show the property of contact inhibition

4) Chronic use of drugs and alcohol can damage nervous system and liver

67. Which one of the following is not a property of cancerous cells?

1) They compete with normal cells for vital nutrients

2) They do not remain confined in the area of origin

3) They divide in an uncontrolled manner

4) They show contact inhibition

68. The cells of the malignant tumors exhibit

1) Metastasis

2) Contact inhibition

3) High differentiation

4) Slow proliferation

69. Cancer cells differ from normal cells by the

1) Breakdown of regulatory mechanism

2) Loss of the property of contact inhibition

3) Attaining the property of contact inhibition

4. Both 1 & 2

70. Select the correct statement

1) Cells in a malignant tumor do not show contact inhibition

2) Computed tomography scans use non-ionising radiations to study cancer of internal organs.

3) AIDS is a retroviral disease caused by unenveloped HIV.

4) Treatment of AIDS with antiretroviral drugs is completely effective and always prevents death.

71. Proto-oncogenes are seen in :

1) Normal cells

2) Malignant cells

3) Oncogenic virus infected cells

4) Cancer cells

72. What is a normal gene that can be become an oncogene?

1) Oncogene 2) Proto-oncogene

3) V-onc 4) Psuedogene

73. Read the following statements about cancer and mark the incorrect ones

i) Ionising radiations like x-rays and UV rays and non-ionizing radiations like gamma rays cause DNA damage leading to neoplastic transformation

ii) CT scan uses non-ionizing radiations to accurately detect pathological and physiological changes in the living tissue

iii) Antibodies against cancer-specific antigents are also used for detection of certain cancers

iv) Some of the chemotherapeutic drugs are specific for certain cancers

1) (i), (ii) and (iii)

2) (i) and (ii)

3) (iii) and (iv)

4) (ii) and (iv)

74. DNA damage leading to neoplastic transformation can be brought about by ionizing radiations like :

1) UV rays

2) Gamma rays

3) Infrared waves

4) Radio waves

75. Cancer cells show the following feature(s) except

1) Metastasis

2) Apoptosis (Programmed cell death)

3) Contact inhibition

4) Both 2 & 3

76. Cellular oncogenes (c-onc) is

1) Mutated gene

2) Present in normal cells

3) Present only in the cells of benign tumour

4) Genes due to which cells loose the property of contact inhibition.

77. Older people are more susceptible to cancer because :

1) Their immune systems have degenerated

2) Secretion of certain hormones is decreased

3) Cell replacement is not adequate

4) They accumulate more mutations

78. Choose the odd one with respect to physical carcinogens

1) Tobacco smoke 2) Gamma rays

3) UV rays 4) X-rays

79. Consider the following statements:

i) Cancer is essentially a genetic disease caused by multiple mutational events

ii) Cancerous cells are rapidly dividing cells that exhibit contact inhibition

iii) Metastasis is the most feared complication of malignant tumor

Which of the above statements are not true?

1) i and ii only 2) i and iii only

3) ii and iii only 4) i, ii and iii

DRUG ABUSE

80. Cirrhosis of liver is caused by the chronic intake of

1) opium 2) alcohol

3) tobacco 4) cocaine

81. Select the correct statement from the ones given below:

1) Barbiturates when given to criminals make them tell the truth

2) Morphine is often given to persons who have undergone surgery as a painkiller

3) Chewing tobacco lowers blood pressure and heart rate

4) Cocaine is given to patients after surgery as it stimulates recovery.

82. Which of the following drug is not obtained from plants ?

1) Cocaine 2) Ganja

3) Charas 4) Barbiturates

83. Which of the following is very effective sedative and pain killer?

1) Cocaine 2) Heroin

3) Morphine 4) Cannabis extract

84. Crack or coke interferes predominantly with the transport of neurotransmitter

1) Glycine 2) Dopamine

3) GABA 4) Acetylcholine

85. Coca alkaloid or cocaine is obtained from:

1) *Papaver somniferum*

2) *Atropa belladonna*

3) *Erythroxylum coca*

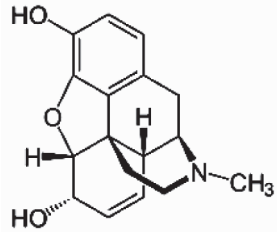
4) *Datura*

86. Which is the particular type of drug that is obtained from the plants whose one flowering branch is shown below?

1) Hallucinogen 2) Depressant

3) Stimulant 4) Pain Killer

87. Chemical structure below represents morphine. The receptors of morphine are primarily located in



1) CNS and CVS 2) CVS and GIT

3) CNS and GIT 4) CNS and PNS

88. Select the incorrect match

1	Biological response modifiers	α-interferon
2	Insomnia	Benzodiazepines
3	Cannabis sativa	Smack
4	Metastasis	Malignant neoplasm

89. What is incorrect regarding opioids?

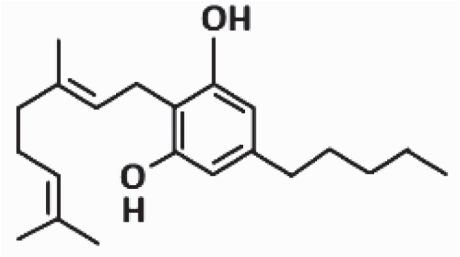
1) Their receptors are in CNS and cardio vascular system

2) They are generally taken by snorting and injection

3) They are CNS depressants

4) They can be powerful sedatives and painkillers

90. The skeletal structure shown in the given diagram shows the structure of:



1) Morphine

2) Diacetyl morphine

3) Cannabinoid

4) Cocaine

91. Which of the following drugs acts by interfering with the transport of the neurotransmitter Dopamine?

1) Morphine 2) Hashish

3) Cocaine 4) Atropine

92. Which of the following drugs has a potent stimulating action of central nervous system?

1) Morphine

2) Cocaine

3) Barbiturate

4) Benzodiazepine

93. Choose the correct option regarding the drug, its source, and its effect on the body

	Drug	Source	Effect
1	Coke	Erythroxylum coca	CNS depressant
2	Heroin	Papaver somniferum	Stimulant
3	Hashish	Cannabis sativa	Hallucinogen
4	Datura	Jimson's weed	Stimulant

94. Which one of the following is the correct statement regarding the particular psychotropic drug specified?

1) Hashish causes altered thought perceptions and hallucinations

2) Opium stimulates the nervous system and causes hallucinations

3) Morphine leads to delusions and disturbed emotions

4) Barbiturates cause relaxation and stimulate the nervous system

95. 'Marijuana' is extracted from

1) Dried leaves and flowers of hemp plant

2) Ergot fungus

3) Poppy plant

4) Cocoa plant

96. Which of the following was a major reason for the development of drugs?

1) For clinical purposes

2) To experience hallucinations

3) Adventure

4) For curiosity

97. Which of the following is not a common reason for drug abuse or drug dependence?

1) Peer Pressure

2) Need for adventure

3) For feeling of excitement and euphoria

4) For longevity

98. What is drug addiction?

1) Addiction to food

2) Dependence on drugs

3) Taking medicines with valid medical prescriptions

4) Not eating a balanced diet

99. In which age group, drug addiction is more common ?

1) Childhood 2) Adolescence

3) Adulthood 4) Old Age

100. International day against drug abuse is observed on

1) 26th June 2) 12th August

3) 14th September 4) 1st December

SAMPLE QUESTIONS

1. The discovery of blood circulation by whom disproved the 'good humor' hypothesis of health?

1) Hippocrates 2) Charles Darwin

3) William Harvey 4) Stanley

2. Read the given statements

Statement-I : Health was considered as a state of body and mind where there was a balance of certain 'humors'.

Statement-II : Both neural system and endocrine system help in maintaining our health by influencing immune system

Select the correct option.

1) Only statement I is correct

2) Only statement II is correct

3) Both statements are correct

4) Neither statement I nor II is correct

3. Select the correct match w.r.t disease listed in column I with corresponding causative agent in column II

	Column I	Column II
1)	Typhoid	E.coli
2)	Malaria	Male Anopheles
3)	Common cold	Rhinovirus
4)	Filariasis	Male Culex

4. Choose the odd one w.r.t bacterial diseases

1) Pneumonia

2) Plague

3) Typhoid

4) Malignant malaria

5. Infective stage of Plasmodium for humans resides in which region in the vector?

1) Crop

2) Salivary glands

3) Liver (hepatocytes)

4) Erythrocytes

6. How many diseases are caused by protozoans?

Malaria, Pneumonia, Common cold, Amoebic dysentery, Ascariasis, Elephantiasis

1) Zero 2) Two

3) One 4) Three

7. Which of the following immune responses is responsible for the rejection of kidney grafts?

1) Cell-mediated immune response.

2) Auto-immune response.

3) Humoral immune response.

4) Innate immune response

8. Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the newborn infants because it contains:

1) Immunoglobulin A (IgA).

2) Natural killer cells.

3) Monocytes.

4) Macrophages

9. Identify the correct pair representing the causative agent of typhoid fever and the confirmatory test for typhoid.

1) Salmonella typhi / Widal test.

2) Plasmodium vivax / UTI test.

3) Wuchereria bancrofti / ELISA test.

4) Streptococcus pneumoniae / PCR test

10. Which of the following is a viral disease?

1) Diphtheria 2) Filariasis

3) Leprosy 4) Influenza

11. The vector for dengue fever is:

1) Anopheles mosquito

2) Culex mosquito

3) Aedes mosquito

4) Housefly

12. Which of the following is a method of passive immunization?

1) Vaccination

2) Administration of antitoxins

3) Exposure to pathogens

4) All of the above

13. Which of the following is a characteristic of cancer cells?

1) Differentiated cells

2) Controlled growth

3) Metastasis

4) Contact inhibition

14. The primary lymphoid organ is:

1) Spleen 2) Lymph nodes

3) Thymus 4) Tonsils

15. What is the full form of ELISA?

1) Enzyme-Linked Immunosorbent Assay

2) Electrical-Linked Immunosorbent Assay

3) Enzyme-Lysed Immunosorbent Assay

4) Electrical-Lysed Immunosorbent Assay

16. Which disease is confirmed by the Western blot test?

1) Typhoid 2) Tuberculosis

3) Malaria 4) AIDS

17. Carcinoma arises from the:

1) Epithelial cells.

2) Bone Marrow.

3) Pigment containing Cells.

4) Connective tissue

18. Which of the following diseases is caused by a protozoan?

1) Influenza 2) Cancer

3) Syphilis 4) Malaria

19. Grafted kidneys may be rejected in a patient due to:

1) Cell mediated immune response

2) Passive immune response

3) Innate immune response

4) Humoral immune response

20. The human body carries out cell-mediated immunity through:

1) Thrombocytes 2) Erythrocytes

3) T-lymphocytes 4) B-lymphocytes

21. What is the causative agent of Amoebiasis?

1) Plasmodium vivax
2) Entamoeba histolytica
3) Salmonella typhi
4) Wuchereria bancrofti

22. Which Immunoglobulin is found in greatest abundance in the blood?

1) IgA 2) IgM
3) IgG 4) IgE

23. Ringworm is caused by:

1) Bacteria 2) Viruses
3) Fungi 4) Protozoans

24. Which is a common sexually transmitted disease?

1) Typhoid 2) Malaria
3) Syphilis 4) Pneumonia

25. : Interferons are:

1) Antiviral proteins
2) Antibacterial proteins
3) Anticancer proteins
4) Antiprotozoan proteins

26. Active immunity is obtained through:

1) Receiving ready-made antibodies
2) Vaccination
3) Mother's milk
4) Antivenom

27. Which cells are responsible for antibody production?

1) T-lymphocytes 2) B-lymphocytes
3) Macrophages 4) Neutrophils

28. Histamine is secreted by:

1) Plasma cells 2) Mast cells
3) T-cells 4) B-cells

29. Which of the following is an autoimmune disease?

1) Cancer
2) AIDS
3) Rheumatoid arthritis
4) Typhoid

30. Cancer cells do not show:

1) Contact inhibition 2) Rapid division
3) Metastasis 4) Apoptosis

31. The vaccine for polio provides:

1) Active immunity
2) Passive immunity
3) Innate immunity
4) Both active and passive immunity

32. Which of the following is a bacterial disease?

1) Common cold 2) Measles
3) Tuberculosis 4) AIDS

33. Which drug is obtained from the latex of the poppy plant?

1) Cocaine 2) Heroin
3) Caffeine 4) Nicotine

34. Cocaine is obtained from:

1) Cannabis sativa
2) Erythroxylum coca
3) Papaver somniferum
4) Atropa belladonna

35. Excessive use of alcohol primarily affects:

1) Lungs 2) Liver
3) Kidneys 4) Heart

36. The effect of opioids is on the:

1) Central nervous system and gastrointestinal tract.

2) Respiratory system and circulatory system.

3) Excretory system and reproductive system.

4) Muscular system and skeletal system

37. Smoking leads to increase risk of:

1) Emphysema 2) Bronchitis

3) Lung cancer 4) All of the above

38. What is the effect of nicotine?

1) Stimulates the adrenal gland

2) Lowers blood pressure

3) Decreases heart rate

4) Increases appetite

39. The term "withdrawal symptoms" is associated with:

1) Vaccination

2) Drug addiction

3) Antibody production

4) Cell-mediated immunity

40. The chemical constituent of tobacco is:

1) Caffeine 2) Nicotine

3) Theine 4) Tannin

41. HIV primarily attacks which type of cells?

1) B-lymphocytes 2) T-helper cells

3) T-killer cells 4) Neutrophils

42. Which enzyme is crucial for the replication of HIV?

1) DNA polymerase

2) RNA polymerase

3) Reverse transcriptase

4) Ligase

43. The confirmatory test for AIDS is:

1) Widal test 2) ELISA

3) Western blot 4) Mantoux test

44. AIDS is caused by:

1) Bacteria 2) Virus

3) Protozoan 4) Fungus

45. The full form of AIDS is:

1) Acquired Immuno Deficiency Syndrome

2) Acquired Infection Deficiency Syndrome

3) Auto Immune Deficiency Syndrome

4) Auto Infection Deficiency Syndrome

46. HIV is a:

1) Bacteriophage 2) Retrovirus

3) Adenovirus 4) Poxvirus

47. Which of the following is a mode of HIV transmission?

1) Sharing food 2) Mosquito bites

3) Sexual contact 4) Casual contact

48. The period between HIV infection and the appearance of AIDS symptoms is called:

1) Incubation period 2) Transition period

3) Dormant period 4) Active period

49. Which of the following is a hallucinogenic drug?

1) Morphine 2) Cocaine

3) LSD 4) Heroin

50. Which among the following is obtained from *Cannabis sativa*

1) Opium 2) Coca

3) Marijuana 4) Atropa

ANSWER KEY

1.	4	21.	3	41.	3	61.	1	81.	2
2.	3	22.	3	42.	3	62.	4	82.	4
3.	3	23.	2	43.	2	63.	4	83.	3
4.	4	24.	3	44.	3	64.	3	84.	2
5.	4	25.	4	45.	4	65.	2	85.	3
6.	3	26.	3	46.	2	66.	3	86.	1
7.	4	27.	1	47.	1	67.	4	87.	3
8.	4	28.	3	48.	2	68.	1	88.	3
9.	2	29.	3	49.	3	69.	4	89.	1
10.	1	30.	2	50.	1	70.	1	90.	3
11.	4	31.	4	51.	3	71.	1	91.	3
12.	1	32.	2	52.	1	72.	2	92.	2
13.	1	33.	4	53.	3	73.	2	93.	3
14.	4	34.	1	54.	2	74.	2	94.	1
15.	2	35.	4	55.	3	75.	4	95.	1
16.	4	36.	1	56.	1	76.	2	96.	1
17.	3	37.	2	57.	3	77.	1	97.	4
18.	4	38.	2	58.	2	78.	1	98.	2
19.	3	39.	4	59.	4	79.	1	99.	2
20.	2	40.	4	60.	4	80.	2	100.	1

SAMPLE QUESTIONS

1.	3	11.	3	21.	2	31.	1	41.	2
2.	3	12.	2	22.	3	32.	3	42.	3
3.	3	13.	3	23.	3	33.	2	43.	3
4.	4	14.	3	24.	3	34.	2	44.	2
5.	2	15.	1	25.	1	35.	2	45.	1
6.	2	16.	4	26.	2	36.	1	46.	2
7.	1	17.	1	27.	2	37.	4	47.	3
8.	1	18.	4	28.	2	38.	1	48.	1
9.	1	19.	1	29.	3	39.	2	49.	3
10.	4	20.	3	30.	1	40.	2	50.	3

WORK BOOK

Chapter 18

MICROBES IN HUMAN WELFARE

INTRODUCTION, MICROBES AS HOUSE-HOLD PRODUCTS

1. Microbes are present everywhere-in soil, water, air, inside our bodies and that of other plants and animals. They are present even at sites where no other life form could possibly exist, such as

1) Deep inside the geysers (thermal vents) where the temperature may be high as 100^0C

2) Deep in the soil, and under the layers of snow several meters thick

3) In highly acidic environment

4) All of the above

2. Which of the following microbes can be grown on nutritive media and form colonies?

a) Bacteria b) Fungi

c) Viruses d) Viroids

1) a and b 2) c and d

3) a,b and c 4) a,b,c and d

3. Select the microbes from the following:

a) Protozoa

b) Becteria

c) Fungi

d) Microscopic plant viruses

e) Viroids

f) Prions

1) a,b and c 2) a,b,c and d

3) d,e and f 4) a,b,c,d,e and f

4. Curd, cheese and butter are produced with the use of

1) Yeast

2) *Penicillium*

3) *Lactobacillus*

4) Monascus

5. Cheeses are classified on the basis of

1) Flavour

2) Colour

3) Texture

4) All of the above

6. Respiratory diseases are caused by

1) *Salmonella typhi*

2) HIV

3) *Mycobacterium*

4) Adenoviruses

7. Vinegar is propared from alcohol with the help of

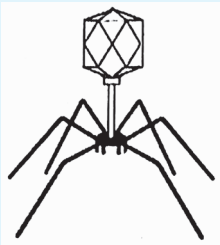
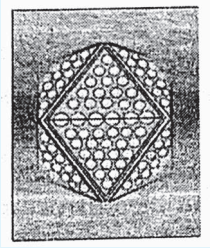
1) *Lactobacillus*

2) *Acetobacter*

3) *Azotobacter*

4) *Rhizobium*

8. Match the columns I and II, and choose the correct combination from the options given

Column I		Column II	
a)		1)	Adenovirus
b)		2)	Bacteriophage
c)		3)	TMV

1) a-1, b-2, c-3 2) a-2, b-3, c-1

3) a-2, b-1, c-3 4) a-3, b-1, c-2

9. Among Swiss cheese, curd, Toddy, statin, Roquefort cheese, Penicillin how many of them are the result of fungal activity?

1) One 2) Two

3) Three 4) Four

10. In cheese, microorganisms are required for

1) Ripening

2) Souring of milk

3) Souring and ripening

4) Development of resistance to spoilage

11. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are thye ones categorised as

1) Chemosynthetic autotrophs

2) Heterotrophic bacteria

3) Cyanobacteria

4) Archaebacteria

12. The nutritional quality of curd is increased due to the presence of

1) Vitamin K 2) Vitamin C

3) Vitamin B_{12} 4) Milk protein

13. When milk is converted to curd, partial digestion of protein is done by

1) Virus 2) Protozoa

3) Bacteria 4) Fungus

14. Which organic compound is produced by fermentation and is used to partially replace fossil fuel?

1) Butanol 2) Methanol

3) Ethanol 4) Propanol

15. Cheese and yoghurt are products of

1) Pasteurisation 2) Fermentation

3) Dehydration 4) Distillation

Read the following statements and Select the correct option.

1) Only statement I is correct

2) Only statement II is correct

3) Both statements are correct

4) Both statements are incorrect

16. **Statement-I** : Microorganisms such as lactobacillus and others commonly called LAB grow in milk and convert it into curd

Statement-II : During growth, the LAB produces and that coagulate and completely digest are milk protein.

17. **Statement-I** : Microbes like bacteria, virus and fungi grown in nutritive media to form colonies.

Statement-II : Adenovirus which cause respiratory infections.

18. How many statements are incorrect?

a) Toddy is obtained from sap of Palm

b) Dosa and Idli prepared by using fungi

c) Curd is completely degraded concentrate of milk fat and casein

d) In our stomach LAB play very beneficial role in checking disease causing microbes.

1) a & b are incorrect

2) a,b,c are incorrect

3) b & c incorrect

4) b,c,d incorrect

19. Big holes in Swiss cheese are made by a:

1) Bacterium producing large amount of oxygen

2) Bacterium that produces methane gas

3) Bacterium producing large amount of carbondioxide

4) Fungus that releases a lot of gases during its metabolic activities

20. Which of the following statement is incorrect regarding fermentation?

1) *Propionibacterium* used to ferment the cheese

2) The puffed-up appearance of dough is due to the production of CO_2 gas

3) The dough, used for making bread is fermented by bacteria

4) Toddy is made by fermenting sap from palms

21. The digestion of milk proteins is carried out by

1) Alkali produced by LAB

2) Acid produced by LAB

3) Alcohol produced by LAB

4) Pectinase is produced by LAB

22. The oldest food item in which microbes are used is

1) Cheese 2) Juices

3) Coconut water 4) Both 1 and 3

23. Microbes are used for the fermentation of

1) Fish 2) Soyabean

3) Bamboo shoots 4) All the above

MICROBES AS INDUSTRIAL PRODUCTS

24. Production of beverages and antibiotics on an industrial scale requires growing microbes in very large vessels called

1) Settling tank 2) Fermentors

3) Biovessel 4) Agitator

25. Type of the alcoholic drinks are depend on the

i) Type of raw material used

ii) Type of processing

iii) Type of fermentors

iv) Type of weather

1) i, ii, iii 2) ii, iii, iv

3) i, ii, iv 4) i, ii only

26. Penicillin was the first antibiotic which was a chance discovery. Alexander Fleming at that time was working on

1) *Streptococci* bacteria

2) *Penicillium pneumoniae*

3) *Penicillium notatum*

4) *Staphylococci* bacteria

27. Match the columns I and II, and choose the correct combination from the options given.

Column I		Column II	
a)	Diphtheria	1)	Kali Khansi
b)	Leprosy	2)	Gal ghotu
c)	Whooping cough	3)	Black death
d)	Plague	4)	Kusht rog

1) a-1, b-2, c-3, d-4

2) a-2, b-3, c-4, d-1

3) a-2, b-4, c-1, d-3

4) a-2, b-1, c-4, d-3

28. Full potential of Penicillin as an antibiotic was established by

1) Chain and Fleming

2) Chain and Florey

3) Chain, Florey and Fleming

4) Florey and Fleming

29. Functioning of Statin is based on

1) Allosteric inhibition

2) Non-competitive inhibition

3) Competitive inhibition

4) Endproduct inhibition

30. Penicillin inhibits bacterial multiplicates because it

1) Checks RNA synthesis

2) Checks DNA synthesis

3) Destroys chromatin

4) Inhibits cell wall formation

31. Match the columns I and II, and choose the correct combination from the options given

Column I		Column II	
i)	*Aspergillus niger*	a)	Ethanol
ii)	*Clostridium butylicum*	b)	Statins
iii)	*Saccharomyces cerevisiae*	c)	Citric acid
iv)	*Trichoderma polysporum*	d)	Butyric acid
v)	*Monascus purpureus*	e)	Cyclosporin-A

1) i-d, ii-c, iii-b, iv-a, v-c

2) i-c, ii-d, iii-a, iv-b, v-c

3) i-c, ii-d, iii-a,iv-e, v-b

4) i-c, ii-d, iii-e, iv-a, v-b

32. Which one of the following alcoholic drinks is produced without distillation?

1) Wine 2) Whisky

3) Rum 4) Brandy

33. Match the following list of bacteria and their commercially important products:

Bacterium		Products	
i)	Aspergillus niger	a)	Lactic acid
ii)	Acetobactre aceti	b)	Butyric acid
iii)	Clostridium butylicum	c)	Acetic acid
iv)	Lactobacillus	d)	Citric acid

1) i-b, ii-c, iii-d, iv-a 2) i-b, ii-d, iii-c, iv-a

3) i-d, ii-c, iii-b, iv-a 4) i-d, ii-a, iii-c, iv-b

34. Monascus purpureus is a yeast used commercially in the production of

1) ethanol

2) streptokinase for removing clots from the blood vessels

3) citric acid

4) blood cholesterol lowering statins

35. The most common substrate used in distilleries for the production of ethanol is

1) Soya meal

2) Ground grain

3) Molasses

4) Corn meal

36. A compound which is produced by an organism that inhibits growth of other organism is called:

1) xenobiotics

2) antibiotic

3) antibody

4) interferon

37. Select the correct statement:

1) *Acetobacter aceti* produces citric acid

2) *Saccharomyces cerevisiae* is used as clot buster

3) *Penicillium notatum* restrict the growth of *staphylococci*

4) Methanogens are found in aerobic conditions.

38. Name the blank spaces A, B, C and D given in the following table

Type of Microbe	Scientific Name	Commercial product
Bacterium	A	Lactic acid
Fungus	B	Cyclosporin A
C	Monascus purpureus	Statins
Fungus	Penicillium notatum	D

1) A- Lactobacillus, B-Trichoderma polysporum, C-Yeast (Fungus), D_Penicillin

2) A- Lactobacillus, B-Trichoderma polysporum, C-Yeast(Algae), D-Penicillin

3) A- Lactobacillus, B- Trichoderma polysporum, C- Yeast (Prokaryote), D-Penicillin

4) A-Lactobacillus, B-Trichoderma polysporum, C-Agaricus (Fungus), D-Penicillin

39. The bioactive molecule, cyclosporin A is used in

1) Whooping cough

2) Diphtheria

3) Leprosy

4) Organ-transplant patients

MICROBES IN SEWAGE TREATMENT AND MICROBES IN BIOGAS PRODUCTION

40. A peculiar odour that occurs in marshy areas and cow sheds is due to gas produced by

1) Cyanobacteria 2) Archaebacteria

3) Mycoplasma 4) Slime Moulds

41. Select the correct statement from the following

1) Biogas is produced by the activity of aerobic bacteria on animal waste

2) *Methanobacterium* is an aerobic bacterium found in rumen of cattle

3) Biogas commonly called gobar gas, is pure methane

4) Activated sludge sediment in settlement tanks of sewage treatment plant is a right source of aerobic bacteria

42. Methanogens are found in:

A) Ethanol

B) Organic acids

C) Anaerobic sludge

D) Rumen of cattle

1) A, C & D 2) C & D

3) B, C & D 4) A and B

43. The technology of biogas production in India has been developed by the effects of:

1) Khadi and Village Industries Commision (KVIC)

2) Indian Council of Agricultural Research (IARI)

3) Indian Agricultural Research Institute (IARI)

4) Indian Council of Mediacl Research (ICMR)

1) A, C and D 2) C and D

3) A and C 4) A and B

44. The primary treatment of sewage involves,

1) Digestion

2) Decomposition

3) Filtration and Sedimentation

4) Floc formation

45. The amount of oxygen required by the microbes in the decomposition of organic matter is called

1) Chemical oxygen demand

2) Biochemical oxygen demand

3) Total oxygen demand

4) Dissolve oxygen

46. Biogas contains:

1) CO_2 2) H_2S

3) CH_4 4) All of these

47. High value of BOD (Biochemical Oxygen Demand) indicates that

1) Water is pure

2) Water is highly polluted

3) Water is less polluted

4) Consumption of organic matter in the water is higher by the microbes

48. Which of the following in sewage treatment removes suspended solids?

1) Tertiary treatment

2) Secondary treatment

3) Primary treatment

4) Sludge treatment

49. How many statements are correct

a) The greater BOD of waste water, more is its polluting potential

b) Tertiary treatment of waste water with the help of chlorine gas, UV rays or reverse osmosis

c) Primary treatment is a physical process which include filteration only

d) In 2^0 treatment aeration tank shows vigorous growth of useful anaerboic heterotropic microbes into flocs.

1) a and b are correct

2) a and c are correct

3) a and d are correct

4) All are correct

50. Activated sludge should have the ability to settle quickly so that it can

1) Absorb colloidal organic matter

2) Be discarded and anaerobically digested

3) Be rapidly pumped back from sedimentation tank to aeration tank

4) Absorb pathogenic bacteria present in the waste water while sinking to the bottom of the setting tank

51. Filtration and sedimentation are the sewage treatment steps involved in

1) 1^0 treatment

2) 2^0 treatment

3) Biological treatment

4) Both 2 and 3

52. Treatment of waste water is done by the

1) Autotrophic microbes

2) Heterotrophic microbes

3) Chemoautotrohic microbes

4) All of the above

53. After secondary treatment, a part of activated sludge in passed back to aeration tank as inoculum while most of the part of activated sludge passed to

1) Anaerobic sludge digesters

2) Rivers and streams

3) Aeration tank

4) Settling tank

54. Physical removal of large and small particle from the sewage through filtration and sedimentation is called

1) Primary treatment

2) Secondary treatment

3) Biological treatment

4) Both 2 and 3

55. Group of bacteria used in biogas production is

1) Eubacteria 2) Organotrophs

3) Halophiles 4) Methanogens

56. Methanogens growing anaerobically on cellulosic material produce

1) Methane

2) Methane and hydrogen

3) Methane and carbondioxide

4) Methane, carbon dioxide and hydrogen

57. Microbes produce different types of gaseous end products during growth and metabolism. The type of the gas produced depends upoin the

1) Microbes

2) Organic substrates utilised by microbes

3) End product

4) Both 1 and 2

58. In which of the following examples CO_2 gas is produced?

a) Fermentation of dough

b) Cheese making

c) Production of beverages

d) Biogas production

e) Alcoholic fermentation

f) Lactic acid fermentation

1) a, b, c and e 2) a,b,c and d

3) a,b,c, d and e 4) a,b,c,d,e and f

MICROBES IN BIOCONTROL AND BIO FERTILISERS

59. If we need to protect our crops from mosquitoes then we can use

1) Ladybird beetle

2) Dragonflies

3) *Bacillus thuringiensis*

4) Both 1 and 2

60. Biological method of control of pests and disease relies on

1) Interspecific competition

2) Intraspecific competition

3) Natural predation

4) Introduced chemicals

61. To control butterfly caterpillars we can use

1) Ladybird beetle

2) Dragonflies

3) Nucleopolyhedrovirus

4) *Bacillus thuringiensis*

62. Biofertilisers include

1) Nitrogen fixing bacteria

2) Mycorrhiza

3) Nitrogen fixing cyanobacteria

4) All of the above

63. Which is incorrect about the nucleopolyhedrovirus (NPV)?

1) These are species specific

2) These are broad spectrum

3) They have no negative impact on plants, mammals, bird, fish and non-target insects

4) They and in an overall IPM programme or when an ecologically sensitive area is being treated

64. Members of which of the following fungal genus mainly participate in the mycorrhiza formation

1) *Frankia* 2) *Mucor*

3) *Glomus* 4) *Yeast*

65. In mycorrhiza the fungal symbiont absorbs ..... from the soil and passes to the plant

1) Phosphorus

2) Potassium

3) Nitrogen

4) Calcium

66. Modern farmer's can increase the yield of Paddy upto 50% by the use of:-

1) Cyanobacteria

2) Rhizobium

3) Mycorrhiza

4) Farm yard manure

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

67. **Assertion** : Mycorrhizal association is useful for plants.

Reason : All fungi do not show mycorrhizal association

68. **Assertion** : The use of bicontrol measures will greatly reduce our dependence on toxic chemicals and pesticides.

Reason : Bt is used to protect the brassicas and fruit trees from butterfly caterpillars.

SAMPLE QUESTIONS

1. The remaining major part of activated sludge is pumped into large tanks called.....

1) Aerobic fermenters

2) Anaerobic fermenters

3) Aerobic Sludge digesters

4) Anaerobic sludge digesters

2. Once BOD from the sewage is reduced significantly, the 'flocs' are allowed to sediment and it is known as.....

1) Primary sludge

2) Secondary sludge

3) Activated sludge

4) Inactivated sludge

3. BOD is the measure of ...in water

1) Organic matter 2) Inorganic matter

3) Bacterial load 4) Toxicity

4. What kind of microbes is present in 'flocs' formed during secondary treatment of sewage?

1) Aerobic 2) Anaerobic

3) Symbiotic 4) Aero tolerant

5. The supernatant left after sedimentation of sewage water during primary treatment is known as

1) Affluent 2) Flocs

3) Sludge 4) Effluent

6. Which of the following is transferred from primary setting tank to another tank for secondary treatment?

1) Grit 2) Sludge

3) Effluent 4) Floc

7. Sewage is treated in

1) STD 2) STP

3) SPT 4) SDT

8. STP stands for

1) Sequential Topographical Projection

2) Standard Test Procedure

3) Sewage Treatment Plant

4) None of these

9. Which microbes help in sewage treatment?

1) Autotrophic 2) Heterotrophic

3) Symbiotic 4) Saprophytic

10. The major portion of waste water in cities and towns is.....

1) Household waste 2) Indurstial waste

3) Human excreta 4) Both 1 and 2

11. The enzyme streptokinase is used medicinally to

1) Check growth of microbes in body fluids

2) Remove blood clots from the blood vessels

3) Weaken walls of blood vessels

4) Create blood clots in blood vessels

12. Which drugs are often administered before and after organ transplant procedure?

1) Immunomodulators

2) Immunosuppressants

3) Vaccination

4) Anabolic steroids

13. Which enzyme produced by microbes is an important ingredient in detergent formulations?

1) Urease 2) Lipase

3) Pectinase 4) Cleansase

14. The fruit juices available commercially are clearer than ones which are homemade. Which ingradient is added in commercially available fruit juices?

1) Lipase and protease

2) Pectinase and hydrolase

3) Pectinase and protease

4) Hydrolase and protease

15. The full potential as an effective antibiotic in the context of penicillin was studied by .....

1) Sutton and Boveri 2) Chain and Florey

3) Watson and Crick 4) Edward Jenner

16. Penicillin was extensively used during which war?

1) World War I 2) World War II

3) Both 1 and 2 4) Cold War

17. .....soldiers were extensively treated with penicillin during World War II

1) German 2) Austrian

3) American 4) Japanese

18. '*Gal ghotu*' is a common name for which disease?

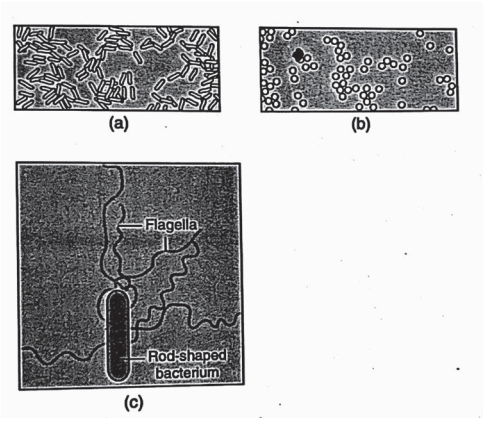
1) Whooping cough

2) Diphtheria

3) Plague

4) Leprosy

19.



The bacteria shown in figure (a) and (b) are at which level of magnification?

1) 150X 2) 1500X

3) 15000X 4) 1.5 lacX

20. The rod shaped bacteria showing flagella in figure (c) of above question is magnified at .....

1) 5×10^3 2) 5×10^4

3) 1.5×10^3 4) 15×10^4

Read the following statements and Select the correct option.

1) Only statement I is correct

2) Only statement II is correct

3) Both statements are correct

4) Both statements are incorrect

21. **Statement-I** : Lactic Acid Bacteria (LAB) are responsible for converting milk into curd

Statement-II : LAB creates acidic medium necessary to coagulate and fully digest the milk proteins.

22. If someone wants to make curd from milk, a small amount of curd is added to fresh milk. The small amount of curd containing millions of LAB is known as

1) Accelerator 2) Promoter

3) Inoculum 4) Germ

23. Waste water treatment generates a large quantity of sludge which can be treated by

1) Digesters 2) Activated sludge

3) Chemicals 4) Oxidation pond

24. The technology of biogas production from cow dung was developed in India largely due to the efforts of

1) Gas Authority of India

2) Oil and Natural Gas Commission

3) Indian Agricultural Research Institute and Khadi and Village Industries Commission

4) Indian oil Corporation

25. The free-living fungus *Trichoderma* can be used for

1) Killing insects

2) Biological control of plant diseases

3) Controlling butterfly caterpillars

4) Producing antibiotics

26. Methanogens do not produce

1) Oxygen

2) Methane

3) Hydrogen sulphide

4) Carbon dioxide

Read the following statements and Select the correct option.

1) Only statement I is correct

2) Only statement II is correct

3) Both statements are correct

4) Both statements are incorrect

27. **Statement-I** : Microbes are present everywhere on earth

Statement-II : They cannot live in thermal vents where temperature is as high as 100^0C.

28. Penicilin is commercially produced by

1) Penicilium notatum

2) Penicilium chrysogenum

3) Penicilium citrinum

4) Penicilium roquefortii

29. .....bacteria fixes atmospheric N_2 in aquatic and terrestrial environments

1) *Cyanobacteria* 2) *Azotobacter*

3) *Methanobacteria* 4) *Mycorrhiza*

30. .....serve as an important bio-fertilizer in paddy fields

1) *Cyanobacteria* 2) *Azotobacter*

3) *Methanobacterium* 4) *Mycorrhiza*

31. Which fungus is used in plants to provide control against pests?

1) *Aspergillus* 2) *Trichoderma*

3) *Trichophyton* 4) *Rhizopus*

32. .....are the pathogens that attack insects and other arthropods.

1) *Rhinovirus* 2) *Baculovirus*

3) *Ranikhet Virus* 4) *Bean Virus*

33. IPM stands for

1) Indian Pollution Management

2) Institute of Pest Management

3) Integrated Pest Management

4) Institute of pollution Management

34. 'Bt' spores are mixed with .....and sprayed on vulnerable plants

1) Only alcohol

2) Any organic solvent

3) Only water

4) Any aqueous solvent

35. Biocontrol refers to

1) Indiscriminate use of microbes for human welfare

2) Use of microbes to control plant diseases

3) Use of microbes to the production of biogas

4) Both 2 and 3

36. A beetle with 'red and black' markings is known as.....

1) Dragonfly 2) Ladybird

3) Clever Wasp 4) Queen Ant

37. 'Bt' is available in sachets as dried.....

1) Spores 2) Capsules

3) Seeds 4) Both 1 and 2

38. Methanogens produces which gases amongst the following list of gases?

CH_4, O_2, CO_2, H_2O_2, H_2S, H_2

1) CH_4, H_2O_2, H_2 2) H_2S, H_2, CO_2

3) CH_4, H_2, CO_2, H_2S 4) H_2S, H_2O_2, CO_2

39. The most commonly found methanogens in anaerobic sludge is.....

1) Ethanobacterium

2) Methanobacterium

3) Cyanobacterium

4) Both 2 and 3

40. Gobar gas is the same as.....

1) Water gas 2) Biogas

3) Natural gas 4) None of these

41. The depth of concrete tank, a part of biogas plant, ranges from .....to.....

1) 10-15 feet 2) 10-15 metre

3) 15-20 feet 4) 15-20 metre

42. What is the input material for a biogas plant?

1) Bio wastes 2) Slurry of dung

3) Industrial waste 4) Both 1 and 2

43. A.....is placed over the slurry in biogas plant

1) Gas holder 2) Floating cover

3) Digester 4) Gas filter

44. After secondary treatment, the effluent is released into

1) DIgester tank

2) Filtration unit

3) Water bodies

4) Chemical treatment unit

45. Which ministry has initiated Ganga Action Plan and Yamuna Action Plan?

1) Ministry of Chemicals and Fertilizers

2) Ministry of Health and Family Welfare

3) Ministry of Community Health and Diseases

4) Ministry of Environment and Forest

ANSWER KEY

1.	4	15.	2	29.	3	43.	3	57.	4
2.	1	16.	1	30.	4	44.	3	58.	3
3.	4	17.	2	31.	3	45.	2	59.	2
4.	3	18.	3	32.	1	46.	4	60.	3
5.	4	19.	3	33.	3	47.	2	61.	4
6.	4	20.	3	34.	4	48.	3	62.	4
7.	2	21.	2	35.	3	49.	1	63.	2
8.	3	22.	1	36.	2	50.	3	64.	3
9.	4	23.	4	37.	3	51.	1	65.	1
10.	3	24.	2	38.	1	52.	2	66.	1
11.	2	25.	4	39.	4	53.	1	67.	2
12.	3	26.	4	40.	2	54.	1	68.	2
13.	3	27.	3	41.	4	55.	4		
14.	3	28.	2	42.	2	56.	4		

SAMPLE QUESTIONS

1.	4	10.	3	19.	2	28.	2	37.	1
2.	3	11.	2	20.	2	29.	1	38.	3
3.	1	12.	2	21.	1	30.	1	39.	2
4.	1	13.	2	22.	3	31.	2	40.	2
5.	4	14.	3	23.	1	32.	2	41.	1
6.	3	15.	2	24.	3	33.	3	42.	4
7.	2	16.	2	25.	2	34.	3	43.	2
8.	3	17.	3	26.	1	35.	2	44.	3
9.	2	18.	2	27.	1	36.	2	45.	4

WORK BOOK

Chapter 19

BIODIVERSITY AND CONSERVATION

LEVELS, PATTERNS AND IMPORTANCE OF BIODIVERSITY

1. The three levels of biodiversity in the increasing hierachial order is

1) Ecological diversity ↑ Species diversity ↑ Genetic diversity

2) Genetic diversity ↑ Species diversity ↑ Ecological diversity

3) Species diversity ↑ Ecological diversity ↑ Genetic diversity

4) Ecological diversity ↑ Generic diversity ↑ Species diversity

2. Genetic diversity is the trait of :

1) Genus

2) Species

3) Community

4) Family

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

3. **Assertion** : Species with low genetic variability are generally at greater risk of extinction than the species with more genetic variability.

Reason : Species with low genetic variability are more vulnerable to diseases, predators or other environmental challenges

4. Species diversity is the product/outcome of

1) Species richness

2) Species evenness

3) Both 1 & 2

4) Biomass of species

5. The number of animal species is more than ..... Plants including algae, fungi, bryophytes, gymnosperms and angiosperms account for nearly.....of the total.

1) 70%, 22% 2) 22%, 70%

3) 60%, 40% 4) 90%, 10%

6. Among plants (algae, bryophytes, pteridophytes, gymnosperms and angiosperms), maximum diversity is present in:

1) Angiosperms

2) Bryophytes

3) Pteridophytes

4) Gymnosperms

7. Amazonian rain forest is home to more than .....species of plants

1) 40,000

2) 4000

3) 35000

4) 50000

8. Which of the following species extinct due to over-exploitation by humans?

1) Steller's sea cow

2) Clarias gariepinus

3) Passenger Pigeon

4) Both 1 and 3

9. Which pair of geographical area shows maximum diversity in our country ?

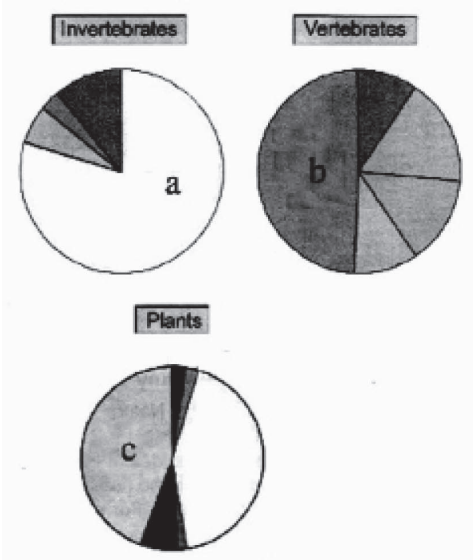
1) Sunderbans and Rann of kutch

2) Eastern Ghats and western ghats

3) Kerala and Punjab

4) Eastern Himalayas and western Ghats

10. Given pie diagrams represents the proportionate number of species of major taxa of invertebrates, vertebrates and plants. Identify the groups a, b and c.



1) a - Insects ; b - Fishes ; c - Fungi

2) a - Molluscs ; b - Mammals ; c - Lichens

3) a - Crustaceans ; b - Reptiles ; c - Algae

4) a - Insects ; b - Birds ; c - Mosses

11. According to species area relationship proposed by Humboldt, species richness :

1) Increases with increasing available resources

2) Decreases with increasing explored area upto a certain limit

3) Increases with reducing competition in a given area

4) Increases with increasing explored area upto a certain limit

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

12. **Assertion** : Western ghats are included among the hot spots of biodiversity

Reason : Western ghats have greater amphibian diversity than eastern ghats

13. **Assertion** : Biodiversity of the prokaryotes cannot be estimated

Reason : Conventional taxonomic methods are not suitable for identification and characterisation of microbes

14. Which of the following region has the greatest species diversity?

1) Tundra 2) Deciduous forests

3) Tropics 4) Grasslands

15. Which type of ecosystem(s) do India possess?

1) Desert, Rainforests

2) Mangroves, Coral reefs

3) Wetlands, estuaries and Alpine

4) All of the above

16. The term biodiversity was popularised by

1) Robert May 2) David Tilman

3) Paul Ehrlich 4) Edward Wilson

17. India with only .....world's land area possess.....species diversity of the world.

1) 2.4%, 8.1% 2) 8.1%, 2.4%

3) 4.8%, 16.2% 4) 16.2%, 8.1%

18. Which of the following is true?

1) Lichens are more diverse than ferns

2) Western Ghats have greater amphibian species diversity as compared to Eastern Ghats

3) Algae shows less diversity than lichens

4) Mosses are more diverse than angiosperms

19. Maximum biodiversity occurs in the latitudinal range of

1) 23.5^0N of 23.5^0S

2) 66.5^0N to 66.5^0S

3) 23.5^0N to 66.5^0S

4) 33^0N to 33^0S

20. Which of the following term includes all of the others?

1) Species diversity

2) Biodiversity

3) Genetic diversity

4) Ecosystem diversity

21. Mark the correct statement/s

1) Amazonian rain forest has greatest biodiversity on earth

2) According to Robert May's estimates, the global species diversity is 7 million

3) Biodiversity is greatest in tropics

4) All of the above

22. Choose the correct statement/s among the following :

A) Species diversity decreases as we move away from equator to the poles

B) In India its land area comprise 8.1% but it share 2.4% of global species diversity.

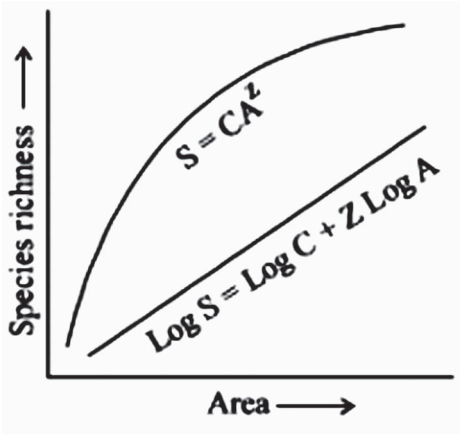
C) Colombia located near equator has nearly 1400 species of birds

D) The IUCN Red list 2004 documents, the extinction of 359 species in the last 500 years.

1) A, B and C only 2) C & D only

3) A & C only 4) C only

23. Which is not true to the Alexander Von Humboldt's species area relationship graph.



1) On a logarithmic scale the relationship is a straight line described by logS = log C + Z log A

2) Value of Z lies in the range of 0.1 to 0.2 regardless of taxonomic group.

3) Species area diversity of entire continent, the Z value is above ten

4) Frugivorous birds and mammals in tropical forest of different continent has a slope of 1.15

24. Identify the ecologist from the given hints.

A) He carried out long term ecosystem experiments using outdoor plots

B) In his experiments he showed that increased diversity, contributed to higher productivity.

1) Robert May

2) David Tilman

3) Paul Ehrlich

4) Edward Wilson

25. The cause of greater biological diversity in tropical region is

1) Tropical latitude remained undisturbed for millions of years therefore it had a long evolutionary time for species diversification

2) Tropical events are less seasonal, more constant & predictable

3) More solar energy availed increased higher productivity & species diversity

4) All

LOSS OF BIODIVERSITY

26. Red data book is maintained by

1) IUCN 2) WWF

3) MAB 4) IBWL

27. Which among the following shows maximum genetic diversity in India?

1) Mango 2) Parthenium

3) Eichhornia 4) Rice

28. Which of the following is not a subspecies of Tiger ?

1) Bali 2) Quagga

3) Javan 4) Caspian

29. Select the mismatched pair

	Column I	Column II
1)	Huge Amazonian rain forest	Lungs of the planet
2)	Extinction of plant pollinator mutualism	Example of co-extinction
3)	Carrot grass	Lantana
4)	African cat fish	*Clarias gariepinus*

30. Biodiversity is essential for

1) Maintenance of gaseous composition of the atmosphere

2) Climatic control

3) Pollination of plants

4) All

31. Amongst the animal groups given below, which one has the highest percentage of endangered species?

1) Insects 2) Mammals

3) Amphibians 4) Birds

32. There are four major causes of accelerated rates of species extinction, which are collectively called as 'the evil quartet'. Which one of the following is not included in 'the evil quartet'.

1) Over - exploitation

2) Co-evolution

3) Co-extinction

4) Alien species invasion

33. The primary and major threat for loss of biodiversity

1) Habitat loss & fragmentation

2) Over-exploitation

3) Co-extinction

4) Alien species invasion

34. Match the following columns and select the correct option

	Column I		Column II
A)	Parthenium (carrot grass)	i)	Accidental entry from tropical America into India
B)	Lantana	ii)	Introduced by Europeans in India
C)	Eichhornia	iii)	African catfish introduced illegally in India
D)	Clarias gariepinus	iv)	Came along with imported wheat inIndia

1) A-i, B-iii, C-iv, D-ii 2) A-ii, B-iv, C-iii, D-i

3) A-iv, B-i, C-ii, D-iii 4) A-iv, B-i, C-iii, D-ii

35. Nile perch, ...(A).....was introduced into Lake Victoria of East Africa, Nile perch eliminated over .....(B).....that were endemic to this lake.

1) A - A large predatory fish,
B - 200 species of cichlid fish

2) A - A large predatory bird,
B - 200 species of cichlid fish

3) A - A alarge crocodile,
B - 200 species of cichlid fish

4) A - A large seal
B - 200 species of cichlid fish

36. Which of the following is incorrect?

1) Coextinction can occur if among two species which are associated symbiotically, one of it gets extinct

2) Extinction of certain marine fish population is an example of over exploitation

3) According to IUCN 2004 red list categories, 31% of gymnosperms facing the threat of extinction

4) Most important threat to loss of biodiversity is Allen species invasion

37. **Assertion** : Amphibians and mammals are the threatened groups of organisms on earth.

Reason : Data shows 32% of all mammals species and 23% of amphibians species in the world face the threat of extinction.

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

38. Recently extincted Quagga belongs to which country?

1) Mauritius 2) Africa

3) Australia 4) Russia

39. Red Data Book deals with :

1) Organisms on the verge of Extinction

2) Endemic plants

3) Organisms showing photoperiodism

4) Organisms that are rare

40. Select the wrong statement.

1) There were five episodes of mass extinction of species

2) Now it is "Sixth Period of Extinction" in progress

3) Human beings are responsible for the faster rate of sixth period of extinction

4) The current species extinction rates are estimated to be 10 - 100 times faster than in pre-human times

41. Which of the following statement is correct?

1) African cat fish *Clarias gariepinus* is not a threat to indigenous cat fishes

2) Steller's sea cow is an extinct animal

3) Parthenium is an endemic species of our country

4) Nile perch is an exotic predatory fish introduced in India

42. The IUCN Red List (2004) documents the extinction of 784 species in the last 500 years. This includes

1) 330 vertrebrates, 367 invertebrates and 87 plants

2) 338 vertebrates, 350 invertebrates and 96 plants

3) 328 vertebrates, 369 invertebrates and 87 plants

4) 338 vertebrates, 359 invertebrates and 87 plants

43. Sixth period of mass extinction was due to

1) Volcanic eruption 2) Comet attack

3) Flood 4) Human activities

44. According to IUCN 2004, the last twenty years alone have witnessed the disappearance of _____ species.

1) 15 2) 67

3) 87 4) 27

45. Wasp fly and Fig tree exists in mutualistic relationship in nature. Which among the following 'Evil Quartet' is a threat to these relationship?

1) Habitat loss

2) Co-extinction

3) Alien species invasions

4) Over-exploitation

46. Once covering more than 14% of the earth's land surface, tropical rain forest now cover no more than _____ % :

1) 2 2) 4

3) 12 4) 6

47. The colonisation of tropical Pacific Islands humans is said to have led to the extinction of more than

1) 1,200 species of native birds

2) 1,300 species of native birds

3) 1,400 species of native birds

4) 2,000 species of native birds

48. The Amazon rain forest harbouring probably millions of species is being cut and cleared for

1) Cultivating soyabeans

2) Conservation to grasslands for raising beef cattle

3) For making play ground

4) Both 1 and 2

49. *Clarias gariepinus* is

1) American cat fish

2) Nile perch

3) Indian cat fish

4) African cat fish

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

50. **Assertion** : The most dramatic examples of habitat loss come from tropical rain forests

Reason : The tropical forests once covering 6% of the earth's land surface now covers more than 14%.

CONSERVATION OF BIODIVERSITY

51. Maintenance of plant diversity in natural reserve is known as

1) Cryopreservation

2) Insitu conservation

3) Genetic conservation

4) Ex-situ conservation

52. The sacred groves like khasi and Jaintia Hills are situated at

1) Rajastan 2) Madhya Pradesh

3) Karnataka 4) Meghalaya

53. Number of biosphere reserves in India

1) 14 2) 15

3) 16 4) 30

54. Which of the following statements regarding biodiversity hot spots are incorrect?

i) High endemism

ii) High levels of species richness

iii) Total number is 34 in the world

iv) Seven of these occur in India

v) High frequency of alien species invasion

vi) Cover less than 2% of the earth's land area; but if properly conserved, they can reduce extinctions by about 30%

1) iii and iv

2) iv, v and vi

3) iii, iv, v and vi

4) iv and v

55. The Hot Spot, which cover India's high biodiversity regions are :

1) Western Ghats and Sri Lanka

2) Indo - Burma

3) Himalaya

4) 1, 2 and 3

56. Match the following and then choose the correct option :

Column I		Column II	
A)	Endemism	i)	Khasi and Jaintia hills, Meghalaya
B)	Hot spot in India	ii)	Advanced ex-situ conservation
C)	Sacred groove	iii)	Species found in particular area only
D)	Cryopreservation	iv)	Zoological park and Botanical garden
E)	Ex-situ Conservation	v)	Western Ghats

1) A - iii ; B - v ; C - i ; D - ii ; E - iv

2) A - i ; B - iii ; C - ii ; D - v ; E - iv

3) A - ii ; B - iii ; C - iv ; D - v ; E - i

4) A - iii ; B - i ; C - v ; D - iv ; E - i

Assertion-Reason Type Questions

1) Both Assertion and Reason are true and the Reason is the correct explanation of Assertion

2) Both Assertion and Reason are true but reason is not correct explanation of Assertion.

3) Assertion is true but Reason is false

4) Both Assertion and Reason are false

57. **Assertion** : Pristine forests are among in-situ conservation strategies

Reason : These are sacred grooves where biota is protected on-site

58. **Assertion** : Biosphere reserves are included under the ex-situ conservation strategies

Reason : Cropping and grazing are allowed in the buffer zone of biosphere reserve

59. The criteria/s for establishing a hot spot is/ are:

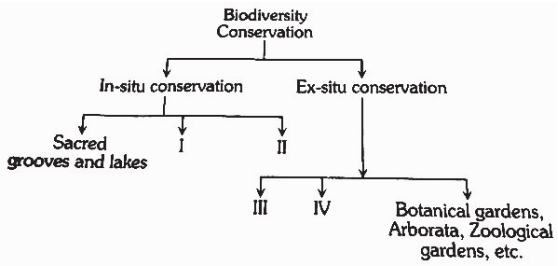
1) Degree of threat measured with respect to habitat loss

2) High degree of endemism

3) High degree of species richness

4) All of the above

60. Study the following flow chart which describes the various types of in situ conservation methods :



Select the correct answer for I, II, III and IV

1) I - Cryopreservation, II - Biosphere reserve, III - National park , IV- Seed bank

2) I - Cryopreservation, II-Seed bank ,

III - National park , IV- Biosphere reserve

3) I - Cryopreservation, II - Biosphere reserve III - Seed bank , IV- National park

4) I - National park, II- Biosphere reserve, III - Cryopreservation, IV- Seed bank

61. In your opinion which is the most effective way to conserve the plant diversity of an area?

1) By tissue culture method

2) By creating biosphere reserve

3) By creating botanical garden

4) By developing seed bank

62. How many 'hot spots' now exist in the world?

1) 25 2) 34

3) 30 4) 42

63. Which of the following is "No human zone" in a biosphere reserve

1) Transition zone

2) Buffer zone

3) Natural/corezone

4) All of these

64. The venue and year of the Earth Summit on Conservation of Biodiversity was

1) South Africa, 2002

2) Rio de Janeiro, 1992

3) Johannesberg, 2004

4) Ramsar, 1974

65. Biodiversity is essential for the maintenance and sustainable utilization of goods & services from ecological system. The various ecosystem services are:

1) Maintenance of gaseous components of the atmosphere

2) Natural pest control

3) Pollination by insects and birds

4) All the above

66. Match the following and choose the correct option

Column I	Column II
A) Narrowly utilitarian argument	I) Conserving biodiversity for major ecosystem services
B) Broadly utilitarian argument	II) Conserving biodiversity for species has intinsic value.
C) Ethical argument	III) Conservation biodiversity for direct economic benefits like food, medicine, industrial products etc.

1) A- I, B - II, C - III
2) A-III, B - I, C - II
3) A - II, B - I, C - III
4) A - I, B - III, C-II

67. Exploring molecular, genetic and species - level diversity for products of economic importance is :

1) Biofortification
2) Bioremediation
3) Biopiracy
4) Bioprospecting

68. Find the wrongly matched pair:

1) Endemism - Species confined to one region and not found anywhere else

2) Hotspots - Regions with very high species richness

3) World summit- Conservation of wet lands

4) Lungs of the planet - Amazon rain forest

69. All the biodiversity hotspots put together cover less than ..... precent of the earth's land area

1) 1
2) 2
3) 3
4) 4

70. Gametes of threatened species can be preserved for long periods using :

1) Safari parks

2) Cryopreservation

3) Botanical garden

4) Zoological park

71. Cultivation of selected or rare varieties of plants in garden is :

1) Insitu conservation

2) Safari parks

3) Cryopreservation

4) Exitu conservation

72. Select the ex-situ conservation method from the following :

1) National Parks

2) Wildlife sanctuary

3) Sacred groves

4) Botanical Gardens

73. Sacred groves are specially useful in :

1) Conserving rare and threatened plants

2) Ex-situ conservation

3) No religious and cultural values

4) Increasing soil erosion

74. Select the correctly matched pair from the following.

i) Sacred groves - *In situ* conservation

ii) Safari parks - *Ex situ* conservation

iii) Hot spots - *In situ* conservation

iv) National parks - *In situ* conservation

v) Zoological parks - *Ex situ* conservation

vi) Cryopreservation - *Ex situ* conservation

1) i, ii, iv and vi only

2) ii, iv and v only

3) iv, v and vi only

4) i, ii, iii, iv, v and vi

75. Choose the wrongly matched pair

	Column I	Column II
1)	World summit on sustainable development	Johannesburg
2)	Earth summit	Brazil
3)	Hot spots	Western Ghat
4)	Sacred grove	Indo-Burma

SAMPLE QUESTIONS

1. The variations shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges represents

1) Genetic diversity

2) Species diversity

3) Ecological diversity

4) Community diversity

2. Species diversity of plants on earth is

1) 2.5 % 2) 22 %

3) 7.1 % 4) 32 %

3. Insects are the most numerous with estimate of

1) 7 out of 10 invertebrates

2) 4 out of 10 invertebrates

3) 7 out of 10 animals

4) 4 out of 10 animals

4. Which of the following is not an in situ technique?

1) Cryopreservation 2) National parks

3) Sanctuaries 4) Sacred forests

5. Conventional taxonomic methods are not suitable for identifying

1) Amphibian species

2) Insect species

3) Microbial species

4) Gymnosperms species

6. Species area relationships among very large areas like the entire continents the z values in the range of

1) 0.1 to 0.2 2) 1.15

3) 0.3 to 0.6 4) 0.6 to 1.2

7. Which of the following statement is wrong?

1) A stable community should show much variation in productivity from year to year

2) According to Tilman's long term ecosystem experiments increased diveristy contributed to higher productivity

3) Stable community must be resistant to occasional disturbances

4) Rich biodiversity is essential for ecosystem health but imperative for the very survival of the human race on this planet

8. Which of the following ecologist gave 'rivet popper' hypothesis?

1) David Tilman

2) Alexander Von Humboldt

3) Robert May

4) Paul Ehrlich

9. Loss of biodiversity in a region may lead to all the following, except

1) Decline in plant production

2) Lowered resistance to environment perturbations

3) Increased variability in certain ecosystem processes

4) Increased endemism

10. Presently ..A...% of all mammal species and ....8....% of all gymnosperm species in ths world face threatening of extinction

1) A - 32, B - 12 2) A - 22, B - 31

3) A - 23, B - 31 4) A - 31, B - 23

11. Which of the following species have been extinct due to over - exploitation by humans in the last 500 years?

1) Water hyacinth and Quagga

2) Parthenium and Lantana

3) Steller's sea cow, passenger pigeon

4) African catfish and Pistia

12. Extinction of more than 200 species of cichild fish in Lake Victoria was due to introduction of

1) African catfish 2) Nile perch

3) Clariasgariepinus 4) Lantana

13. How many biodiversity hotspots have been idenified in the world?

1) 30 2) 3

3) 34 4) 20

14. Select incorrect match

	Column I	Column II
1)	Aravalli hills	Gujarat
2)	Khasi and Jaintia hills	Meghalaya
3)	Sarguja	Madhya Pradesh
4)	Western Ghats	Karnataka , Maharashtra

15. The highest number of plant species in the world is represented by

1) Algae 2) Lichens

3) Fungi 4) Mosses

16. Count the number of correct statement.

A) 32% of amphibians species facing threat of extinction

B) Algae have least global diversity among major plant taxa

C) Out of every ten animals on this planet, seven are insects

D) India has more than 50,000 strains of rice and 1000 variety of mango. This indicate genetic diversity.

E) Species diversity represent variety in the number and richness of species.

1) 3 statements correct

2) 2 correct

3) 4 correct

4) all are correct

17. Which one of the following is not observed in biodiversity hotspots?

1) Species richness

2) Endemism

3) Accelerated species loss

4) Lesser inter- specific competition

18. Which one of the following is not included under in situ conservation?

1) National park , Sacred groves

2) Sanctuary, National parks

3) Botanical garden, Wildlife Safari parks

4) Biosphere reserve, Sanctuary

19. Which of the following is narrowly utilitarian aspet to conserve biodiversity?

1) Pollination 2) Aesthetic value

3) Air purification 4) Medicinal value

20. What is common to Lantana, Eichhornia and African Catfish?

1) All are endangered species of India

2) All of keystone species

3) All are mammals found in India

4) All the species are neither threatened not indigenous species of India

21. Count the number of correct statement.

1) Species confined to a region and not found anywhere else is an endemic species.

2) New species entering a geographical region is called exotic species or alien species

3) Western ghats comes under the category of hotspots because of high endemism

4) 34 hotspot of the world occupy an area of less than 2% of world's land area

1) 2 only 2) 1 only

3) 3 only 4) all correct

22. Which of the following forests is known as the "lungs of the planet earth"?

1) Taiga forest

2) Tundra forest

3) Amazon rainforest

4) Rainforests of North East India

23. Which of the below mentioned regions exhibit less seasonal variations?

1) Tropics 2) Temperates

3) Polar 4) Both 1 and 2

24. The historic convention of Biological Diversity held in Rio de Janeiro in 1992 is known as

1) CITES Convention 2) The Earth Summit

3) G - 16 Summit 4) MAB Programme

25. What is common to the techniques ?

i) In vitro fertilization

ii) Cryopreservation and

iii) Tissue culture

iv) Seed banks

1) All are in - situ conservation methods

2) All are ex- situ conservation methods

3) All require ultra modern equipments and low temperature of -196°C

4) All are methods of conservation of extinct organisms

26. The active chemical drug reserpine is obtained from:

1) *Datura* 2) *Rauwolfia*

3) *Atropa* 4) *Papaver*

27. Troublesome water weed found in India is

1) Eichhornia 2) Trapa

3) Lantana 4) Cyperus

28. Which region on the planet earth is rich in species diversity?

1) North pole 2) Temperate region

3) Tropical region 4) South pole

29. The organization which publishes the Red List categories is

1) WWF 2) KVIC

3) IUCN 4) UNEP

30. Arrange the following in ascending order based on their numbers in India

a) Biosphere reserves

b) Hot spots

c) National parks

d) Wild life sanctuaries

1) b-a-c-d 2) b-c-d-a

3) a-b-c-d 4) d-c-b-a

ANSWER KEY

1.	1	16.	4	31.	3	46.	4	61.	2
2.	2	17.	1	32.	2	47.	4	62.	2
3.	1	18.	2	33.	1	48.	4	63.	3
4.	3	19.	1	34.	3	49.	4	64.	2
5.	1	20.	2	35.	1	50.	3	65.	4
6.	1	21.	4	36.	4	51.	2	66.	2
7.	1	22.	3	37.	3	52.	4	67.	4
8.	4	23.	3	38.	2	53.	1	68.	3
9.	4	24.	2	39.	1	54.	4	69.	2
10.	1	25.	4	40.	4	55.	4	70.	2
11.	4	26.	1	41.	2	56.	1	71.	4
12.	2	27.	4	42.	4	57.	1	72.	4
13.	1	28.	2	43.	4	58.	4	73.	1
14.	3	29.	3	44.	4	59.	4	74.	4
15.	4	30.	4	45.	2	60.	4	75.	4

SAMPLE QUESTIONS

1.	1	7.	1	13.	3	19.	4	25.	2
2.	2	8.	4	14.	1	20.	4	26.	2
3.	3	9.	4	15.	3	21.	4	27.	1
4.	1	10.	3	16.	3	22.	3	28.	3
5.	3	11.	3	17.	4	23.	1	29.	3
6.	4	12.	2	18.	3	24.	2	30.	1