

SPECIAL QUESTIONS FOR SRG

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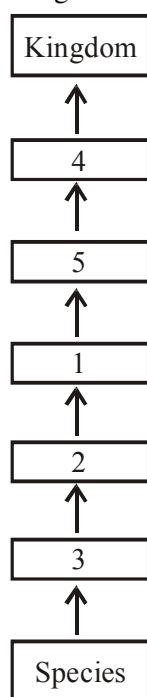
THE LIVING WORLD

1. Classification systems have many uses. Which of the following is not a goal of biological classification?
 - (1) To depict convergent evolution
 - (2) To clarify relationships among organisms
 - (3) To help us remember organisms and their traits
 - (4) To clearly identify the species being studied
 2. Select the incorrect statement about living processes.
 - (1) All living phenomena are due to underlying interaction.
 - (2) Properties of tissues are not present in the constituent cells.
 - (3) Properties of cellular organelles are present in the molecular constituents of the organelles.
 - (4) The interactions result in emergent properties at a higher level of organisation.
 3. Among the following, select the correct statements.
 - (a) In majority of higher plants and animals, growth and reproduction are mutually exclusive events.
 - (b) In non-living objects growth is by accumulation of material on the surface.
 - (c) An isolated metabolic reaction outside the body of an organism, performed in a test tube is neither living nor non-living.
 - (d) All organism, from the prokaryotes to the most complex eukaryotes can sense and respond to environmental cues.
 - (1) b, c, d
 - (2) a, b, c
 - (3) a, d, c
 - (4) a, b, c, d
 4. Read the following statement and select the incorrect one.
 - (1) Mountains, boulders and sand mounds do grow if we take increase in body mass as criterion for growth.
 - (2) Many organisms like mules, sterile worker bees and infertile human couples do not reproduce at all.
 - (3) Living organisms are self-replicating, evolving and self-regulating interactive systems capable of responding to external stimuli.
 - (4) Isolated metabolic reaction *in vitro* are living things.
 5. Read the following statements and select the incorrect one.
 - (1) Isolated metabolic reactions *in vitro* are not living things but surely living reactions.
 - (2) The sum total of all the chemical reactions occurring in our body is metabolism.
 - (3) All organisms, from the prokaryotes to the most complex eukaryotes have self consciousness
 - (4) Metabolic reaction can be demonstrated outside the body in cell-free system.
 6. Ernst Mayr was a
 - (1) Geographer
 - (2) Biochemist
 - (3) Botanist
 - (4) Evolutionary biologist
 7. Recognise the following flow diagram and find the correct option according to taxonomic hierarchy.
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- ```

graph TD
 6 --- 4
 6 --- 5
 4 --- 1
 4 --- 2
 5 --- 3
 5 --- 4
 1 --- Datura
 2 --- Potato
 3 --- Mango
 4 --- Wheat

```
- (1) 1-Polymoniales, 2-Sapindales, 3-Poales, 4-Dicotyledonae, 5-Monocotyledonae, 6-Angiospermae
  - (2) 1-Solanaceae, 2-Anacardiaceae, 3-Poaceae, 4-Polymoniales, 5-Poales, 6-Angiospermae
  - (3) 1-Solanum, 2-Mangifera, 3-Triticum, 4-Dicotyledonae, 5-Monocotyledonae, 6-Plantae
  - (4) 1-Polymoniales, 2-Sapindales, 3-Poales, 4-Angiospermae, 5-Monocotyledonae, 6-Plantae

8. In the following flow diagram, identify the correct categories according to the taxonomic hierarchy.

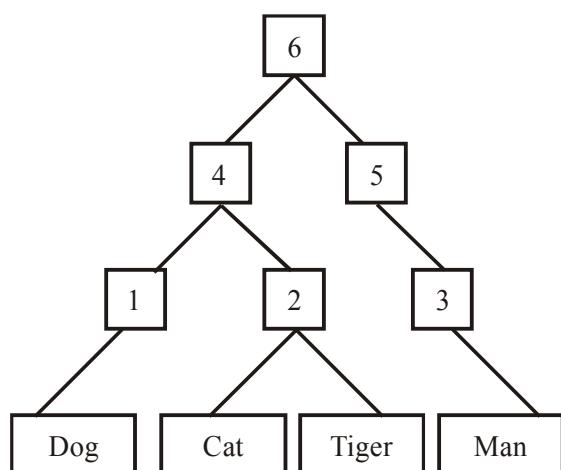


- (a) Primata, diptera and carnivora belong to category '1'.
- (b) *Petunia*, *Datura* and *Solanum* belong to same category '2'.
- (c) Angiospermae belongs to category '5'.
- (d) Man and dog show maximum similarity at category '5'.
- (e) Category '3' is same for lion, tiger and leopard.

Select the correct statements :

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

9. Recognise the following flow diagram and find the correct option according to taxonomic hierarchy.



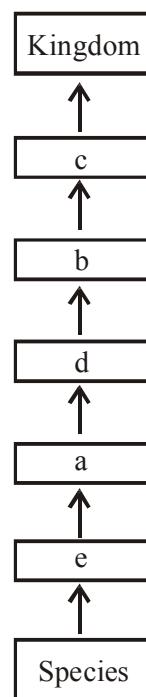
- (1) 1-*Canis*, 2-*Felis*, 3-*Homo*, 4-*Felidae*, 5-*Hominidae*, 6-*Primata*

- (2) 1-*Canidae*, 2-*Felidae*, 3-*Hominidae*, 4-*Carnivora*, 5-*Primata*, 6-*Mammalia*

- (3) 1-*Canidae*, 2-*Felidae*, 3-*Hominidae*, 4-*Carnivora*, 5-*Felidae*, 6-*Chordata*

- (4) 1-*Canis*, 2-*Felis*, 3-*Homo*, 4-*Carnivora*, 5-*Primata*, 6-*Mammalia*

10. In the following flow diagram identify the correct categories.



- (A) Wheat and mango belong to same category 'b'.

- (B) Potato, brinjal and makoi belong to same category 'e'.

- (C) Muscidae, anacardiaceae and angiospermae belong to category 'a'

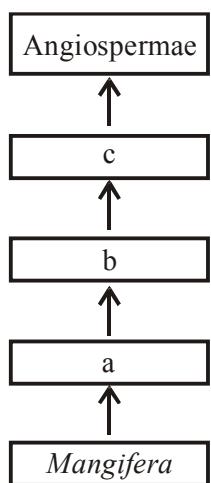
- (D) Gorilla, gibbon and chimpanzee belong to same category 'd'.

- (E) Dicotyledonae and monocotyledonae belong to category 'c'.

Select the correct statements :

- |             |             |
|-------------|-------------|
| (1) D, B, C | (2) A, C, E |
| (3) B, D    | (4) E, B, D |

11. Recognise the following flow diagram and find the correct option according to taxonomic hierarchy.



- (1) 'a' is comparable to muscidae while 'b' is at the same level as that of primata.
- (2) 'c' includes all the angiosperms having two cotyledons in their seeds.
- (3) For wheat 'a' is poaceae, 'b' is poales and 'c' is monocotyledonae.
- (4) All of the above are correct statements.

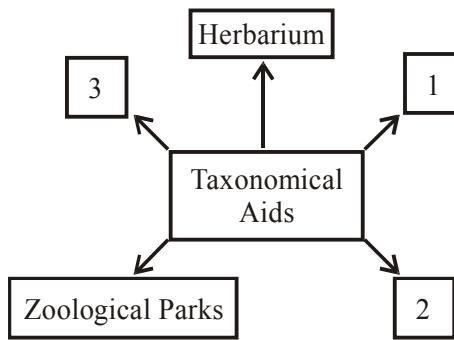
12. Man, housefly, mango, wheat, dog, cat, lion, tiger, potato, brinjal, makoi and leopard these given species belong to how many different families?

- |       |       |
|-------|-------|
| (1) 4 | (2) 7 |
| (3) 5 | (4) 6 |

13. The families, Convolvulaceae and Solanaceae are included in the order polyphiales mainly on the basis of

- (1) Vegetative characters
- (2) Morphological characters
- (3) Floral characters
- (4) Both 1 and 2

14. Fill in the blanks according to taxonomical aids.



- (1) 1-Flora, 2-Kingdom, 3-Botanical gardens
- (2) 1-Catalogues, 2-Keys, 3-Species
- (3) 1-Botanical garden, 2-Museum, 3-Keys
- (4) 1-Monographs, 2-Order, 3-Manuals

15. Read the following statements and select the correct ones.

- (i) Increase in mass and increase in number of individuals are twin characteristics of growth
  - (ii) In unicellular organisms growth and reproduction are synonymous.
  - (iii) 'Feel or response to stimuli' is a defining property of living organisms.
- |                   |                         |
|-------------------|-------------------------|
| (1) (i) and (ii)  | (2) (ii) and (iii)      |
| (3) (i) and (iii) | (4) (i), (ii) and (iii) |

16. The statement 'nothing lives forever, yet life continues' illustrates the role of :-

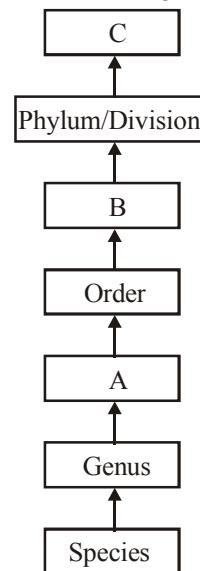
- |                   |                   |
|-------------------|-------------------|
| (1) embryogenesis | (2) morphogenesis |
| (3) replication   | (4) reproduction  |

17. Linnaeus described many species of plants in his book \_\_\_\_\_ (1753) and of animals in his book \_\_\_\_\_ (1758):-

- (1) *Philosophia Botanica, Genera Plantarum*
- (2) *Historia Naturalis, Species Plantarum*
- (3) *Systema Naturae, Species Plantarum*
- (4) *Species Plantarum, Systema Naturae*

- 18.** The main objective of plant taxonomy is :-
- To study the world's flora
  - To provide a method for identification and nomenclature
  - To provide Latin 'scientific' names for every group of plants in the world
  - All of these
- 19.** The scientific name of banyan is written as *Ficus bengalensis* Linn. Which of the following statements is correct regarding this?
- "Linn." word signifies Latin language
  - The scientific name should be derived from english language
  - "Linn." signifies the taxonomist Linnaeus.
  - Bengalensis is a generic name.
- 20.** Which of the following statements is **not correct**?
- Biodiversity is the occurrence of variety of life forms differing in morphology, anatomy, habitats and habits.
  - Systematics is the branch of biology that deals with cataloguing plants, animals and other organisms into categories that can be named, remembered, compared and studied.
  - Classification is the branch of biology that deals with principles and procedures of identification and nomenclature of organisms
  - None of these

- 21.** The given flowchart represents the hierarchy of various taxonomic categories.

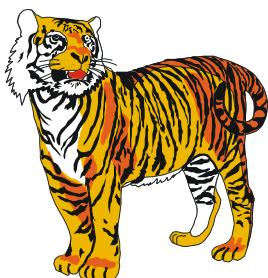


Identify the missing categories (A, B and C) and select the **correct** statements regarding these.

- A is the taxonomic category which contains a number of related genera.
  - Examples of category B are Monocotyledonae, Dicotyledonae, Mammalia, etc
  - C represents the basic unit of taxonomic hierarchy.
  - Examples of category C are Fungi, Monera, Prostista, etc.
- (i) and (ii)
  - (iii) and (iv)
  - (i), (ii) and (iv)
  - (i), (ii), (iii) and (iv)

- 22.** Select the **incorrect** statement with respect to 'genus'.
- It is a group or assemblage of related species.
  - A genus essentially possesses more than one number of species.
  - Lion, Tiger, Leopard are closely related species which have been placed in the genus *Panthera* and are respectively named as *Panthera leo*, *P. tigris* and *P. pardus*.
  - Solanum*, *Penicillium*, *Withania* and *Asparagus* are the examples of genera.

23. Which of the following options represents the correct classification for the given animal?



|     | Phylum     | Class      | Order      | Family    | Genus           | Species         |
|-----|------------|------------|------------|-----------|-----------------|-----------------|
| (1) | Chordata   | Vertebrata | Chiroptera | Felidae   | <i>Canis</i>    | <i>C.tigris</i> |
| (2) | Chordata   | Mammalia   | Carnivora  | Felidae   | <i>Panthera</i> | <i>P.tigris</i> |
| (3) | Vertebrata | Mammalia   | Carnivora  | Felidae   | <i>Panthera</i> | <i>P.tigris</i> |
| (4) | Mammalia   | Felidae    | Carnivora  | Feliaceae | <i>Panthera</i> | <i>P.leo</i>    |

24. Read the following statements regarding biological museums:-

- (i) Biological museums are generally set up in educational institutes such as schools and colleges.
- (ii) Biological museums have collections of preserved plant and animal specimens for study and reference
- (iii) Specimens are preserved in the containers or jars in preservative solutions.
- (iv) Insects are preserved in insect boxes after collecting, killing and pinning.
- (v) Larger animals like birds and mammals are usually stuffed and preserved.
- (vi) Skeletons of mammals are not allowed to be kept in museums

Which of the above statements is/are not correct?

- (1) (ii) and (iii)
- (2) (i) and (vi)
- (3) (v) only
- (4) (vi) only

25. Study the following statements regarding the preparation of herbarium sheets.

- (i) Herbaria also serve as quick referral system.
- (ii) Detail regarding the plant such as locality, ecological conditions, local or english names etc. should be noted.
- (iii) Plants are evenly pressed by unfolding all the plant parts between blotting papers (or newspapers) with the help of plant presses.
- (iv) Blotting papers need not be changed until the plant gets dried.
- (v) After drying, the plant specimen is carefully mounted/pasted on the herbarium sheets.
- (vi) The herbarium sheet is labelled on the lower right hand corner representing the name of collector, date of collection etc.

Which of the above statements is/are not correct?

- (1) (i) only
- (2) (iv) only
- (3) (i) and (iv)
- (4) (iii) and (iv)

26. Read the following statements:-

(P) The taxonomic hierarchy for *Mangifera M. indica* can be written as:

Plantae → Angiospermae → Dicotyledonae → Sapindales → Anacardiaceae → *Mangifera* → *M.indica*

(Q) Tautonym is the taxonomic designation used for certain plants having trinomial nomenclature

(R) Taxonomic keys are generally analytical in nature

(S) Families like convolvulaceae and Anacardiaceae are included in the order Polymoniales

Which of the following combinations of above statements is correct?

- (1) P and Q
- (2) P and R
- (3) R and S
- (4) P, R and S

27. Which of the following statements is incorrect?
- Taxonomists also prepare and disseminate information through manuals and monographs for further taxonomic studies.
  - Live specimen of plants and animals are found in botanical gardens and zoological parks.
  - Metabolism and response to external stimuli are considered as the defining properties of living organisms
  - Growth and reproduction are synonymous events for members of plantae and animalia
28. Match Column-I with Column-II and select the correct:-

|   | <b>Column-I</b>                       |       | <b>Column-II</b>   |
|---|---------------------------------------|-------|--------------------|
| A | Artificial system of classification   | (i)   | Bentham and Hooker |
| B | Natural system of classification      | (ii)  | Linnaeus           |
| C | Phylogenetic system of classification | (iii) | A.W. Eichler       |

- (1) A-(ii), B-(i), C-(iii) (2) A-(i), B-(ii), C-(iii)  
 (3) A-(iii), B-(ii), C-(i) (4) A-(iii), B-(i), C-(ii)

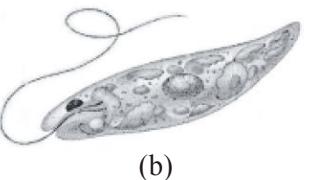
29. The common character present in Yeast and *Hydra* is
- Sexual organs
  - Fragmentation
  - Budding
  - Spore formation
30. All living organisms are linked to one another because
- They have common genetic material of the same type
  - They share common genetic material, but to varying degrees
  - All have common cellular organisation
  - All of the above

**ANSWER KEY**

| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Ans.</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>4</b> | <b>3</b> | <b>4</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>4</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       | 25       | 26       | 27       | 28       | 29       | 30       |
| <b>Ans.</b> | <b>4</b> | <b>4</b> | <b>4</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>4</b> | <b>2</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>3</b> | <b>2</b> |

# **BIOLOGICAL CLASSIFICATION**

- 12.** Which of the following is correct about the slime mould?
- Its thylloid body, plasmodium has pseudopodia for locomotion and engulfing organic matter
  - During unfavourable conditions, plasmodium differentiates and forms fruiting bodies
  - Spore possess no true cell wall
  - They are dispersed by air current
  - Being extremely resistant, spores survive for many years
  - Plasmodium can grow up to several feet.
- (1) I, II, IV, V, VI      (2) I, II, III  
 (3) I, II, III, VI      (4) II, III, VI
- 13.** Which of the following is false about ascomycetes?
- Mode of nutrition is saprophytic, decomposer, coprophilous (growing on dung) and parasitic
  - Includes unicellular (e.g. yeast) and multicellular forms
  - Mycelium is coenocytic and aseptate
  - Aspergillus, Claviceps, and Neurospora* are important members of Ascomycetes
- 14.** (I) It includes unicellular as well as multicellular fungi  
 (II) In multicellular forms, hyphae are branched and septate  
 (III) Asexual reproduction by conidia  
 (IV) Sexual spores are ascospores produced in ascus  
 (V) Fruiting body is called ascocarp
- Which of the following characteristics are shown by
- Phycomycetes
  - Sac fungi
  - Club fungi
  - Fungi imperfecti
- 15.** (I) Mycelium is branched and septate.  
 (II) No asexual spores are generally formed  
 (III) Vegetative reproduction by fragmentation  
 (IV) Sex organs are absent but sexual reproduction takes place by somatogamy  
 (V) Karyogamy and meiosis occur in basidium
- The above characteristics are assigned to
- Sac fungi
  - Club fungi
  - Algal fungi
  - Fungi imperfecti
- 16.** Which of the following remains constant in all type of classifications from Linnaeus to Whittaker are
- Plantae and Animalia
  - Monera and Protista
  - Protista and Fungi
  - Monera and Fungi
- 17.** Match the columns I and II, and choose the correct combination from the options given.
- |   | Kingdom  |   | Body organisation          |
|---|----------|---|----------------------------|
| a | Plantae  | 1 | Cellular                   |
| b | Monera   | 2 | Multicellular/loose tissue |
| c | Fungi    | 3 | Tissue/organ               |
| d | Animalia | 4 | Tissue/organ/organ system  |
| e | Protista | 5 | Tissue                     |
- (1) a-4, b-1, c-2, d-3, e-5  
 (2) a-3, b-1, c-2, d-4, e-5  
 (3) a-3, b-2, c-5, d-4, e-1  
 (4) a-3, b-1, c-2, d-4, e-1
- 18.** The drawbacks or limitations of two-kingdom classification are
- No distinction between eukaryotes and prokaryotes
  - No distinction between unicellular and multicellular organisms
  - Photosynthetic and non-photosynthetic organisms are placed together
  - All of the above

- 19.** Read the following statements and select the incorrect statement.
- Though the bacterial structure is very simple, they are very complex in behaviour.
  - Chemosynthetic autotrophic bacteria play a great role in recycling nutrients like nitrogen, phosphorous, iron and sulphur.
  - Majority of the heterotrophic bacteria are important decomposers.
  - Autotrophic bacteria synthesize their food from only organic substrates.
- 20.**
- I. Unicellular, colonial, filamentous, marine or terrestrial forms
  - II. The colonies are surrounded by a gelatinous sheath
  - III. Some can fix atmospheric nitrogen in specialised cells called heterocysts
  - IV. They often form blooms in water bodies
- These above characters are seen in
- Archaeabacteria
  - Cyanobacteria
  - Chrysophytes
  - Dinoflagellates
- 21.** During unfavourable conditions, slime moulds
- form fruiting bodies bearing spores at their tips
  - form an aggregation called plasmodium
  - form an aggregation called pseudoplasmodium
  - Both 1 and 2 are correct
- 22.** Recognise the figure and find out the suitable matching.
- (a) 
- (b) 
- 23.** Which of the following combination of characters is true for slime moulds?
- Parasitic, plasmodium with true walls, spores dispersed by air currents.
  - Saprophytic, plasmodium without walls, spores dispersed by water.
  - Parasitic, plasmodium without walls, spores dispersed by water
  - Saprophytic, plasmodium without walls, spores dispersed by air currents
- 24.** Read the following statements and select the correct statement.
- Members of kingdom fungi show a great diversity in structures and habitat
  - Most of the fungi are saprophytic in their mode of nutrition.
  - Fungi grow warm and humid place
  - All of the above
- 25.** Read the following statements and select the incorrect statement.
- The colonies of cyanobacteria are generally surrounded by gelatinous sheath.
  - The cyanobacteria are unicellular, colonial or filamentous, fresh water/marine or terrestrial algae.
  - Rhizopus* belongs to class phycomycetes of kingdom fungi.
  - Bacteria are grouped under only two categories based on their shape.

26. Match the column-I and II, and choose the correct combination from the options given.

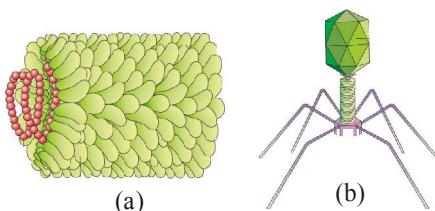
|   | <b>Column-I<br/>(Types of spore)</b> |   | <b>Column-II<br/>(Production)</b> |
|---|--------------------------------------|---|-----------------------------------|
| a | Zoospores                            | 1 | Exogenous                         |
| b | Aplanospores                         | 2 | Endogenous                        |
| c | Conidia                              |   |                                   |
| d | Ascospores                           |   |                                   |
| e | Basidiospores                        |   |                                   |

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

27. Find out the correct statement.

- (1) In lichens, the algal component is called phycobiont and fungal component is known as mycobiont, which are heterotrophic and autotrophic respectively.  
 (2) Viroid contains low molecular weight RNA and protein coat  
 (3) A virus contains both RNA and DNA  
 (4) Viruses are obligatory parasites.

28. Recognise the figure and find false option



- (1) 'a' attacks on an eukaryotic organisms while 'b' attacks on a prokaryotic organisms  
 (2) 'a' has ssRNA as genetic material while 'b' had dsDNA as genetic material  
 (3) 'a' belongs to protista and 'b' belongs to monera  
 (4) 'a' is TMV and 'b' is bacteriophage

29. Read the following statements.

- (a) No virus contains both DNA and RNA  
 (b) A virus is a nucleoprotein and the genetic material is infectious.  
 (c) Viruses that infect plants generally have a single stranded DNA  
 (d) In general, viruses that infect plants have either single or double stranded RNA or double stranded DNA  
 (e) Bacteriophages usually have ssDNA

How many statements are not correct?

- (1) 1      (2) 3      (3) 4      (4) 2

30. Read the following statements regarding methanogens and select the **correct** option:-

- (i) They are included in the group Archaeabacteria  
 (ii) They are responsible for the production of biogas in gobar gas plants  
 (iii) They live in hot sulphur springs.  
 (iv) They are anaerobic  
 (1) Statements (i) and (ii) are correct  
 (2) Statements (i), (ii) and (iv) correct  
 (3) Statements (ii), (iii) and (iv) are correct  
 (4) All statements are correct

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

**Statement 1:** Almost all bacteria possess lipoproteinaceous plasma membrane.

**Statement 2:** The plasma membrane of archaeabacteria as well as eubacteria have same type of lipids and their arrangement.

- (1) Both statements 1 and 2 are correct and statements 2 is the correct explanation of statement 1.  
 (2) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.  
 (3) Statement 1 is correct and statement 2 is incorrect  
 (4) Both statements 1 and 2 are incorrect

32. Which of the following statements is **incorrect**?

- (1) Maximum bacteria are heterotrophic.  
 (2) A large number of antibiotics are produced by Actinomycetes (e.g., Streptomyces), which is a class of eukaryotic fungi.  
 (3) N<sub>2</sub>-fixing bacteria pick up free N<sub>2</sub> from atmosphere and convert it into nitrogenous compounds.  
 (4) Archaeabacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions.

33. Match Column-I with Column-II and select the correct option from the codes given below:-

|   | <b>Column-I</b>           |       | <b>Column-II</b> |
|---|---------------------------|-------|------------------|
| A | Chief producers in oceans | (i)   | Euglenoids       |
| B | Red tides                 | (ii)  | Diatoms          |
| C | Mixotrophic nutrition     | (iii) | Slime moulds     |
| D | Plasmodium                | (iv)  | Dinoflagellates  |

- (1) A-(ii), B-(iv), C-(i), D-(iii)  
 (2) A-(ii), B-(iv), C-(iii), D-(ii)  
 (3) A-(ii), B-(iii), C-(i), D-(iv)  
 (4) A-(i), B-(iv), C-(iii), D-(ii)

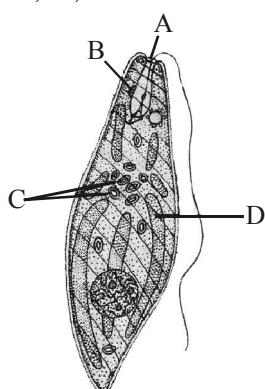
34. The given statements describe a group of organisms.

- (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 show mixotrophic nutrition  
 (iv) They are connecting link between plants and animals.

Which of the following group is referred here?

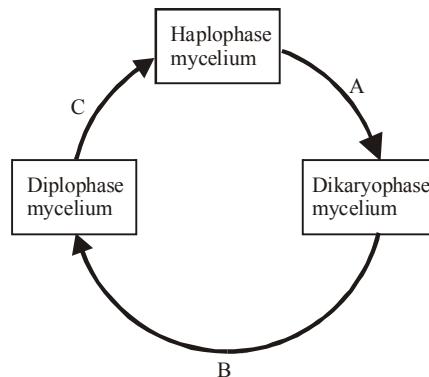
- (1) Dinoflagellates  
 (2) Slime moulds  
 (3) Desmids and diatoms  
 (4) Euglenoids

35. Study the given figure showing structure of *Euglena*, and select the option that correctly identifies A, B, C and D.



|     | <b>A</b>               | <b>B</b>          | <b>C</b>         | <b>D</b>    |
|-----|------------------------|-------------------|------------------|-------------|
| (1) | Cystostome             | Photoreceptor     | Paramylum bodies | Myonemes    |
| (2) | Contractile vacuole    | Photoreceptor     | Paramylum bodies | Chloroplast |
| (3) | Cystostome (Reservoir) | Stigma (Eye spot) | Paramylum bodies | Chloroplast |
| (4) | Cystostome             | Stigma (Eye spot) | Mesosome         | Chloroplast |

36. Life cycle of classes Ascomycetes and Basidiomycetes is given. Select the correct option for processes A, B and C :-



|     | <b>A</b>   | <b>B</b>   | <b>C</b>   |
|-----|------------|------------|------------|
| (1) | Karyogamy  | Plasmogamy | Meiosis    |
| (2) | Plasmogamy | Karyogamy  | Meiosis    |
| (3) | Plasmogamy | Meiosis    | Karyogamy  |
| (4) | Karyogamy  | Meiosis    | Plasmogamy |

37. Match Column-I with Column-II and select the correct option from the codes given below.

|   | <b>Column-I</b>        |       | <b>Column-II</b>                  |
|---|------------------------|-------|-----------------------------------|
| A | Edible delicacies      | (i)   | <i>Penicillium</i>                |
| B | Experimental genetics  | (ii)  | <i>Neurospora</i>                 |
| C | Source of antibiotics  | (iii) | <i>Puccinia</i> , <i>Ustilago</i> |
| D | Rust and smut diseases | (iv)  | Morels and truffles               |

- (1) A-(iv), B-(ii), C-(iii), D-(i)  
 (2) A-(iii), B-(i), C-(ii), D-(iv)  
 (3) A-(iv), B-(ii), C-(i), D-(iii)  
 (4) A-(iv), B-(iii), C-(ii), D-(i)

- 38.** Read the given statements about lichens and select the **incorrect** ones :-
- They are example of symbiosis
  - Algal partner obtains water and mineral salts from the fungus and the fungal partner obtains food prepared by the alga.
  - These do not grow in polluted areas.
  - The mycobiont is usually an Ascomycetes or a Basidiomycetes.
  - The phycobiont is mostly a red alga
  - These constitute the pioneer community in case of hydrosere
- (1) (i) and (ii)  
 (2) (v) and (vi)  
 (3) (i) and (vi)  
 (4) (i), (v) and (vi)
- 39.** Which of the following is incorrect about cyanobacteria
- They are photoautotrophs
  - They lack heterocyst
  - They often form bloom in polluted water bodies
  - They have chlorophyll-a
- 40.** Which one single organism or the pair of organism is correctly assigned of its or their named taxonomic group
- Paramoecium* and *Amoeba* belong to the same kingdom as that of *Penicillium*
  - Lichen is a composite organism formed from the symbiotic association of algae and protozoan
  - Yeast used in making bread and beer are fungi
  - Nostoc* and *Anabaena* are examples of protista
- 41.** Which of the following is not a way, in case of viruses, which insert themselves into the cytoplasm inside a cell and begin an infection?
- Any virus can enter animal or plant cells after a sucking insect
  - Viruses can enter bacterial cells by binding to a specific molecule on the cell membrane or cell wall
  - Viruses can enter animal cells by binding to a specific molecule on the cell membrane
  - Plant viruses infect plant cells and generally they have RNA.
- 42.** Virus having DNA is
- Retrovirus
  - Reo virus
  - Gemini virus
  - TMV
- 43.** The component of viral envelope is mostly
- lipids
  - carbohydrates
  - lipids and proteins
  - lipids and carbohydrates
- 44.** The bacterial genome refers to the total number of genes located upon a
- haploid set of chromosomes
  - diploid set of chromosomes
  - tetraploid set of chromosomes
  - hexaploid set of chromosomes
- 45.** Which of the following is **not correct**?
- Heterotrophic bacteria are most abundant in nature
  - Photosynthetic autotrophic bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for their ATP production
  - Cyanobacteria have chlorophyll-a like green plants
  - Bacteria reproduce mainly by fission
- 46.** *Thermococcus*, *Methanococcus* and *Methanobacterium* exemplify the
- archaeabacteria that contain protein homologous to eukaryotic core histones
  - archaeabacteria that lack any resemblance those found in eukaryotes but whose DNA is negatively supercoiled
  - bacteria whose DNA is relaxed or positively supercoiled but have cytoskeleton as well as mitochondria
  - bacteria that contain a cytoskeleton and ribosomes

47. Match the following columns -

|     | <b>Column - I</b>    |     | <b>Column - II</b>                     |
|-----|----------------------|-----|----------------------------------------|
| (A) | <i>Nitrobacter</i>   | (1) | Free - living aerobic nitrogen fixer   |
| (B) | <i>Clostridium</i>   | (2) | Converts ammonia into nitrite          |
| (C) | <i>Nitrosococcus</i> | (3) | Changes nitrite to nitrate             |
| (D) | <i>Azotobacter</i>   | (4) | Free - living anaerobic nitrogen fixer |

Codes :

|     | A | B | C | D |
|-----|---|---|---|---|
| (1) | 2 | 4 | 3 | 1 |
| (2) | 3 | 4 | 2 | 1 |
| (3) | 4 | 2 | 1 | 3 |
| (4) | 1 | 2 | 3 | 4 |

48. Match the following columns -

|     | <b>Column - I</b> |     | <b>Column - II</b> |
|-----|-------------------|-----|--------------------|
| (A) | Protozoan         | (1) | <i>Gonyaulax</i>   |
| (B) | Chrysophytes      | (2) | <i>Diatoms</i>     |
| (C) | Euglenoid         | (3) | <i>Paramoecium</i> |
| (D) | Dinoflagellates   | (4) | <i>Euglena</i>     |

Codes :

|     | A | B | C | D |
|-----|---|---|---|---|
| (1) | 4 | 1 | 3 | 2 |
| (2) | 3 | 2 | 4 | 1 |
| (3) | 3 | 1 | 4 | 2 |
| (4) | 4 | 2 | 3 | 1 |

49. Which one of the following is a characteristics feature of Chrysophytes?

- (1) They are parasitic forms which cause disease in animals
- (2) They have a protein rich layer called pellicle
- (3) They have indestructible cell wall deposited with silica
- (4) They are commonly called dinoflagellates

50. Hartig net is formed due to

- (1) aggregation of free living mycelium
- (2) association of fungal hyphae with host roots
- (3) intermingling of cytoplasm and nuclei of (+) mating type hyphae and (-) mating type hyphae
- (4) All of the above

51. A Basidiomycete fungus producing uredospores is :-

- |                         |                       |
|-------------------------|-----------------------|
| (1) <i>Penicillium</i>  | (2) <i>Puccinia</i>   |
| (3) <i>Phytophthora</i> | (4) <i>Alternaria</i> |

#### ANSWER KEY

|             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
| <b>Ans.</b> | <b>4</b> | <b>4</b> | <b>4</b> | <b>3</b> | <b>4</b> | <b>4</b> | <b>1</b> | <b>4</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>1</b> | <b>3</b> | <b>2</b> | <b>2</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       | 25       | 26       | 27       | 28       | 29       | 30       |
| <b>Ans.</b> | <b>1</b> | <b>4</b> | <b>4</b> | <b>4</b> | <b>2</b> | <b>1</b> | <b>4</b> | <b>4</b> | <b>4</b> | <b>4</b> | <b>3</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>2</b> |
| <b>Que.</b> | 31       | 32       | 33       | 34       | 35       | 36       | 37       | 38       | 39       | 40       | 41       | 42       | 43       | 44       | 45       |
| <b>Ans.</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>3</b> | <b>1</b> | <b>3</b> | <b>3</b> | <b>1</b> | <b>2</b> |
| <b>Que.</b> | 46       | 47       | 48       | 49       | 50       | 51       |          |          |          |          |          |          |          |          |          |
| <b>Ans.</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>3</b> | <b>2</b> | <b>2</b> |          |          |          |          |          |          |          |          |          |

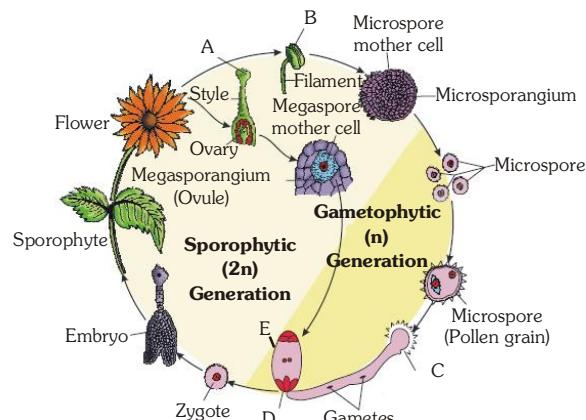
## PLANT KINGDOM

- 1.** Consider the following statements :
- Most of the red algae are multicellular
  - Red algae may occur in both well-lighted regions close to water surface and also at great depths in oceans, where light penetration is little
  - Cell wall of red algae consists of cellulose and polysulphate esters
  - 2-8, equal and apical flagella are found in green algae
- All are correct
  - All are false
  - Only I and II are correct
  - Only III & IV are correct
- 2.** You are given an unknown plant to study in the laboratory. You find that it has chlorophyll and no xylem. Its multicellular sex organs are enclosed in a layer of jacket cell. Its gametophyte stage is free living. The plant probably belongs to
- Chlorophyceae
  - Bryophyte
  - Pteridophyte
  - Gymnosperm
- 3.** Place the following groups of plants in order, beginning with those that first appeared on the earth and progressing toward those that appeared most recently in time.
- Gymnosperms, angiosperms, ferns, moss, algae
  - Algae, moss, ferns, gymnosperms, angiosperms
  - Moss, algae, ferns, angiosperms, gymnosperms
  - Algae, ferns, angiosperms, gymnosperms, moss
- 4.** The correct sequence of the ploidy moss protonemal cell, primary endosperm nucleus in dicots, leaf cell of a moss, prothallus cell of a fern, gemma cell in *Marchantia*, meristematic cell of monocot, ovum of liverwort, and zygote of a fern is
- n, 3n, n, n, n, 2n, n, 2n
  - 3n, 2n, n, n, n, 2n, n, n
  - 2n, 3n, 2n, n, n, n, n, n
  - n, 3n, n, n, n, n, 2n, 2n

- 5.** Match the following

|     | Column-I                   |     | Column-II                                                                                  |
|-----|----------------------------|-----|--------------------------------------------------------------------------------------------|
| (A) | Haplontic life cycle       | (I) | Bryophytes, <i>Pteridophytes</i> , <i>Ectocarpus</i> , <i>Polysiphonia</i> , kelps         |
| (B) | Diplontic life cycle       | II  | Seed bearing plants Gymnosperm and Angiosperm                                              |
| (C) | Haplo-diplontic life cycle | III | Many algae ( <i>Volvox</i> , <i>Spyrogyra</i> , and some species of <i>Chlamydomonas</i> ) |

- A-III, B-II, C-I
  - A-I, B-II, C-III
  - A-II, B-I, C-III
  - A-III, B-I, C-II
- 6.** In the life cycle of angiosperms A, B, C, D and E are, respectively



- Stigma, anther, male gametophyte, egg and female gametophyte
- Stigma, anther, female gametophyte, egg and male gametophyte
- Stigma, anther, male magetophyte, fertilized egg and female gametophyte
- Stigma, anther, embryo sac, egg and female gametophyte

7. Prothallus is

- (1) a sporophytic structure in pteridophytes formed before the thallus develops
- (2) a sporophytic inconspicuous free living structure formed in pteridophytes
- (3) a gametophytic inconspicuous free living structure formed in pteridophytes
- (4) a gametophytic conspicuous structure formed after fertilization in pteridophytes

8. Read the following statements :

- (a) This is an exceptionally large group of plants occurring in wide range of habitats.
- (b) They provide us food, fodder, fuel, medicines and several other commercially important products.
- (c) They range in size from tiny, almost microscopic to tall trees over 100 metres.

Here, we are talking about

- |                 |                  |
|-----------------|------------------|
| (1) Bryophytes  | (2) Pteridophyte |
| (3) Gymnosperms | (4) Angiosperms  |

9. *Cycas* antherozoids are

- |                   |                  |
|-------------------|------------------|
| (1) Kidney-shaped | (2) Heart-shaped |
| (3) Liver-shaped  | (4) Top-shaped   |

10. Read the following statements :

- (a) The male or female cones or strobili are borne on same tree in *Pinus*
- (b) In *Cycas*, male cones and megasporophylls are borne on different trees.
- (c) Stem of *Cycas* is branched and of *Pinus* and *Cedrus* is unbranched
- (d) In gymnosperms, generally tap roots are found.

Select the correct statements :

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

11. Match Column-I with Column-II and select the correct option from the codes given below.

|   | <b>Column-I</b>         |       | <b>Column-II</b>         |
|---|-------------------------|-------|--------------------------|
| A | Non-vascular cryptogams | (i)   | Gymnosperms, angiosperms |
| B | Vascular cryptogams     | (ii)  | Pteridophytes            |
| C | Phanerogams             | (iii) | Algae, bryophytes        |

- (1) A-(iii), B-(ii), C-(i)
- (2) A-(ii), B-(i), C-(iii)
- (3) A-(i), B-(ii), C-(iii)
- (4) A-(ii), B-(iii), C-(i)

12. Read the given statements about algae and select the correct option:-

- (i) Plant body is thalloid
- (ii) Mainly they are aquatic
- (iii) Reproduction by vegetative, asexual and sexual methods.
- (iv) *Chlamydomonas*, *Volvox* and *Ulothrix* are the multicellular algae

- (1) Statements (i) and (ii) are true
- (2) Statements (ii) and (iii) are true
- (3) Statements (i), (ii) and (iii) are true
- (4) All statements are true

13. Which of the following statements about Phaeophyceae is **incorrect**

- (1) Vegetative reproduction occurs by fragmentation
- (2) Asexual reproduction is by biflagellate pear-shaped zoospores
- (3) In sexual reproduction, gametes are pyriform and bear 2 laterally attached flagella.
- (4) Only oogamous reproduction is found

14. Read the given statements and select the correct option.

**Statement 1:** *Volvox* forms spherical colony

**Statement 2:** *Volvox* colony is made up of non-motile cells

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
- (2) Both statement 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
- (3) Statement 1 is correct and statement 2 is incorrect
- (4) Both statements 1 and 2 are incorrect

15. Read the given statements and select the correct option.

**Statement 1:** Bryophytes are amphibians of plant kingdom.

**Statement 2:** They live in soil but depend on water for sexual reproduction.

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
- (2) Both statement 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
- (3) Statement 1 is correct and statement 2 is incorrect
- (4) Both statements 1 and 2 are incorrect

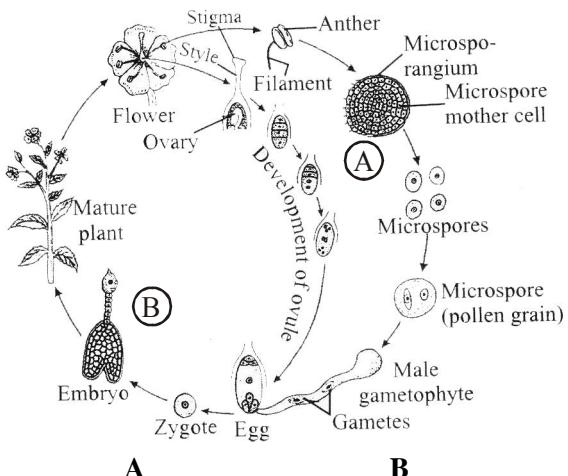
16. Read the given statements and select the correct option.

**Statement 1:** Male gametes of mosses have two flagella

**Statement 2:** Water is essential for metabolic activities in mosses

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
- (2) Both statement 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
- (3) Statement 1 is correct and statement 2 is incorrect
- (4) Both statements 1 and 2 are incorrect

17. The given figure shows two phases, A and B of a typical angiospermic life cycle. Select the correct option regarding it.

**A****B**

- |                                 |                             |
|---------------------------------|-----------------------------|
| (1) Gametophytic generation (n) | Sporophytic generation (2n) |
| (2) Sporophytic generation (2n) | Gametophytic generation (n) |
| (3) Sporophytic generation (2n) | Sporophytic generation (2n) |
| (4) Gametophytic generation (n) | Gametophytic generation (n) |

18. Bryophytes resemble algae on the following basis

- (1) differentiation of the plant body into root, stem and heterotrophic mode of nutrition
- (2) thallus - like plant body, lack of vascular tissue, absence of root and autotrophic mode of nutrition
- (3) thallus - like plant body, presence of roots, and heterotrophic mode of nutrition
- (4) filamentous body, presence of vascular tissue, and autotrophic mode of nutrition

19. Why are the bryophytes, in spite of the thallus plant body, are **not included** under the division - Thallophyta?

- (1) Terrestrial in habit; presence of multicellular and jacketed sex organs, occurrence of heterologous alternation of generation, etc.
- (2) The retention of motility by the male gametes
- (3) Lack of vascular tissue and absence of roots
- (4) Autotrophic mode of nutrition

20. In *Cycas*

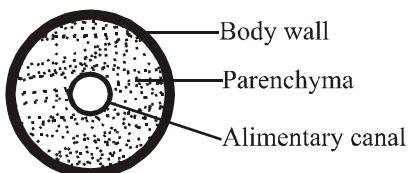
- (1) microsporangia and ovule are present in same sporophyte
- (2) micro and megasporophylls are present in same cone
- (3) male cone and megasporophylls are borne on separate plants
- (4) male cone and megasporophylls are borne on the same plant

**ANSWER KEY**

|             |                            |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------------|----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Que.</b> | 1                          | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
| <b>Ans.</b> | <b>1</b>                   | <b>2</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>4</b> | <b>2</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>3</b> | <b>1</b> |
| <b>Que.</b> | 16    17    18    19    20 |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| <b>Ans.</b> | <b>2</b>                   | <b>1</b> | <b>2</b> | <b>1</b> | <b>3</b> |          |          |          |          |          |          |          |          |          |          |

## ANIMAL KINGDOM

1. The given figure shows a cross section of the body of an invertebrate. Identify the animal which has such body cavity :-



- (1) Cockroach (Arthropoda)
- (2) Round worm (Aschelminthes)
- (3) *Planaria* (Platyhelminthes)
- (4) Earthworm (Annelida)

2. In which one of the following, the genus name, its two characters and its phylum are not **correctly** matched?

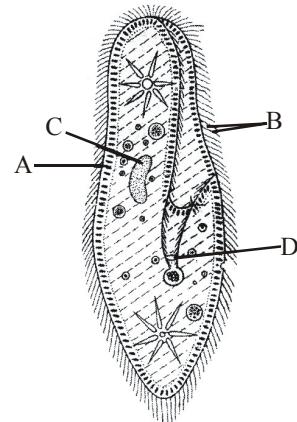
|     | Genus name       | Characters                                        | Phylum        |
|-----|------------------|---------------------------------------------------|---------------|
| (1) | <i>Pila</i>      | (i) Body segmented<br>(ii) Mouth with radula      | Mollusca      |
| (2) | <i>Echinus</i>   | (i) Spiny skinned<br>(ii) Water vascular system   | Echinodermata |
| (3) | <i>Spongilla</i> | (i) Pore bearing<br>(ii) Canal system             | Porifera      |
| (4) | <i>Locusta</i>   | (i) Jointed appendages<br>(ii) Malpighian tubules | Arthropoda    |

3. Match animals given in column B with their respective mode of locomotion from column A and select the correct option:-

|     | Column A                                      |     | Column B           |
|-----|-----------------------------------------------|-----|--------------------|
| (w) | Ciliary locomotion                            | I   | Earthworm          |
| (x) | Pseudopodial movements                        | II  | <i>Nereis</i>      |
| (y) | Flagellar movements                           | III | Crab               |
| (z) | Circular and longitudinal muscles in the body | IV  | <i>Paramecium</i>  |
|     |                                               | V   | <i>Amoeba</i>      |
|     |                                               | VI  | <i>Trypanosoma</i> |

- (1) w-I, x-II, y-III, z-IV
- (2) w-V, x-VI, y-IV, z-III
- (3) w-IV, x-III, y-II, z-I
- (4) w-IV, x-V, y-VI, z-I

4. Refer the given figure of *Paramoecium caudatum* and select the option that **correctly** identifies A, B, C and D.



|     | A         | B           | C                   | D           |
|-----|-----------|-------------|---------------------|-------------|
| (1) | Cell wall | Cilia       | Contractile vacuole | Cytostome   |
| (2) | Pellicle  | Cilia       | Contractile vacuole | Cytostome   |
| (3) | Pellicle  | Cilia       | Macronucleus        | Cytostome   |
| (4) | Pellicle  | Trichocysts | Macronucleus        | Cytopharynx |

5. Which of the following statement(s) is/are correct regarding phylum Coelenterata?

- (i) They are aquatic, mostly marine, sessile or free-swimming, radially symmetrical animals.
- (ii) They have a central gastro-vascular cavity with a single opening on hypostome.
- (iii) Digestion is extracellular and intracellular.
- (iv) Examples are *Sycon*, *Spongilla* and *Euspongia*

- (1) (i) and (ii) only      (2) (i) and (iv)
- (3) (i), (ii) and (iii)      (4) All of these

6. Which of the following statement(s) is/are correct regarding phylum aschelminthes?

- (i) The body is circular in cross-section hence the name roundworms.
- (ii) Alimentary canal is complete with a well-developed muscular pharynx.
- (iii) Sexes are separate (dioecious), i.e., males and females are distinct.
- (iv) Nephridia help in osmoregulation and excretion.

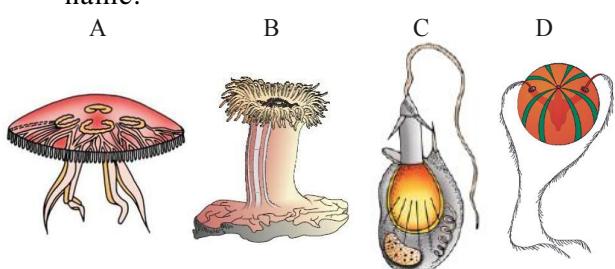
- (1) (i) and (ii)      (2) (iii) and (iv)
- (3) (i), (ii) and (iii)      (4) All of these

7. Match the phylum/class given in column-I with the special features present in them given in column-II and choose the correct option.

|   | <b>Column-I<br/>(Phylum/Class)</b> |     | <b>Column-II<br/>(Special features<br/>present)</b> |
|---|------------------------------------|-----|-----------------------------------------------------|
| A | Porifera                           | I   | Mammary glands                                      |
| B | Mollusca                           | II  | Cloaca                                              |
| C | Ctenophora                         | III | Choanocytes                                         |
| D | Amphibia                           | IV  | Radula                                              |
| E | Mammalia                           | V   | Comb plates                                         |

- (1) A-(III), B-(IV), C-(V), D-(II), E-(I)
- (2) A-(IV), B-(III), C-(V), D-(I), E-(II)
- (3) A-(III), B-(IV), C-(II), D-(I), E-(V)
- (4) A-(III), B-(V), C-(IV), D-(I), E-(II)

8. Refer the given figures A, B, C and D and identify the option which shows their correct name.



|   | <b>A</b>      | <b>B</b>      | <b>C</b>      | <b>D</b>      |
|---|---------------|---------------|---------------|---------------|
| 1 | Pleurobrachia | Cnidoblast    | Aurelia       | Adamsia       |
| 2 | Aurelia       | Adamsia       | Cnidoblast    | Pleurobrachia |
| 3 | Cnidoblast    | Pleurobrachia | Adamsia       | Aurelia       |
| 4 | Adamsia       | Aurelia       | Pleurobrachia | Cnidoblast    |

9. Which of the following pairs of animals are similar to each other pertaining to the feature stated against them?
- (1) Canis and Pantheratigris - Viviparity
  - (2) Wall lizard and Alligator - Three chambered heart
  - (3) Roundworm and Filaria worm - Metameric segmentation
  - (4) Sea fish and sting ray - Cold blooded (poikilothermal)

10. The combination of a true coelom and repeating body segmentation allows the annelids (unlike the anatomically "simpler" worms) to do which of the following?

- (1) Attain complex body shapes and thus locomote more precisely.
- (2) Move through loose marine sediments.
- (3) Be hermaphrodite
- (4) Inject paralytic poisons into their prey.

11. Which of the following characteristic distinguish arthropoda from annelids and molluscs?

- (1) An external skeleton made of chitin (a polysaccharide) and protein rather than a shell made chiefly of mineral salts.
- (2) Subdivision of the legs into movable segments.
- (3) Distinct group of muscles, derived from many body segments, that move the separate parts of the exoskeleton.
- (4) All of the above

12. A student brought home a strange animal which he found outside under a rock. It had moist skin, a complete digestive tract, a ventral nerve cord, and have metamerized segments. Identify the phylum of the animal.

- (1) Porifera
- (2) Annelida
- (3) Mollusca
- (4) Echinodermata

13. Refer the following animals and identify those which have a fluid filled body cavity with a complete lining derived from mesoderm.

- |                                    |                 |
|------------------------------------|-----------------|
| (i) Sycon                          | (ii) Butterfly  |
| (iii) Nereis                       | (iv) Sea fan    |
| (v) Scorpion                       | (vii) King crab |
| (1) (i) and (iii) only             |                 |
| (2) (ii) and (iv) only             |                 |
| (3) (ii), (iii), (v) and (vi) only |                 |
| (4) All of these                   |                 |

14. A scientist is studying an organism. After studying he found that the animal has a cavity which originated from blastocoel. This cavity is present between body wall and gut. Which animal is this?

- (1) Planaria
- (2) Fasciola
- (3) Ancylostoma
- (4) Both 1 and 2

15. Given below are four matchings of an animal and its kind of respiratory organ  
 (a) Silver fish - trachea  
 (b) Scorpion and Spider - book lung  
 (c) Ascidia and Salpa - pharyngeal gills  
 (d) Dolphin and Whale - skin

The correct matchings are

- |             |                |
|-------------|----------------|
| (1) A and D | (2) A, B and C |
| (3) B and D | (4) C and D    |

16. When a fresh water amoeba is subjected to X-rays, the contractile vacuole is degenerated. Which function will be stopped?  
 (1) Formation of pseudopodia  
 (2) Food digestion  
 (3) Respiration  
 (4) Osmoregulation

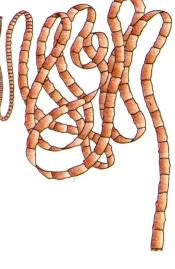
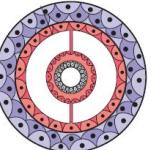
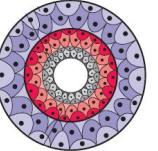
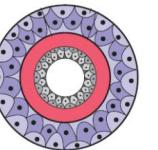
17. Sycon spongilla and euspongia belongs to a group of animals, which are best described as  
 (1) unicellular or acellular  
 (2) multicellular without any tissue organization  
 (3) multicellular with a gastrovascular system  
 (4) multicellular having tissue organization, but no body cavity

18. A scientist collects a sample of water. In the water, he found the following organisms : *Amoeba, Hydra, Plasmodium, Trypanosoma, Leucosolania, Adamsia and Spongilla*  
 Which of the following is not an incorrect statement?  
 (1) Only *Adamsia* contains collar cells  
 (2) Only *Plasmodium* is parasite  
 (3) Only *Leucosolania* is asymmetrical  
 (4) Only *Spongilla* and *Leucosolenia* has cellular grade of organization and contain water canal system

19. In comparision of coelenterata, ctenophora show  
 (1) hollow tentacles around mouth  
 (2) stinging cells in epidermis and gastrodermis polymorphism and metagenesis  
 (3) polymorphism and metagenesis  
 (4) only sexual reproduction and bioluminescence

20. Radial symmetry and lack of cnidoblasts are the characteristics of  
 (1) *Hydra* and *Starfish*  
 (2) *Starfish* and *Sea Anemone*  
 (3) *Ctenoplana* and *Beroe*  
 (4) *Aurelia* and *Paramoecium*

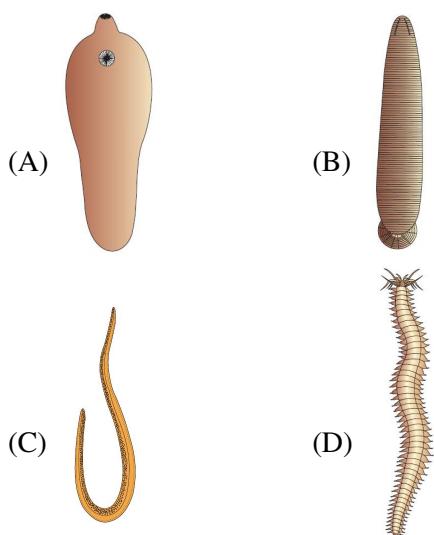
21. Match the items in Column-I with those in Column-II and choose the correct option.

| Column-I                                                                                 | Column-II                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A)    | (i)                                                                                                        |
| (B)   | (ii)                                                                                                      |
| (C)  | (iii) <br><br>(iv)  |

- (1) A-ii, B-ii, C-iv  
 (2) A-iii, B-iv, C-ii  
 (3) A-iv, B-iii, C-i  
 (4) A-i, B-ii, C-iii

22. In contrast to Annelids, the Platyhelminthes show  
 (1) Absence of body cavity  
 (2) Presence of pseudocoel  
 (3) Radial symmetry  
 (4) Bilateral symmetry

23. Match the items in Column-I with those in Column-II and Column-III and choose the correct option.

**Column-I**

|   | <b>Column-II</b>   |     | <b>Column-III</b>      |
|---|--------------------|-----|------------------------|
| a | <i>Ascaris</i>     | i   | Phylum-Annelida        |
| b | <i>Fasciola</i>    | ii  | Phylum-Platyhelminthes |
| c | <i>Nereis</i>      | iii | Phylum-Aschelminthes   |
| d | <i>Hirudinaria</i> | iv  | Phylum-Coelenterata    |

- (1) A-b-ii, B-a-iii, C-d-iv, D-c-ii
- (2) A-a-ii, B-b-iv, C-c-iii, D-d-ii
- (3) A-b-ii, B-d-i, C-a-iii, D-c-i
- (4) A-b-ii, B-d-iv, C-a-iii, D-c-ii

24. Consider the following statements.

- (A) Alimentary canal of earthworm is complete with a well developed muscular pharynx
- (B) In roundworms, sexes are separate, which means they are monoecious
- (C) In annelida, neural system consists of paired ganglia connected by lateral nerves
- (D) Nereis is dioecious
  - (1) A, C and D correct
  - (2) A and C incorrect
  - (3) A and B correct
  - (4) C and D incorrect

25. Which of the following animals contains open circulatory system?

- (1) Silk worm
- (2) *Pila*
- (3) *Balanoglossus*
- (4) All of the above

26. Phylum Mollusca is differentiated from other by

- (1) Bilateral symmetry and external skeleton
- (2) Mantle and gills
- (3) Shell and segmented body
- (4) Mantle and non-segmented body

27. All chordates have the following characteristics.

- (1) Bilaterally symmetrical, presence of coelom, triploblastic and open circulatory system
- (2) Bilaterally symmetrical, presence of coelom and diploblastic or triploblastic
- (3) Open circulatory system, diploblastic or triploblastic, coelom and bilaterally symmetrical
- (4) Bilaterally symmetrical, coelom, triploblastic and mainly with closed circulatory system

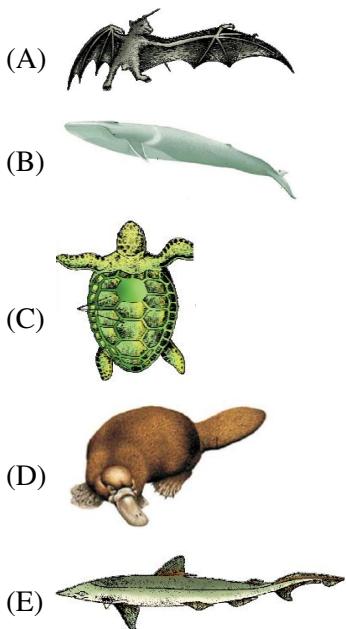
28. Select the correct statement.

- (1) In closed circulatory system, cells and tissues are directly bathed in blood
- (2) Platyhelminthes have a single opening out of body, so it is called complete digestive system
- (3) Notochord is ectodermal structure formed on the dorsal side
- (4) From Porifera to echinoderms all are non-chordates

29. Which one of the following is not a living fossil?

- (1) *Peripatus*
- (2) King crab
- (3) *Sphenodon*
- (4) *Archaeopteryx*

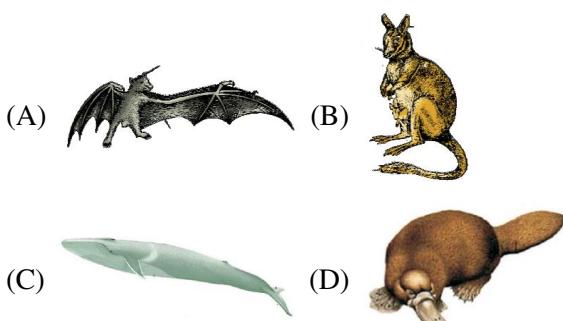
30. Which of the following animals do not belong to class Mammalia?



- (1) B and E      (2) A and C  
 (3) E and C      (4) D and E

31. Match the pictures in column-I with their generic names in column-II and their correct order of taxonomic category in column-III and choose the correct option.

**Column-I**



|   | <b>Column-II</b>       |     | <b>Column-III</b>                |
|---|------------------------|-----|----------------------------------|
| a | <i>Ornithorhynchus</i> | i   | Metatheria-Mammalia              |
| b | <i>Balaenoptera</i>    | ii  | Cetacea-Eutheria-Mammalia        |
| c | <i>Pteropus</i>        | iii | Chiroptera-Eutheria-Mammalia     |
| d | <i>Macropus</i>        | iv  | Monotremata-Prototheria-Mammalia |

**Options:**

- (1) A-c-ii, B-d-iii, C-b-i, D-b-iv  
 (2) A-c-iii, B-d-i, C-b-ii, D-a-iv  
 (3) A-a-i, B-b-i, C-b-ii, D-d-iv  
 (4) A-b-iii, B-d-i, C-c-ii, D-b-iv

32. A body cavity which is lined by mesoderm is called \_\_\_\_\_ is found in \_\_\_\_\_.

- (1) Haemocoel, Ascaris  
 (2) Pseudocoel, Fasciola  
 (3) Coelom, Taenia  
 (4) Coelom, Culex

33. Which one is first time evolved in annelida?

- (1) Triploblastic development  
 (2) Bilateral symmetry  
 (3) Cephalisation  
 (4) True coelom

34. Heart to pump blood evolved for the first time in

- (1) Annelids      (2) Arthropods  
 (3) Roundworms      (4) Flatworms

35. Among the following cells, each cell is specialised to perform a single specific function except.

- (1) Nematocytes      (2) Choanocytes  
 (3) Interstitial cells      (4) Gastrodermal cells

36. The basic fundamental feature(s) that enable us to broadly classify the animal kingdom is/are

- (1) Level of organization and coelom  
 (2) Cell organization and symmetry  
 (3) Segmentation and notochord  
 (4) All of the above

37. Which of the following is sedentary or does not show locomotion?

- (1) *Sycon*      (2) *Amoeba*  
 (3) *Hydra*      (4) *Physalia*

38. If '1' represents the extracellular digestion, '2' represent the intracellular digestion and '3' represent both type, then for coelentrata, ctenophora and porifera, select the correct option.

- (1) 1, 2, 3 respectively (2) 3, 3, 2 respectively  
(3) 3, 2, 1 respectively (4) 3, 2, 2 respectively

39. The member of Aschelminthes that is parasitic to plants is

- (1) *Ascaries* (Ascariasis)  
(2) *Wuchereria* (Filariasis)  
(3) *Meloidegyne incognititia*  
(4) All of the above

40. Match the columns I, II and III and choose the correct combination from the options given.

|   | Column-I           | Column-II             | Column-III     |
|---|--------------------|-----------------------|----------------|
| a | <i>Wuchereria</i>  | 1 Liver fluke         | Q Monoecious   |
| b | <i>Hirudinaria</i> | 2 Filaria worm        | R Metamerism   |
| c | <i>Ancylostoma</i> | 3 Blood sucking leech | S Endoparasite |
| d | <i>Fasciola</i>    | 4 Hookworm            | T Dioecious    |

- (1) a-4-T, b-3-R, c-2-S, d-1-Q  
(2) a-2-S, b-3-Q, c-4-T, d-1-S  
(3) a-2-T, b-3-R, c-4-S, d-1-R  
(4) a-2-Q, b-3-T, c-4-R, d-1-S

41. Which of the following is correct matching?

- (1) Haemocoel - Prawn and *Pila*  
(2) Protonephridia - Some rotifers  
(3) Acoelomate - Hookworm  
(4) Both 1 and 2

42. Which of the following is incorrect matching?

- (1) *Taenia*, *Fasciola*, *Dugesia*, *Schistosoma* - Platyhelminthes  
(2) *Ascaris*, *Wuchereria*, Hookworm - Aschelminthes  
(3) Pinworm, flatworm, liver fluke - Platyhelminthes  
(4) Eye worm, Filaria worm, seatworm - Aschelminthes

43. What is present in crustaceans but not in insects?

- (1) Paired limbs  
(2) Two pairs of antennae  
(3) Bilateral symmetry  
(4) Chitinous exoskeleton

44. Which one of the following is a matching pair of an animal and a certain phenomenon it exhibits?

- (1) *Pheretima* - Pseudocoel  
(2) *Musca* - Jointed appendages  
(3) *Chamaeleon* - Four chambered heart  
(4) *Taenia* - Rounded body

45. Which one of the following statements is incorrect?

- (1) In cockroaches and prawns, excretion of waste material occur through malpighian tubules  
(2) In ctenophores, locomotion is mediated by comb plates  
(3) In *Fasciola* and *Taenia* flame cells takes part in excretion  
(4) Earthworm are hermaphrodite and yet cross fertilization take place among them

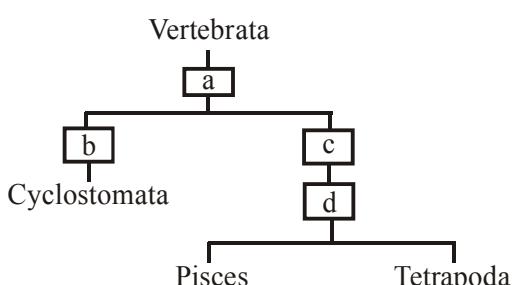
46. Larva of the echinoderms is

- (1) Sessile  
(2) Free-swimming  
(3) Both 1 and 2  
(4) In echinoderms larva is not found / development is direct

47. In arthropods the balancing organ is

- (1) Radula (2) Reticulocyst  
(3) Statocyst (4) Antennae

48. Fill in the blanks



- (1) a-subphylum, b-chondrichthyes, c-osteichthyes, d-class  
(2) a-subphylum, b-agnatha, c-gnathostomata, d-class  
(3) a-superclass, b-agnatha, c-gnathostomata, d-class  
(4) a-division, b-agnatha, c-gnathostomata, d-super class

- 49.** Match the column-I and II and choose the correct combination from the options given

|   | <b>Column-I</b> | <b>Column-II</b>                      |
|---|-----------------|---------------------------------------|
| a | Lamprey         | 1 Flame cells                         |
| b | Rohu            | 2 Tetrapoda                           |
| c | Lancelet        | 3 Migrate to fresh water for spawning |
| d | <i>Camelus</i>  | 4 Cycloid/ctenoid scales              |
| e | <i>Trygon</i>   | 5 Placoid scales                      |

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

- 50.** Match the columns I and II, and choose the correct combination from the options given

|   | <b>Column-I</b>     |   | <b>Column-II</b>   |
|---|---------------------|---|--------------------|
| a | Limbless amphibian  | 1 | <i>Icthyophis</i>  |
| b | Jawless vertebrate  | 2 | <i>Icthyosaurs</i> |
| c | Tail less amphibian | 3 | Frog               |
| d | Limbless reptile    | 4 | Lamprey            |
| e | Fish like reptile   | 5 | Snake              |

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

- 51.** Most poisonous fish among the following is



- 52.** Match the columns I and II, and choose the correct combination from the options given.

|   | <b>Column-I</b>    |   | <b>Column-II</b>    |
|---|--------------------|---|---------------------|
| a | <i>Macaca</i>      | 1 | Limbless vertebrate |
| b | <i>Aptenodytes</i> | 2 | Cloacal chamber     |
| c | <i>Vipera</i>      | 3 | Pneumatic bones     |
| d | <i>Bufo</i>        | 4 | Ear pinna           |

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

- 53.** The cervical vertebrae in human is

- (1) Same as in Whale

- ## (2) More than that in Rabbit

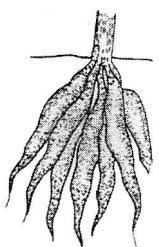
- (3) Double than that of Horse

- (4) Less than that in Giraffe

- 54.** Which one of the following does not have an excretory system?

## MORPHOLOGY OF FLOWERING PLANTS

1. Select the **correct** statement for given figure :-



- (1) Conical roots of *Asparagus*
- (2) Modified tap roots that occurs in *Dahlia*.
- (3) Modified adventitious fasciculated root that stores reserve food material
- (4) These roots are modified to provide mechanical supports

2. Match Column-I with Column-II and select the **correct** option.

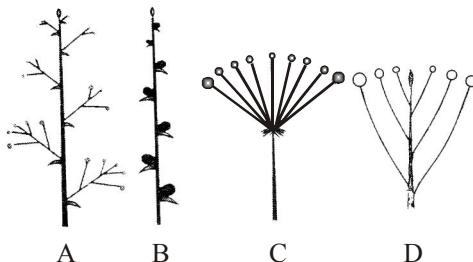
|     | <b>Column-I</b> |       | <b>Column-II</b>                       |
|-----|-----------------|-------|----------------------------------------|
| (A) | Vegetative bud  | (i)   | Buds develop in axils of leaves        |
| (B) | Floral buds     | (ii)  | Bud that produces leafy shoot          |
| (C) | Axillary buds   | (iii) | Reproductive buds that produce flowers |

- (1) (A)-(ii), B-(iii), C-(i)
- (2) (A)-(iii), B-(ii), C-(i)
- (3) (A)-(i), B-(iii), C-(ii)
- (4) (A)-(i), B-(ii), C-(iii)

3. A simple leaf can be differentiated from the leaflet of a compound leaf due to presence of :-

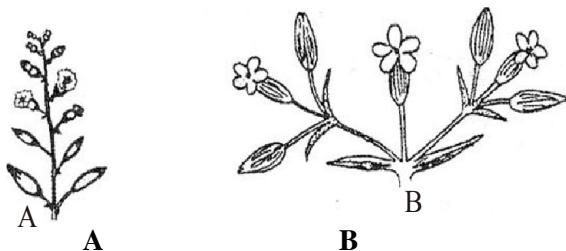
- (1) Number of leaflets
- (2) Shape
- (3) Axillary bud
- (4) Apical bud

4. The given figure shows some types of inflorescences. Select the option that **correctly** identifies them:-



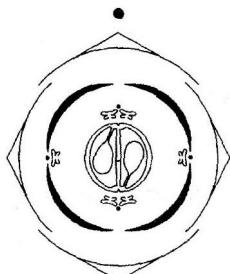
|     | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|----------|----------|----------|----------|
| (1) | Panicle  | Spike    | Corymb   | Catkin   |
| (2) | Spike    | Panicle  | Corymb   | Catkin   |
| (3) | Panicle  | Catkin   | Umbel    | Spike    |
| (4) | Panicle  | Spike    | Umbel    | Corymb   |

5. Identify the types of inflorescence shown in figure A and B and select the **correct** option.

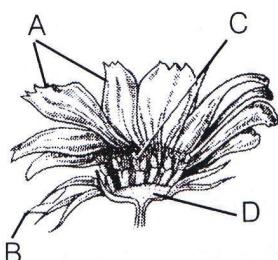


- (1) Cymose
- (2) Racemose
- (3) Racemose
- (4) Cymose

6. Which of the following features characterize the family brassicaceal represented by the given floral diagram?

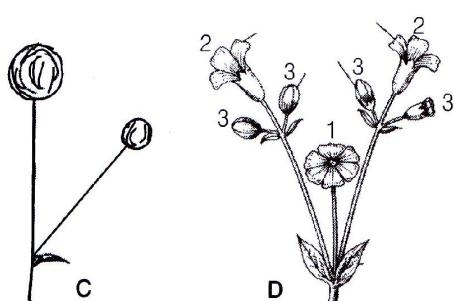
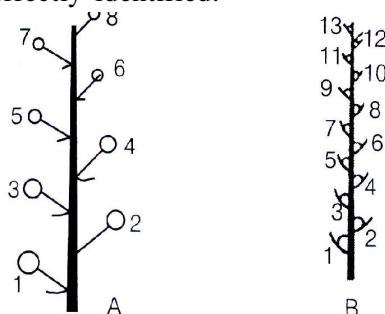


- (1) Cruciform corolla with vexillary aestivation
- (2) Stamens with didynamous condition
- (3) Bicarpellary, syncarpous gynoecium with parietal placentation
- (4) Inflorescence usually cymose



- (1) A-Disc florest;B-Receptacle;C-Ray florets;  
D -Involucr
  - (2) A-Ray florets;B-Involucr;C-Disc florets;  
D-Receptacle
  - (3) A-Disc florets; B-Involucr;C-Receptacle;  
D-Ray florets
  - (4) A-Ray florets;B-Disc florets;C-Receptacle;  
D-Involucr

- 10.** Select the option in which A, B, C and D are correctly identified.



- (1) A-Spike; B-Raceme; C-Dichasial cyme;  
D-Monochasial cyme
  - (2) A-Raceme; B-Spike; C-Monochasial cyme;  
D-Dichasial cyme
  - (3) A-Dichasial cyme; B-Monochasial cyme;  
C-Raceme; D-Spike
  - (4) A-Spike; B-Dichasial cyme; C-Monochasial  
cyme; D-Raceme

11. Which of the following is unmatched pair ?

  - (1) Carrot and turnip - modified tap root
  - (2) Sweet potato - Prop root
  - (3) Maize and sugarcane - Stilt root
  - (4) *Rhizophora* - Pneumatophore

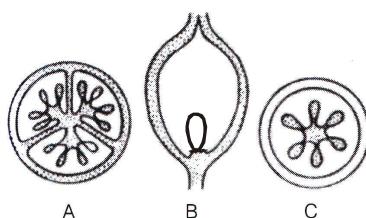
12. Which of the following is incorrect statement?

  - (1) When veinlets form a network in lamina, the venation is termed as reticulate
  - (2) When the veins run parallel to each other within lamina the venation is termed as parallel
  - (3) Parallel venation is a characteristic of dicots
  - (4) Reticulate venation is a characteristic of dicots

- 13.** Which one of the following match is **incorrect** with respect to placenta?

- |                     |   |              |
|---------------------|---|--------------|
| (1) Pea             | - | Axile        |
| (2) <i>Dianthus</i> | - | Free central |
| (3) <i>Musturd</i>  | - | Parietal     |
| (4) Arhar           | - | Marginal     |

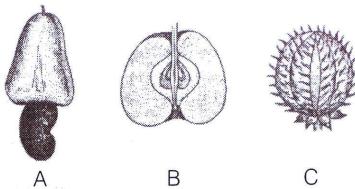
- 14.** Select the correct option in which given placements (A, B and C) are along with their suitable example.



- (1) A-Marginal,Pea;B-Parietal,*Argemone*;C-Basal,Wheat
  - (2) A-Axile,*Citrus*; B-Basal,Wheat;C-Free central, Primrose
  - (3) A-Axile,*Citrus*; B-Basal,Wheat;C-Free central, Rose
  - (4) A-Parietal,Radish;B-Basal;Maize;C-Superficial; *Nymphaea*

15. The fruits of *Annona squamosa* (custard apple) develop from  
 (1) Multicarpellary and syncarpous gynoecium  
 (2) Monocarpellary and gynoecium  
 (3) Multicarpellary and apocarpous gynoecium  
 (4) Multicarpellary and syncarpous gynoecium

16. Select the correct option in which types of fruit along with suitable example are correctly identified.



- (1) A - Sorosis (*Morus*), B - Regma (Apple), C - Siliqua (*Ficus*)  
 (2) A - Nut (*Anacardium*), B - Pome (Apple), C - Regma (*Ricinus*)  
 (3) A - Syconus (*Ficus*), B - Pome (Apple), C - Silicula (*Iberis*)  
 (4) A - Samara (*Holoptelea*), B - Pome (Apple), C - Syconus (*Ficus*)

17. Adventitious roots are adventitious, in their :-  
 (1) Function (2) Position  
 (3) Place of origin (4) Internal structure

18. A few millimeters above the root cap is the region of :-  
 (1) Elongation (2) Maturation  
 (3) Meristematic activity (4) Root hairs

19. In which of the following root is not used as vegetable?  
 (1) Sweet potato (2) Potato  
 (3) Turnip (4) Carrot

20. Thorn develops from :-  
 (1) Root (2) Leaf  
 (3) Axillary bud (4) Peduncle

21. Racemose inflorescence is identified by :-  
 (1) Acropetal arrangement of flowers on peduncle  
 (2) Presence of sessile flowers only  
 (3) Continuous growth of main axis (peduncle)  
 (4) Both 1 and 3

22. Cymose inflorescence is identified by :-  
 (1) Basipetal arrangement of flowers on peduncle  
 (2) Main axis terminates in a flower  
 (3) Both 1 and 2  
 (4) Presence of pedicellate flowers only

23. Which of the following combination only is false ?  
 (1) Apocarpous - Carpels free- Lotus, rose  
 (2) Syncarpous - Carpels fused - Mustard, tomato  
 (3) Placentation - Arrangement of ovules within ovary  
 (4) Aestivation - Arrangement of ovules within ovary

24. Which of the following are example of endospermic seeds ?  
 (1) Bean, gram (2) Coconut, maize  
 (3) Pea, maize (4) Bean, coconut

25. Scutellum is found in :-

- (1) Monocot embryo  
 (2) Dicot embryo  
 (3) Gymnosperm embryo  
 (4) Pteridophyte embryo

26. Select the correct option in which column-I and II are correctly matched.

|   | <b>Column-I</b>                                   |      | <b>Column-II</b>  |
|---|---------------------------------------------------|------|-------------------|
| A | Pneumatophores                                    | i    | Encloses radicle  |
| B | Stilt roots                                       | ii   | Ovary inferior    |
| C | Outer layer of seed coat of a dicotyledonous seed | iii  | Ovary superior    |
| D | Coleoptile                                        | iv   | Brinjal           |
| E | Hypogynous condition                              | v    | <i>Rhizophora</i> |
| F | Epipetalous condition of stamens                  | vi   | Maize             |
| G | Coleorrhiza                                       | vii  | Encloses plumule  |
| H | Epigynous condition                               | viii | Testa             |
| I | Inner layer of seed coat of a dicotyledonous seed | ix   | Tegmen            |

- (1) A-iv; B-v; C-viii; D-vii; E-vi; F-iii; G-i; H-ii; I-ix  
 (2) A-v; B-vi; C-viii; D-vii; E-iii; F-iv; G-i; H-ii; I-ix  
 (3) A-i; B-ii; C-iii; D-vii; E-vi; F-v; G-iv; H-viii; I-ix  
 (4) A-ix; B-viii; C-vii; D-vi; E-i; F-ii; G-iii; H-iv; I-v

27. Select the correct option in which column-I and II are correctly matched.

|   | <b>Column-I</b>      |     | <b>Column-II</b> |
|---|----------------------|-----|------------------|
| A | Edible mesocarp      | i   | Coconut          |
| B | Endospermic seed     | ii  | Mango            |
| C | Fibrous mesocarp     | iii | Bean             |
| D | Non-endospermic seed | iv  | Castor           |

- (1) A-ii; B-iv; C-ii; D-i
- (2) A-i; B-iii; C-iv; D-ii
- (3) A-vi; B-i; C-iv; D-iii
- (4) A-ii; B-iv; C-i; D-iii

28. Select the option in which all statements are **false**.

- (I) Calyx and corolla are reproductive whorls of a flower
  - (II) Zygomorphic flower can be divided into two equal halves passing through any vertical plane
  - (III) Flowers may be bracteate or ebracteate
  - (IV) Parthenocarpic fruit is developed from fertilized ovary
  - (V) In legumes, seeds are non-endospermic
  - (VI) Ovary is inferior in members of fabaceae
  - (VII) A sterile stamen is called staminode
- (1) I, II, IV, VI
  - (2) I, II, V, VII
  - (3) III, V, VII
  - (4) IV, V, VII

29. Select correct option in which column I, II and III are correctly matched.

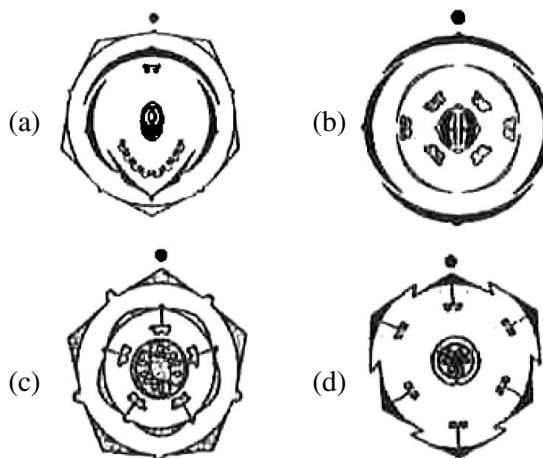
**Column-I**

- (A) Brassicaceae
- (B) Fabaceae
- (C) Solanaceae
- (D) Liliaceae

**Column-II**

- (i) Br $\oplus$ ♀ $\widehat{P}_{(3+3)}$ A $_{3+3}$ G $_{(3)}$
- (ii) Br $\oplus$ ♀ $\widehat{K}_{(5)}$ C $_{(5)}$ A $_{5}$ G $_{3}$
- (iii) %♀ $\widehat{K}_{(5)}$ C $_{1+2+(2)}$ A $_{(9)+1}$ G $_{1}$
- (iv)  $\oplus$ ♀ $\widehat{K}_{2+2}$ C $_{4}$ A $_{2+4}$ G $_{(2)}$

**Column-III**



- (1) A-iv-b; B-iii-a; C-ii-c; D-i-d
- (2) A-iv-a; B-iii-b; C-ii-c; D-i-d
- (3) A-iv-b; B-iii-a; C-ii-d; D-i-c
- (4) A-iv-b; B-iii-c; C-ii-a; D-i-d

30. Stamens in *Hibiscus* are :-

- (1) Didynamous
- (2) Monoadelphous
- (3) Diadelphous
- (4) Polyadelphous

31. How many plants in the list given below have composite fruits that develop from an inflorescence?

Walnut, poppy, radish, fig, pineapple, apple, tomato and mulberry.

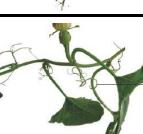
- (1) Two
- (2) Three
- (3) Four
- (4) Five

32. Fill in the blanks :

- (a) K. Esau was born in ...1... in 1898.
- (b) K Esau reported in her early publications that the curly top virus spreads through a plant via the ...2... tissue.
- (c) In the root, a few ...3... above the root cap is the region of meristematic activity.
- (d) The ...4... absorb water and minerals from the soil.

- (1) 1-Ukraine, 2-phloem, 3-millimeters, 4-root hairs
- (2) 1-Russia, 2-phloem, 3-centimetres, 4-cap
- (3) 1-Germany, 2-xylem, 3-centimetres, 4-cap
- (4) 1-Ukraine, 2-xylem, 3-millimeters, 4-root hairs

33. Match the columns-I, II and III and choose the option with correct combination.

|   | <b>Column-I</b>                                                                   |   | <b>Column-II</b>       |   | <b>Column-III</b>                   |
|---|-----------------------------------------------------------------------------------|---|------------------------|---|-------------------------------------|
| a |  | 1 | Protection             | K | Stem tendrils                       |
| b |  | 2 | Support                | L | Under ground stem                   |
| c |  | 3 | Storage                | M | Leaves and roots arising from nodes |
| d |  | 4 | Vegetative propagation | N | Axillary bud is modified into thorn |

(1) a-2-K, b-1-N, c-3-L, d-4-M

(2) a-3-L, b-4-M, c-2-K, d-1-N

(3) a-3-K, b-4-N, c-2-L, d-1-M

(4) a-3-L, b-2-M, c-4-K, d-1-N

34. Fill in the blanks :

(a) In ...1..., the leaf base expands into a ...2... covering the stem partially or wholly.

(b) In some ...3... plants, the leaf base may become swollen, which is called ...4...

(1) 1-monocotyledons, 2-sheath,  
3-leguminous, 4-pulvinus

(2) 1-leguminous, 2-sheath,  
3-monocotyledons, 4-pulvinus  
(3) 1-monocotyledons, 2-pulvinus,  
3-leguminous, 4-sheath

(4) 1-leguminous 2-pulvinus,  
3-monocotyledons, 4-sheath

35. Match the columns I, II and III choose the correct combination from the options given.

|   | <b>Column-I</b>                                                                    |   | <b>Column-II</b>                                                                   |   | <b>Column-III</b> |
|---|------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------|---|-------------------|
| a |  | 1 | The main axis continues to grow, and flowers are arranged in acropetal manner      | K | Racemose          |
| b |  | 2 | The main axis terminates in a flower, and flowers are arranged in basipetal manner | L | Cymose            |

(1) a-1-L, b-2-K

(2) a-2-L, b-1-K

(3) a-1-K, b-2-L

(4) a-2-K, b-1-L

36. Match the columns I, II and III and choose the option with correct combination.

|   | <b>Column-I</b>                                                                      |   | <b>Column-II</b>        |   | <b>Column-III</b> |
|---|--------------------------------------------------------------------------------------|---|-------------------------|---|-------------------|
| a |  | 1 | Parallel venation       | K | Dicots            |
| b |  | 2 | Reticulate venation     | L | Neem              |
| c |  | 3 | Pinnately compound leaf | M | Silk cotton       |
| d |  | 4 | Palmately compound leaf | N | Monocots          |

(1) a-3-M, b-2-K, c-4-L, d-1-N

(2) a-4-M, b-1-N, c-3-L, d-2-K

(3) a-3-L, b-1-N, c-4-M, d-2-K

(4) a-4-M, b-2-K, c-3-L, d-1-N

37. Match the columns I and II, and choose the option with **correct** combination.

|   | <b>Column-I</b>                                     |   | <b>Column-II</b>    |
|---|-----------------------------------------------------|---|---------------------|
| a | Calyx and Corolla                                   | 1 | Bisexual            |
| b | Androecium and gynoecium                            | 2 | Unisexual           |
| c | Calyx and Corolla are not distinct                  | 3 | Accessory whorls    |
| d | A flower having either only stamens or only carpels | 4 | Reproductive whorls |
| e | When a flower have both androecium and gynoecium    | 5 | Perianth            |

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

- 38.** Read the following statements and find out the incorrect statement.

- (1) Orchids are monocotyledonous in which seeds are non-endospermic
  - (2) Castor is dicotyledonous in which seeds are endospermic.
  - (3) In monocotyledonous seeds, the outer covering of endosperm separates the embryo by a proteinaceous layer called aleurone layer



40. The term papilionaceous is related to -  
(1) Calyx                          (2) Androecium  
(3) Corolla                        (4) Gynoecium

| ANSWER KEY |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Que.       | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
| Ans.       | 3  | 1  | 3  | 4  | 2  | 3  | 4  | 4  | 2  | 2  | 2  | 3  | 1  | 2  | 3  |
| Que.       | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans.       | 2  | 3  | 3  | 2  | 3  | 4  | 3  | 4  | 2  | 1  | 2  | 4  | 1  | 1  | 2  |
| Que.       | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |    |    |    |    |    |
| Ans.       | 2  | 1  | 2  | 1  | 2  | 2  | 3  | 4  | 2  | 3  |    |    |    |    |    |

## ANATOMY OF FLOWERING PLANTS

- 1.** Read the given statements and select the **correct** option.

**Statement 1:** Root cap protects the root apical meristem from the friction of the soil

**Statement 2:** The effect of the soil-friction damages the outer cells of root cap which are peeled off and replaced by new cells produced by root apical meristem

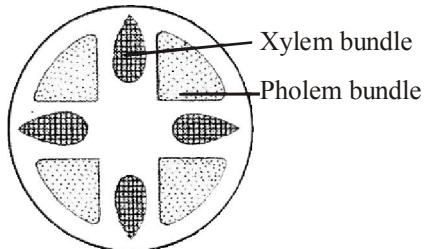
- Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
- Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
- Statement 1 is correct and statement 2 is incorrect
- Both statements 1 and 2 are incorrect

- 2.** Match the Column-I with Column-II and select the **correct** option from the codes given below:-

|     | Column-I         |       | Column-II                                                                        |
|-----|------------------|-------|----------------------------------------------------------------------------------|
| (A) | Vessels          | (i)   | Cells are living, with thin cellulosic cell walls                                |
| (B) | Tracheids        | (ii)  | Cells possess highly thickened walls with obliterated central lumens             |
| (C) | Xylem fibres     | (iii) | Individual members are interconnected through perforations in their common walls |
| (D) | Xylem parenchyma | (iv)  | Elongated tube-like cells with thick, lignified walls and tapering ends          |

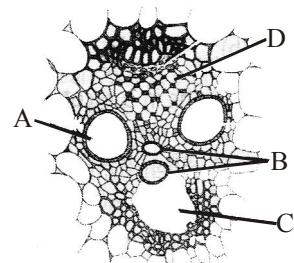
- A-(iv), B-(iii), C-(ii), D-(i)
- A-(iii), B-(iv), C-(ii), D-(i)
- A-(ii), B-(iv), C-(iii), D-(i)
- A-(iv), B-(ii), C-(iii), D-(i)

- 3.** Identify the type of vascular bundle as shown in the figure and select the **incorrect** statement regarding this:-



- Figure represents radial vascular bundles in which xylem and phloem occur in the form of separate bundles.
- Xylem bundles and phloem bundles occur on different radii
- These are the characteristic of monocot and dicot leaves
- These are the characteristic of monocot and dicot roots

- 4.** Refer the given figure which represents a section of vascular bundle as seen in T.S. of a monocot stem and select the option that **correctly** labels A, B, C and D.



|     | A                 | B                 | C                 | D            |
|-----|-------------------|-------------------|-------------------|--------------|
| (1) | Protoxylem vessel | Metaxylem vessel  | Protoxylem cavity | Phloem       |
| (2) | Protoxylem vessel | Metaxylem vessel  | Protoxylem cavity | Sclerenchyma |
| (3) | Metaxylem vessel  | Protoxylem vessel | Protoxylem cavity | Phloem       |
| (4) | Metaxylem vessel  | Protoxylem vessel | Protoxylem cavity | Sclerenchyma |

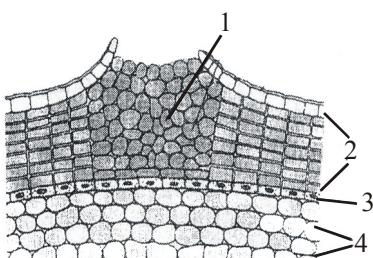
5. Following table summarizes the differences between a monocot root and a dicot root:-

|       | Characters            | Monocot root                                   | Dicot root                                   |
|-------|-----------------------|------------------------------------------------|----------------------------------------------|
| (i)   | Vascular bundle       | Polyarch i.e. more than 6 vascular bundles     | Diarch to hexarch i.e., 2-6 vascular bundles |
| (ii)  | Cambium               | Absent                                         | Formed during secondary growth               |
| (iii) | Pith                  | Poorly developed                               | Well developed large pith                    |
| (iv)  | Activity of pericycle | Gives rise to secondary roots and cork cambium | Gives rise to lateral roots only             |

Pick up the **wrong differences** and select the **correct option**.

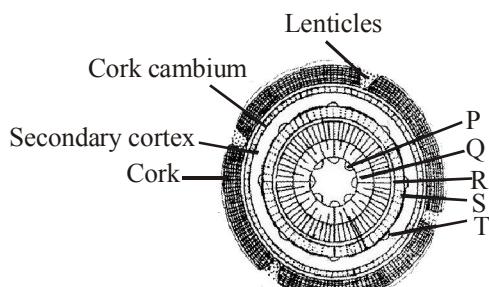
- (1) (i) and (iii)      (2) (i) and (iv)  
 (3) (iii) and (iv)      (4) (ii) and (iii)

6. Given transverse section of stem showing periderm, identify the parts labelled 1, 2, 3 and 4 and select the correct answer :-



|     | 1                   | 2         | 3         | 4         |
|-----|---------------------|-----------|-----------|-----------|
| (1) | Complementary cells | Cork      | Phellogen | Pheloderm |
| (2) | Lenticels           | Cork      | Phellogen | Pheloderm |
| (3) | Lenticels           | Pheloderm | Phellogen | Cork      |
| (4) | Complementary cells | Pheloderm | Phellogen | Cork      |

7. Identify P, Q, R, S, and T in the given T.S. of dicot stem showing secondary growth and select the correct option:-



|     | P               | Q               | R                | S                | T                |
|-----|-----------------|-----------------|------------------|------------------|------------------|
| (1) | Primary phloem  | Primary xylem   | Vascular cambium | Secondary xylem  | Secondary phloem |
| (2) | Secondary xylem | Primary xylem   | Secondary phloem | Primary phloem   | Vascular cambium |
| (3) | Primary xylem   | Secondary xylem | Vascular cambium | Secondary phloem | Primary phloem   |
| (4) | Primary xylem   | Secondary xylem | Vascular cambium | Primary phloem   | Secondary phloem |

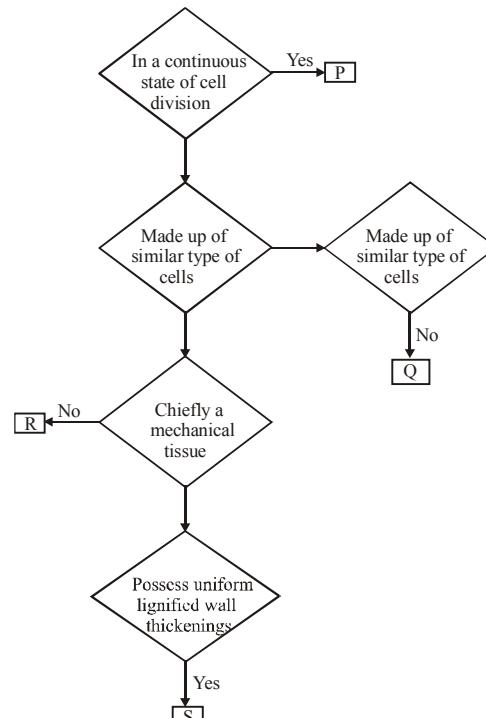
8. Read the given statements and select the **correct option**.

**Statement 1:** Annual rings are distinct in plants growing in temperate regions.

**Statement 2:** In temperate regions, the climatic conditions are uniform throughout the year.

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.  
 (2) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.  
 (3) Statement 1 is correct and statement 2 is incorrect  
 (4) Both statements 1 and 2 are incorrect

9. Study the flow chart given below:-



Which one of the following statements is **incorrect** regarding this?

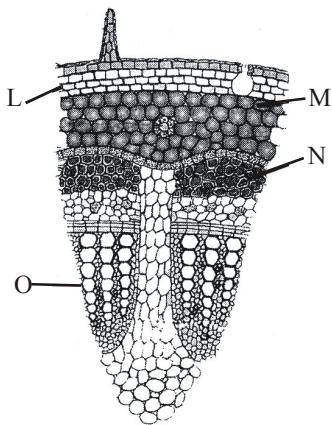
- (1) P can be root apical meristem which is generally subterminal in position.

(2) Q can be phloem

(3) R can be parenchyma which comprises of thin walled isodiametric cells.

(4) S can be collenchyma which is a living mechanical tissue

**10.** Read the following statements regarding the given figure and select the **correct** one.



- (1) 'L' is the collenchymatous hypodermis that provides mechanical strength and flexibility to young dicot stems.
  - (2) 'M' is the innermost layer of cortex which usually possesses caspary strips
  - (3) 'N' is the parenchymatous pericycle that synthesizes food.
  - (4) 'O' is xylem which is exarch with respect to the positions of protoxylem and metaxylem.

11. In (i) porus wood, vessels are very broad in the (ii) wood and are quite narrow in the (iii) wood. This kind of wood is present in (iv) and it translocates (v) amount of water when required by the plant.

Select the **correct** fill ups for the above paragraph.

- (1) (i)-diffuse, (ii)-autumn, (iii)-spring  
(iv)-***Dalbergia sissoo***, (v)-more
  - (2) (i)-diffuse, (ii)-spring, (iii)-autumn  
(iv)-***Syzygium cumini***, (v)-less
  - (3) (i)-ring, (ii)-spring, (iii)-autumn  
(iv)-***Dalbergia sissoo***, (v)-more
  - (4) (i)-ring, (ii)-autumn, (iii)-spring  
(iv)-***Syzygium cumini***, (v)-less

- 12.** Secondary tissues of a plant :-

  - Add to the length of roots and shoots
  - Add to the diameter of roots and shoots
  - Are found only in the embryo
  - Are found only in the seedling

**13.** Consider the following statements

  - Forms major component within organs
  - Cell wall - thin, cellulosic
  - Shape of cells - generally isodiametric
  - Intercellular space - present/absent
  - Photosynthetic, storage or secretory in function

The above characteristics are attributed to

  - Collenchyma
  - Parenchyma
  - Sclerenchyma
  - Vascular tissue

**14.**

  - Occurs as layers or patches
  - Cell wall - Unevenly thickened due to pectocellulosic deposition
  - Cells-Spherical, oval or polygonal
  - Cells often has chloroplasts
  - Living mechanical tissue
  - Occurs in hypodermis of young dicot stem and petiole

The characteristics are shown by which of the following tissues?

  - Parenchyma
  - Collenchyma
  - Sclerenchyma
  - Vascular tissue

**15.**

  - Multicellular with wide lumen
  - Consists of vertical rows of cell with cross walls dissolved
  - Discontinuous lumen due to presence of end walls
  - Cells are dead
  - Cell walls are lignified
  - Long, tube-like structure
  - Elongated cell with tapering ends

Match the above characteristics with (A) and (B)

(A) Vessel

(B) Tracheids

|                        |                       |
|------------------------|-----------------------|
| (1) A-I, II, IV, V, VI | B-III, IV, V, VII,    |
| (2) A-III, IV, V, VII  | B-I, II, IV, V, VI    |
| (3) A-I, IV, V, VII    | B-III, II, IV, V, VII |
| (4) A-I, II, III, IV   | B-II, V, VI, VII      |

- 16.** On the basis of location and function, how many types of the tissue system are found in vascular plants?  
 (1) 2      (2) 3      (3) 4      (4) 5
- 17.** Epidermis consists of \_\_\_\_\_ and is \_\_\_\_\_ (layered).  
 (1) Sclerenchyma, multilayered  
 (2) Collenchyma, singlelayered  
 (3) Parenchyma, multilayered  
 (4) Parenchyma, single-layered
- 18.** How many shoot apical meristematic zones are expected in a plant possessing 9 branches and 39 leaves?  
 (1) 9      (2) 39      (3) 10      (4) 8
- 19.** (I) Unicellular hair  
 (II) Endodermis with passage cells  
 (III) Pith-small/inconspicuous  
 (IV) Radial vascular bundles  
 (V) Xylem exarch  
 (VI) 2-4 xylem and phloem bundles/patches  
 The above description refers to which of the following?  
 (1) Monocot root      (2) Dicot root  
 (3) Monocot stem      (4) Dicot stem
- 20.** Which one is **false** about monocot stem?  
 (I) Vascular bundles are scattered, conjoint, closed, surrounded by sclerenchymatous bundle sheath and with water cavity.  
 (II) Hypodermis is sclerenchymatous  
 (III) Peripheral vascular bundles are smaller than centrally placed ones  
 (IV) Ground tissue is differentiated into cortex, pericycle, pith, etc  
 (V) Homogeneous parenchymatous ground tissue.  
 (1) I, III, V      (2) III, IV  
 (3) IV      (4) V

|      | <b>Column-I</b>                                                     |   | <b>Column-II</b>                     |
|------|---------------------------------------------------------------------|---|--------------------------------------|
| I    | Leaf is hypostomatic                                                | A | Dicotyledonous/<br>Dorsiventral leaf |
| II   | Mesophyll is differentiated into palisade and spongy parenchyma     | B | Monocotyledonous/<br>Monocot leaf    |
| III  | Leaf is amphistomatic                                               |   |                                      |
| IV   | Vascular bundles are conjoint and closed                            |   |                                      |
| V    | Mesophyll consists of only spongy parenchyma                        |   |                                      |
| VI   | Epidermis is cuticularized                                          |   |                                      |
| VII  | Vascular bundles are of different sizes                             |   |                                      |
| VIII | Vascular bundles are of nearly similar sizes except main (mid) vein |   |                                      |

Which is correctly matched ?

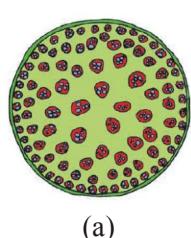
- (1) A=I, IV, V, VI, VII; B=II, III, IV, VI, VIII  
 (2) A=I, II, IV, VI, VII; B=III, IV, V, VI, VIII  
 (3) A=III, IV, V, VI, VII; B=I, II, IV, VI, VII  
 (4) A=I, IV, V, VIII; B=II, III, IV, VI, VII

- 22.** Which one is **correct** about the secondary growth?

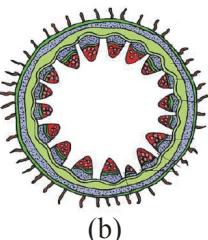
- (1) Youngest secondary phloem is present just outside the vascular cambium while youngest secondary xylem is present inside the cambium  
 (2) Oldest secondary phloem is present just below the primary phloem while oldest secondary xylem present is just above the primary xylem  
 (3) Secondary medullary rays occurs through both secondary xylem and secondary phloem  
 (4) All of the above

- 23.** Moving from the centre of tree trunk to outward, the order of vascular tissues is  
 (1)  $1^\circ$  (primary) xylem  $\rightarrow 2^\circ$  (secondary) xylem  
 $\rightarrow$  vascular cambium  $\rightarrow 2^\circ$  (secondary) phloem  $\rightarrow 1^\circ$  (primary) phloem  
 (2)  $2^\circ$  (secondary) xylem  $\rightarrow 1^\circ$  (primary) xylem  
 $\rightarrow$  vascular cambium  $\rightarrow 1^\circ$  (primary) phloem  
 $\rightarrow 2^\circ$  (secondary) phloem  
 (3)  $1^\circ$  (primary) xylem  $\rightarrow 2^\circ$  (secondary) phloem  
 $\rightarrow 2^\circ$  (secondary) xylem  $\rightarrow 2^\circ$  (secondary) phloem  $\rightarrow$  vascular cambium  
 (4)  $1^\circ$  (primary) xylem  $\rightarrow 1^\circ$  (primary) phloem  
 $\rightarrow$  vascular cambium  $\rightarrow 2^\circ$  (secondary) phloem  $\rightarrow 2^\circ$  (secondary) xylem
- 24.** Phellogen cuts/forms  
 (1) Cork/phellem inside and secondary cortex (phelloderm) outside  
 (2) Cork outside and phelloderm inside  
 (3) Both cork and phelloderm inside  
 (4) Both cork and phelloderm outside
- 25.** When secondary growth is initiated in a dicot root, which of the following happens first?  
 (1) Portion of conjunctive parenchyma present below the phloem bundles forms strips of vascular cambium.  
 (2) Portion of pericycle above the protoxylem becomes meristematic and forms vascular cambial cells  
 (3) Cells of endodermis become meristematic  
 (4) Cambial initials between the xylem and phloem divide
- 26.** Some vascular bundles are described as open because they ?  
 (1) Are surrounded by pericycle but no endodermis  
 (2) Are capable of producing secondary xylem and secondary phloem due to presence of cambium  
 (3) Possess conjunctive tissue between xylem and phloem  
 (4) Are not surrounded by pericycle
- 27.** Epidermis is the surface covering of a plant body. Which of the following functions is not performed by the epidermis?  
 (1) Protecting the plant from mechanical injury  
 (2) Protecting the plant from invasion by pathogens  
 (3) Preventing the loss of water from the plant, along with the cuticle  
 (4) Preventing the exchange of gases between the plant and environment
- 28.** Passage cells are thin-walled cells found in  
 (1) Central region of style through which the pollen tube grows towards the ovary  
 (2) Endodermis of roots facilitating rapid transport of water from cortex to pericycle  
 (3) Phloem elements that serve as entry points for substances for transport to other plant parts  
 (4) Testa of seeds to enable emergence of growing embryonic axis during seed germination.
- 29.** Read the different components from (a) to (d) in the list given below and tell the correct order of the components with reference to their arrangement from outerside to innerside in a woody dicot stem.  
 (a) Secondary cortex (b) Wood  
 (c) Secondary phloem (d) Phellem  
 The correct order is :-  
 (1) d, c, a, b (2) c, d, b, a  
 (3) a, b, d, c (4) d, a, c, b
- 30.** Read the following statements and find out the incorrect statement.  
 (1) There are structural similarities and variations (differences) in the external morphology and internal structure of the larger living organism, both plants and animals.  
 (2) Plants have cells as the basic unit which are organised into tissues and the tissues are organised into organs.  
 (3) A tissue is a group of cells having a common origin and usually performing different functions  
 (4) Axillary buds are present in the axils of leaves and are capable of forming a branch or a flower

31. Recognise the figure :



(a)



(b)

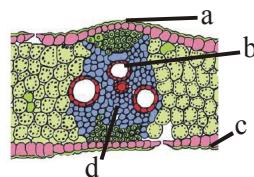
- (1) Figure 'a' shows T.S. of dicot stem as it has scattered vascular bundles, while figure 'b' shows T.S. of monocot stem as it has ring arrangement of vacular bundles.
- (2) Figure 'a' shows T.S. of monocot stem as it has scattered vascular bundles while figure 'b' shows T.S. of dicot stem as it has ring arrangement of vascular bundles.
- (3) Figure 'a' shows T.S. of dicot stem as it has ring arrangement of vascular bundles while figure 'b' shows T.S. of monocot stem as it has scattered vascular bundles.
- (4) Figure 'a' shows T.S. of monocot stem as it has ring arrangement of vascular bundles while figure 'b' shows T.S. of dicot stem as it has scattered vascular bundles.

32. Match the columns I and II and choose the correct combination from the options given.

|   | <b>Column-I</b> |   | <b>Column-II</b> |
|---|-----------------|---|------------------|
| a |                 | 1 | Monocot leaf     |
| b |                 | 2 | Dicot leaf       |
| c |                 | 3 | Monocot stem     |
|   |                 | 4 | Dicot stem       |

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

33. Recognise the figure and find out the correct matching.



- (1) a-abaxial epidermis, c-adaxial epidermis, b-xylem, d-phloem
- (2) c-abaxial epidermis, a-adaxial epidermis, b-xylem, d-phloem
- (3) a-abaxial epidermis, c-adaxial epidermis, d-xylem, b-phloem
- (4) c-abaxial epidermis, a-adaxial epidermis, d-xylem, b-phloem

34. Match the columns I, II and III and choose the correct combination from the options given

|   | <b>Column-I</b> |   | <b>Column-II</b> |   | <b>Column-III</b> |
|---|-----------------|---|------------------|---|-------------------|
| a | Early wood      | 1 | Winter season    | K | Lighter colour    |
| b | Late wood       | 2 | Spring season    | L | Higher density    |
|   |                 |   |                  | M | Darker colour     |
|   |                 |   |                  | N | Lower density     |
|   |                 |   |                  | Q | Wider vessels     |
|   |                 |   |                  | R | Narrow vessels    |

- (1) a-1-K-L-Q, b-2-M-N-R
- (2) a-1-M-N-R, b-2-K-L-Q
- (3) a-2-K-N-Q, b-1-L-M-R
- (4) a-2-K-M-R, b-1-K-N-Q

#### ANSWER KEY

| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Ans.</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>3</b> | <b>3</b> | <b>1</b> | <b>3</b> | <b>3</b> | <b>4</b> | <b>1</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>1</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       | 25       | 26       | 27       | 28       | 29       | 30       |
| <b>Ans.</b> | <b>2</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>3</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>2</b> | <b>4</b> | <b>3</b> |
| <b>Que.</b> | 31       | 32       | 33       | 34       |          |          |          |          |          |          |          |          |          |          |          |
| <b>Ans.</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>3</b> |          |          |          |          |          |          |          |          |          |          |          |

## STRUCTURAL ORGANISATION IN ANIMALS

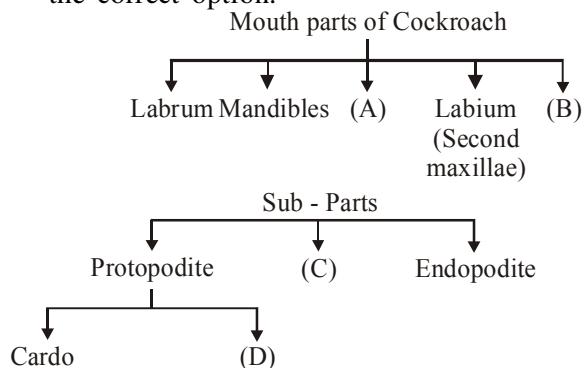
1. How many of the following are composed of columnar epithelium and its modification? Bile duct, gallbladder, PCT, Collecting tube, Ependymal epithelium and mesothelium.
  - (1) 3
  - (2) 1
  - (3) 4
  - (4) 2
2. Haversian canal system is found in
  - (1) Femur of *Pavo*
  - (2) Humerus of Panther
  - (3) Ribs of *Python*
  - (4) Vertebral column of fish
3. Continuous bleeding from an injured part of body is due to deficiency of
  - (1) Vitamin A
  - (2) Vitamin B
  - (3) Vitamin K
  - (4) Vitamin E
4. Abnormal increase in number of RBCs in the blood is called
  - (1) Anaemia
  - (2) Polycythaemia
  - (3) Leukemia
  - (4) Sarcoma
5. Examination of blood of a person suspected of having anemia shows large, immature and nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following is likely to alleviate his symptoms?
  - (1) Thiamine
  - (2) Folic acid and cynocobalamine
  - (3) Riboflavin
  - (4) Iron compounds
6. Male frog can be distinguished from female frog due to the presence of
  - (1) vocal sacs and copulatory pad on the first digit of the forelimb
  - (2) a neck and tail is absent
  - (3) the hind limb ends in the five digits
  - (4) eyes which are bulged and are covered by the nictitating membrane
7. Compared to those of human beings, the erythrocytes in frog are
  - (1) very much smaller and fewer
  - (2) nucleated and without haemoglobin
  - (3) without nucleus but with haemoglobin
  - (4) nucleated
8. Which of the following features is not present in *Periplaneta americana*?
  - (1) Schizocoelom as body cavity
  - (2) Indeterminate and radial cleavage during embryonic development
  - (3) Exoskeleton composed of N-acetylglucosamine
  - (4) MetamERICALLY segmented body
9. In cockroach, labium, labrum and hypopharynx are commonly called
  - (1) Upper lip, lower lip and crop respectively
  - (2) Upper lip, lower lip and tongue respectively
  - (3) Lower lip, upper lip and tongue respectively
  - (4) Lower lip, upper lip and jaw respectively
10. With the help of several ommatidia, a cockroach can receive several images of an object. This kind of vision is called
  - (1) Nocturnal vision, being common during night
  - (2) Mosaic vision, with more sensitivity but less resolution
  - (3) Mosaic vision, with more resolution but less sensitivity
  - (4) Nocturnal vision, with more sensitivity and more resolution
11. Read the following statements and find out the incorrect statement
  - (1) Mosaic vision is common during night hence called nocturnal vision
  - (2) In cockroach, brain supplies nerves to antennae and compound eyes
  - (3) Fat body, nephrocytes and urecose glands also helps in excretion in cockroach
  - (4) Male cockroach bears one pair of collateral glands, which functions as an accessory reproductive glands

- 12.** On an average, female cockroach produces \_\_\_\_\_ a \_\_\_\_\_ oothecae, each containing \_\_\_\_\_ b \_\_\_\_\_ eggs. The nymph grows by moulting about \_\_\_\_\_ c \_\_\_\_\_ times to reach the adult form.
- a-9 to 10, b-14 to 16, c-13
  - a-14 to 16, b-9 to 10, c-13
  - a-9 to 10, b-15 to 40, c-10
  - a-2 to 20, b-14 to 16, c-13
- 13.** On land, the respiratory organs(s) of frog is/are
- Skin (cutaneous respiration)
  - Skin, lungs (pulmonary respiratory) and bucco-pharyngeal cavity
  - Lungs and buccal cavity
  - Skin and buccal cavity
- 14.** In frog during aestivation and hibernation gaseous exchange takes place through
- Skin (cutaneous respiration)
  - Skin, lungs (pulmonary respiratory) and buccal cavity
  - Lungs and buccal cavity
  - Skin and buccal cavity
- 15.** In male frog, vasa efferentia enter the kidney and open into
- Ureter
  - Urinogenital duct
  - Cloaca
  - Bidder's canal
- 16.** Match the columns I, II and III choose the correct combination from the options given.

|   | Column-I               | Column-II |                                               | Column-III |
|---|------------------------|-----------|-----------------------------------------------|------------|
| a | Male genital pore(s)   | 1         | 10 <sup>th</sup> and 11 <sup>th</sup> segment | K Single   |
| b | Female genital pore(s) | 2         | 14 <sup>th</sup> segment                      | L 1 Pair   |
| c | Test                   | 3         | 18 <sup>th</sup> segment                      | M 2 Pair   |
| d | Ovaries                | 4         | 12-13 intersegments septum                    | N 4 Pair   |

- (1) a-2-K, b-3-1, c-1-N, d-4-M  
 (2) a-3-L, b-2-K, c-1-M, d-4-L  
 (3) a-3-K, b-2-L, c-1-M, d-4-L  
 (4) a-3-L, b-2-K, c-4-N, d-1-M
- 17.** Which is incorrect about cockroach ?
- The anterior part of female genital pouch contains female gonopore, spermathecal pores and collateral glands
  - Male genital pouch contains ventral anus, dorsal male genital pore and gonapophysis
  - The heart is differentiated into funnel shaped chambers with ostia on either side
  - Blood vascular system is open type in which blood from sinuses enter into heart through ostia and pumped anteriorly to sinuses again.
- 18.** Read the following statements and find out the incorrect statement about frog.
- The blood cells are RBC and WBC platelets.
  - The lymph is different from blood as it lacks few proteins and RBCs.
  - Kidneys are bean shaped structures of which one is situated a little anteriorly in the body cavity and they present on both sides of vertebral column.
  - In male frog, ureters acts as urinogenital duct, which opens into cloaca.
- 19.** Read the following statements and find out the incorrect statement about frog :-
- The brain is divided into fore-brain, mid-brain and hind-brain.
  - Fore-brain includes olfactory lobes, paired cerebral hemispheres and unpaired diencephalon
  - The mid-brain is characterised by a pair of optic lobes.
  - Hind-brain consists of cerebellum, pons and medulla oblongata

20. Complete the following flowchart by selecting the correct option.



|     | A              | B           | C           | D              |
|-----|----------------|-------------|-------------|----------------|
| (1) | Stipes         | Hypopharynx | Exopodite   | First Maxillae |
| (2) | Stipes         | Exopodite   | Hypopharynx | First Maxillae |
| (3) | First maxillae | Hypopharynx | Exopodite   | Stipes         |
| (4) | First maxillae | Exopodite   | Hypopharynx | Stipes         |

21. In cockroach, head can move in all directions due to -

- (1) Absence of neck
- (2) Fusion of all 6 segments of head
- (3) Flexible neck
- (4) Head is small and light in weight

22. Young cockroach is called -

- (1) Maggot (2) Nymph
- (3) Ephyra (4) Pupa

23. Eggs of cockroach are fertilised in

- (1) fallopian tube
- (2) ootheca
- (3) genital pouch of female
- (4) cocoon

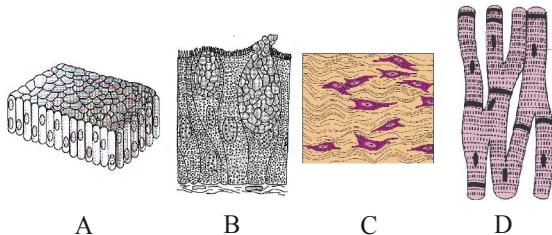
24. Conglobate gland is found in

- (1) female cockroach
- (2) male cockroach
- (3) Anopheles mosquito
- (4) Culex mosquito

25. Trophocyte, myecetocytes, oenocytes and urate cells are found in the fat body of cockroach, which statement is true?

- (1) Trophocyte contain reserve food
- (2) Oenocytes secrete wax and urate cells contain uric acid
- (3) Myecetocytes contain symbiotic bacteria
- (4) All of the above

26. The four figures (A, B, C and D) given below, represent four different type of animal tissues. Which one of these is correctly identified in the options given, along with its **correct** location and function?



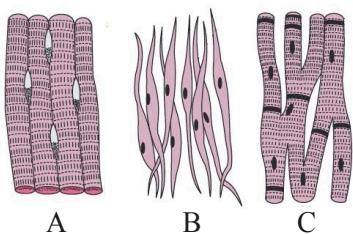
|     | Tissue                        | Location  | Function                 |
|-----|-------------------------------|-----------|--------------------------|
| (1) | B - Glandular epithelium      | Intestine | Secretion                |
| (2) | C - Fibrous connective tissue | Cartilage | Attach skeletal          |
| (3) | D - Smooth muscle tissue      | Heart     | Heart contraction        |
| (4) | A - Columnar epithelium       | Nephron   | Secretion and absorption |

27. Match Column - I with Column - II and select the **correct** option from the codes given below.

| Column - I |                     | Column - II |                             |
|------------|---------------------|-------------|-----------------------------|
| (A)        | Hyaline cartilage   | (i)         | Pectoral girdle of frog     |
| (B)        | Fibrous cartilage   | (ii)        | Long bones, Sternum, Ribs   |
| (C)        | Elastic cartilage   | (iii)       | Pubic symphysis             |
| (D)        | Calcified cartilage | (iv)        | Eustachian tube, Epiglottis |

- (1) A - (i) , B - (ii), C - (iii), D - (iv)
- (2) A - (ii) , B - (iii), C - (iv), D - (i)
- (3) A - (ii) , B - (iv), C - (iii), D - (i)
- (4) A - (iv) , B - (iii), C - (ii), D - (i)

28. Identify the figures A, B, C showing different types of muscle and select the **correct** option.



|     | A                  | B                | C               |
|-----|--------------------|------------------|-----------------|
| (1) | Smooth muscle      | Striated muscle  | Cardiac muscle  |
| (2) | Cardiac muscle     | Smooth muscle    | Striated muscle |
| (3) | Striated muscle    | Smooth muscle    | Cardiac muscle  |
| (4) | Involuntary muscle | Voluntary muscle | Heart Muscle    |

29. Lack of blood supply and presence of the noncellular basement membrane are the characteristics of the  
 (1) muscular tissue  
 (2) fluid connective tissue  
 (3) epithelial tissue  
 (4) nervous tissue
30. Cartilage tissues are likely to be slow in healing following an injury because  
 (1) cartilage cells cannot reproduce.  
 (2) they lack direct blood supplies.  
 (3) the intercellular material is missing.  
 (4) cartilage cells are surrounded by fluids.
31. Which of the following is a unicellular gland?  
 (1) Salivary gland  
 (2) Mucous gland  
 (3) Sebaceous gland  
 (4) Milk producing gland
32. Major functions of loose connective tissue include  
 (1) occupying spaces between organs and supporting epithelia  
 (2) supporting and surrounding blood vessels and nerves  
 (3) cushioning organs, storing lipids and facilitating diffusion.  
 (4) All of the above

33. Non-ciliated simple columnar epithelium often contains \_\_\_\_\_, which increase the surface area for secretion and absorption.

- (1) flagella
- (2) collagen fibres
- (3) microvilli
- (4) all of these

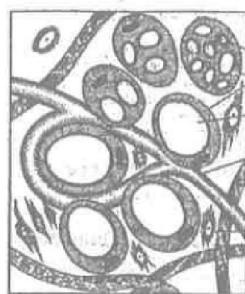
34. A student was given a sample of tissue. He observes and concludes the following characters.

- (i) The cells are composed of a single layer of tall and slender cells.
- (ii) Their nuclei are located at the base.
- (iii) Free surface may have microvilli.
- (iv) It is found in the lining of stomach and intestine
- (v) They help in secretion and absorption.

Based on the above features identify the epithelium.

- (1) Cuboidal epithelium
- (2) Columnar Epithelium
- (3) Squamous epithelium
- (4) Glandular epithelium

35. Identify the figure with its correct function :-



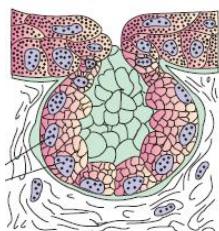
- (1) Areolar connective tissue – Serves as a support framework for epithelium.
- (2) Adipose tissue – Store fats and act as heat insulators.
- (3) Dense regular tissue – Provide flexibility.
- (4) Dense irregular tissue – Provide strength and elasticity.

**36.** Match the terms given in column-I with their feature given in column-II and choose the correct option.

|   | <b>Column-I<br/>(Terms)</b> |     | <b>Column-II<br/>(Features)</b>                                                     |
|---|-----------------------------|-----|-------------------------------------------------------------------------------------|
| A | Exocrine gland              | I   | They help to stop substances from leaking across a tissue                           |
| B | Endocrine gland             | II  | Hormones are secreted directly into the fluid bathing the gland                     |
| C | Tight junctions             | III | They perform cementing to keep neighbouring cells together                          |
| D | Adhering junctions          | IV  | Secrets mucus, saliva, earwax, oil, milk, digestive enzymes and other cell products |

- (1) A-(IV), B-(II), C-(I), D-(III)
  - (2) A-(II), B-(IV), C-(I), D-(III)
  - (3) A-(IV), B-(II), C-(III), D-(I)
  - (4) A-(IV), B-(I), C-(II), D-(III)

37. Select the correct option for the diagram of gland.



|     | <b>Gland</b>  | <b>Location</b> | <b>Function</b> |
|-----|---------------|-----------------|-----------------|
| (1) | Unicellular   | GIT             | Secret mucus    |
| (2) | Multicellular | Buccal cavity   | Secret saliva   |
| (3) | Unicellular   | Buccal cavity   | Secret saliva   |
| (4) | Muticelluar   | GIT             | Secret mucus    |

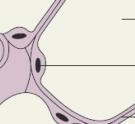
**38.** Fill in the blanks :

- (a) The 1 consists of two or more cell layers and has protective function as it does in our skin.

- (b) The 2 is composed of single layer of cells and functions as a lining for body cavities, ducts and tubes.

- (1) 1-Squamous epithelium, 2-Cuboidal epithelium
  - (2) 1-Columnar epithelium, 2-Squamous epithelium
  - (3) 1-Simple epithelium, 2-Compound epithelium
  - (4) 1-Compound epithelium, 2-Simple epithelium

**39.** Match the columns I, II and III and choose the correct combination from the options given.

| Column-I |                                                                                      | Column-II |                                   | Column-III |                  |
|----------|--------------------------------------------------------------------------------------|-----------|-----------------------------------|------------|------------------|
| a        |    | 1         | Areolar tissue                    | K          | Tendon           |
| b        |  | 2         | Adipose tissue                    | L          | Ligament         |
| c        |  | 3         | Dense regular connective tissue   | M          | Present in skin  |
| d        |  | 4         | Dense irregular connective tissue | N          | Beneath the skin |

- (1) a-1-M, b-2-N, c-4-K, d-3-L
  - (2) a-2-N, b-1-M, c-3-K, d-2-K
  - (3) a-1-M, b-2-N, c-3-K, d-2-L
  - (4) a-2-N, b-1-N, c-4-M, d-3-K

**40.** Cartilage is present

- (a) in the tip of nose and middle ear joints
  - (b) between adjacent bones of vertebral column
  - (c) between adjacent bones of limbs and hands

- 41.** Neuroglial cells make up more than  
 (1) One-third the volume of neural tissue in our body and, form and protect the neurons  
 (2) One-half the volume of neural tissue in our body and form and support the neurons  
 (3) One-half the volume of neural tissue in our body and, protect and support neurons.  
 (4) One-third the volume of neural tissue in our body and, protect and support neurons
- 42.** Human heart consists of  
 (1) Epithelial and connective tissue  
 (2) Muscular and neural tissue  
 (3) Connective and muscular tissue  
 (4) Both 1 and 2

- 43.** How many of the following statements are related to bone?  
 (a) It is a specialised connective tissue having hard and pliable ground substance rich in calcium salts and collagen fibres which gives bone its strength.  
 (b) It is the main tissue that provides structural frame to the body.  
 (c) It supports and protects softer tissues and organs.  
 (d) The bone cells, osteocytes are present in the spaces called lacunae.  
 (e) They also interact with smooth muscles attached to them to bring about movements.  
 (1) Two    (2) Three    (3) Four    (4) Five

**ANSWER KEY**

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

# **CELL - THE UNIT OF LIFE**

- 1.** Unicellular organisms are :-

  - not capable of independent existence because they cannot perform all the essential functions of life
  - not capable of independent existence but they can perform all the essential vital functions
  - are capable of independent existence and perform all the essential vital functions
  - are capable of independent existence but they can not perform vital functions

**2.** Cell is the fundamental structural and functional unit of all living organisms is evidenced by the fact that :-

  - Anything less than a complete structure of a cell does not ensure independent living
  - Subcellular components can regenerate whole cell
  - A cell arises by fusion of two cells
  - All cells are totipotent

**3.** Select the right option, which relates to Schwann, regarding following statements :-

  - He reported that cells have a thin outer layer, which is today known as plasma membrane
  - Cell wall is a unique character of the plant cell
  - Body of the plants and animals are composed of cells and products of cells

**Options :-**

  - All are correct
  - Only III is correct
  - Only II and III are correct
  - All are incorrect

**4.** Which of the following statements was not explained in the cell theory given by Schleiden and Schwann?

  - All living organisms are composed of cells and products of cells
  - Cell is the structural and functional unit of living organisms
  - New cells arise from pre-existing cells
  - None of the above

**5.** Go through the following statements and then select correct option for prokaryotic cells :-

  - They are generally smaller than eukaryotic cells
  - They multiply more rapidly than the eukaryotic cells
  - They are presented by bacteria, BGA, mycoplasma and PPLO (Pleuro Pneumonia like organism)

**Options :-**

  - All of these
  - Only II and III
  - Only III
  - Only I and III

**6.** Arrange the following cells in an ascending order of their sizes :-

  - Mycoplasma
  - Ostrich egg
  - Human RBC
  - Bacteria
  - I, II, III, IV
  - I, IV, III, II
  - II, IV, I, III
  - IV, III, II I

**7.** Match the column-I with column-II :-

|     | <b>Column-I<br/>Various types of<br/>cell and organism</b> |   | <b>Column-II<br/>Size</b> |
|-----|------------------------------------------------------------|---|---------------------------|
| I   | Typical bacteria                                           | A | 10-20 $\mu\text{m}$       |
| II  | Viruses                                                    | B | 1-2 $\mu\text{m}$         |
| III | PPLO                                                       | C | 0.1 $\mu\text{m}$         |
| IV  | A typical eukaryotic cell                                  | D | 0.02-0.2 $\mu\text{m}$    |

**Options :-**

  - I-B; II-D; III-C; IV-A
  - I-A; II-B; III-C; IV-D
  - I-D; II-C; III-B; IV-A

|     | <b>Column-I</b><br><b>Various types of cell and organism</b> |   | <b>Column-II</b><br><b>Size</b> |
|-----|--------------------------------------------------------------|---|---------------------------------|
| I   | Typical bacteria                                             | A | 10-20 $\mu\text{m}$             |
| II  | Viruses                                                      | B | 1-2 $\mu\text{m}$               |
| III | PPLO                                                         | C | 0.1 $\mu\text{m}$               |
| IV  | A typical eukaryotic cell                                    | D | 0.02-0.2 $\mu\text{m}$          |

## **Options :-**

- (1) I-B; II-D; III-C; IV-A
  - (2) I-A; II-B; III-C; IV-D
  - (3) I-D; II-C; III-B; IV-A
  - (4) I-B; II-D; III-A; IV-C



18. (A) Varied number of cisternae are present in GB  
(B) Golgi cisternae are concentrically arranged near the nucleus  
(C) GB shows polarity-cis/proximal/forming/convex face near nucleus and distal/concave trans/maturation face  
(D) The cis and trans faces are interconnected  
(E) Both the faces are similar

Which of the above statements about GB is/are false?



- 19.** Consider the following statements :-

- (a) Plant cells have centrioles which are absent in almost all animal cells
  - (b) Ribosomes are the site of protein synthesis
  - (c) The middle lamella is mainly composed of calcium carbonate, which holds the different neighbouring cells together
  - (d) In animal cells lipid like steroid hormones are synthesized by smooth endoplasmic reticulum.

Of the given statements :-

- (1) Only a and b are correct
  - (2) Only a and d are correct
  - (3) Only b and d are correct
  - (4) Only c and d are correct

20. The number of chloroplast varies from 1 per cells in a to b per cell in the mesophyll :-

- (1) a-*Chlorella*, b-15 to 20
  - (2) a-*Chlamydomonas*, b-20 to 40
  - (3) a-*Chlamydomonas*, b-15 to 20
  - (4) a-*Chlamydomonas*, b-10 to 40

- 21.** Fill in the blanks :-

- (I) Centrioles are \_\_a\_\_ structures that lie  
      \_\_b\_\_ to each other
  - (II) Centriole has an organisation like \_\_c\_\_
  - (III) Centrioles are made up of nine evenly spaced  
            peripheral fibrils of \_\_d\_\_ protein.
  - (IV) Each peripheral fibril of centriole is a \_\_e\_\_
  - (V) Central part of the proximal region of the  
            centriole is called \_\_f\_\_ which is  
            proteinaceous

Choose the correct option for blanks (a to f) :-

- (1) a-spherical; b-parallel, c-cart wheel,  
d-flagellin, e-doublet, f-bridge
  - (2) a-cylindrical; b-perpendicular, c-cart  
wheel,  
d-tubulin, e-triplet, f-hub
  - (3) a-cylindrical; b-perpendicular, c-cart wheel,  
d-tubulin, e-doublet, f-hub
  - (4) a-spherical; b-perpendicular, c-cart wheel,  
d-tubulin, e-triplet, f-hub

- 22.** All plastids have same basic structure :-

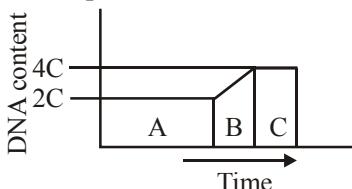
- (1) because they have to perform the same function
  - (2) so that one type of plastid can differentiate into another type of plastid depending upon the requirement
  - (3) because all plastids have to store starch, lipids and proteins
  - (4) because they are localised in the aerial parts of the plants

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**ANSWER KEY**

## CELL CYCLE AND CELL DIVISION

1. The graph given shows the change in DNA-content during various phases (A to D) in a typical mitotic cell cycle. Identify the phases and select the correct option :-



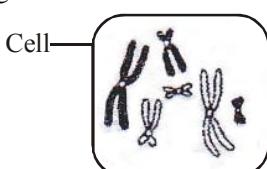
|     | A              | B              | C              |
|-----|----------------|----------------|----------------|
| (1) | G <sub>2</sub> | G <sub>1</sub> | S              |
| (2) | G <sub>2</sub> | S              | G <sub>1</sub> |
| (3) | G <sub>1</sub> | S              | G <sub>2</sub> |
| (4) | G <sub>1</sub> | G <sub>2</sub> | S              |

2. What does (i) and (ii) represent in the given flowchart ?

Parent cell  $\xrightarrow{(2n)}$  M-I  $\xrightarrow{(i)}$  2 Daughter cells  $\xrightarrow{(ii)}$  M-II  $\xrightarrow{(ii)}$  4 Daughter cells

- |                          |                           |
|--------------------------|---------------------------|
| (1) (i) = 2n<br>(ii) = n | (2) (i) = n<br>(ii) = n   |
| (3) (i) = n<br>(ii) = 2n | (4) (i) = 4n<br>(ii) = 2n |

3. Which of the following is correct regarding the given figure?



|     | Number of pairs of homologous chromosomes cell may form | Number of chromatids | Number of centromeres |
|-----|---------------------------------------------------------|----------------------|-----------------------|
| (1) | 3                                                       | 6                    | 12                    |
| (2) | 3                                                       | 12                   | 6                     |
| (3) | 6                                                       | 6                    | 12                    |
| (4) | 6                                                       | 12                   | 6                     |

4. The second meiotic division leads to :-
- separation of sex chromosomes
  - fresh DNA synthesis
  - Splitting of centromeres and separation of sister chromatids
  - separation of homologous chromosomes
5. The products of mitosis is/are :-
- One nucleus containing twice as much DNA as the parent nucleus
  - Two genetically identical cells
  - Four nuclei containing half as much DNA as the parent nucleus
  - Four genetically identical nuclei
6. Centrosomes are :-
- constricted regions of metaphase chromosomes
  - region where microtubules polymerize during cell division
  - the central region of some cells
  - Double membrane bound organelles
7. The diagnosis of Down syndrome is made by examining the individual's :-
- spores
  - karyotype
  - chromatin
  - nucleosome
8. The four haploid nuclei formed at the end of meiosis differ from one another in their genetic composition. This difference is due to :-
- cytokinesis
  - replication of DNA during the "S" phase
  - spindle formation
  - crossing over during prophase I
9. During meiosis I in human beings, each daughter cell receives :-
- only maternal or paternal chromosomes
  - a mixture of maternal and paternal chromosomes
  - the same number of chromosomes as a diploid cell
  - a sister chromatid from each chromosome

10. A triploid nucleus cannot undergo meiosis because :-
- (1) the DNA cannot replicate
  - (2) not all of the chromosomes can form homologous pairs
  - (3) the sister chromatids cannot separate
  - (4) cytokinesis cannot occur

**ANSWER KEY**

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |
|------|---|---|---|---|---|---|---|---|---|----|--|
| Ans. | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 4 | 2 | 2  |  |

# **BIMOLECULES**

- 1.** Select the option that correctly identifies the chemical bonds present in the given biomolecules.

Polysacharides-A, Proteins-B, Fats-C, Water-D

|     | <b>A</b>   | <b>B</b> | <b>C</b>   | <b>D</b> |
|-----|------------|----------|------------|----------|
| (1) | Ester      | Peptide  | Glycosidic | Hydrogen |
| (2) | Glycosidic | Peptide  | Ester      | Hydrogen |
| (3) | Glycosidic | Peptide  | Hydrogen   | Ester    |
| (4) | Hydrogen   | Ester    | Ester      | Glycogen |

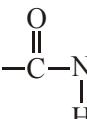


8. Based up on the number of  $\text{NH}_2$  and  $\text{COOH}$  amino acids are -



- 9.** All are proteins except -

- (1) Insulin, starch
  - (2) Antibody + Trypsin
  - (3) GLUT - 4 + Collagen
  - (4) Elastin



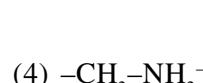
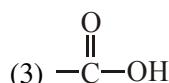
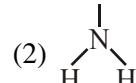
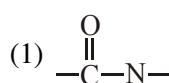
- 10.**  $\text{--C}=\text{N--}$  is found in all except.

- (1) Polypeptides  
(2) Proteinaceous enzymes  
(3) Fatty acid  
(4) Proteins

- 11.** You have isolated an unidentified liquid from a sample of beans. You add the liquid to a beaker of water and shake vigorously. After a few minutes, the water and the other liquid separate into two layers. To which class of biological molecules does the unknown liquid most likely belong?

- (1) Monosaccharide                          (2) Lipid  
(3) Globular protein                          (4) Maltose

12. One of the following suggests the chemical similarity between *amino acids* and *fatty acid* -



13. Which one of the following is not a polymeric substance?



- 14.**  $C_{16}H_{32}O_2$  and  $C_{12}H_{22}O_{11}$  are \_\_\_\_\_ and respectively -

- ### (1) Protein Starch

- ## (2) Lipid Protein

- ### (3) Cellulose-Pectine

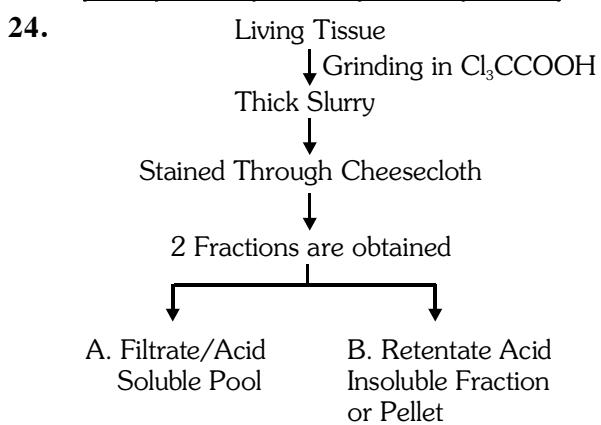
- #### (4) Fatty acid Carbohydrate

15. Which is least harmful  
 (1) Saturated fat  
 (2) Oils  
 (3) Cholesterol  
 (4) Polyunsaturated fats
16. At isoelectronic point, a protein has  
 (1) No net charge      (2) Negative charge  
 (3) Positive charge    (4) Both (2) and (3)
17. How many phosphodiester bonds are there in ATP?  
 (1) 3      (2) 2      (3) 1      (4) 0
18. Cellobiose, the hydrolytic breakdown product of cellulose is -  
 (1) a monosaccharide    (2) a disaccharide  
 (3) a tetrasaccharide    (4) a trisaccharide
19. Amino acids are  
 (1) laevrotatory  
 (2) dextrorotatory  
 (3) laevo-rotatory except glycine which is non - rotatory  
 (4) laevo-rotatory except glycine, which is dextrorotatory
20. Aspartame is  
 (1) natural peptide sweetner  
 (2) artificial peptide sweetner  
 (3) Both (1) and (2)  
 (4) Non - protein amino acids
21. Lipid contains :-  
 (1) greater proportion of oxygen than in carbohydrates  
 (2) no oxygen  
 (3) equal oxygen in comparison to carbohydrates  
 (4) less oxygen than in carbohydrates
22. The function not normally subserved by proteins is  
 (1) hydrolysis for energy provision  
 (2) structural integrity of the cell  
 (3) regulation of metabolism  
 (4) defence mechanism
- 23.
- 
- (I) Segment representing the energy of activation

- (II) Segment representing the amount of free energy released by the reaction  
 (III) Transition state  
 (IV) Segment would be the same regardless of whether the reaction were uncatalysed or catalysed

Which one is correct ?

|     | I | II | III | IV |
|-----|---|----|-----|----|
| (1) | 1 | 3  | 2   | 4  |
| (2) | 1 | 2  | 3   | 2  |
| (3) | 1 | 3  | 2   | 4  |
| (4) | 1 | 2  | 4   | 3  |



- (I) Molecular weight ranging from 18 to 800 daltons (Da), approximately  
 (II) Has four types of organic compounds- proteins nucleic acids, polysaccharides and lipids  
 (III) Contain chemicals that have molecular weight more than 800 Da  
 (IV) Has monomers  
 (V) Has generally polymers  
 (VI) Represent chemical rough composition of cytosol  
 (VII) Represent the framework of cytoplasm and cell organelles

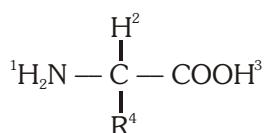
Which of the following is the correct statements (I to VII) for A and B ?

|     | A          | B               |
|-----|------------|-----------------|
| (1) | I, II, III | IV, V, VI, VII  |
| (2) | II, IV, VI | I, III, V, VII  |
| (3) | I, IV, VI  | II, III, V, VII |
| (4) | I, III, V  | II, IV, VI, VII |

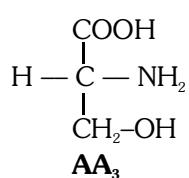
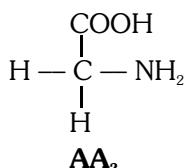
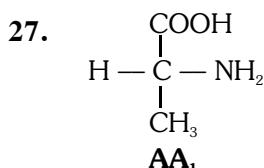
25. The correct order of chemical composition of living tissues/cells in term of percentage of the total cellular mass is

- (1) Nucleic acids > Proteins > H<sub>2</sub>O > Carbohydrates > Ions > Lipids
- (2) H<sub>2</sub>O > Proteins > Nucleic acids > Carbohydrates > Lipids > Ions
- (3) H<sub>2</sub>O > Proteins > Carbohydrates > Nucleic acids > Lipids > Ions
- (4) Lipids > Ions > Carbohydrates > H<sub>2</sub>O > Proteins > Nucleic acids

26. Which of the two groups of following involved in peptide bond between different amino acids?

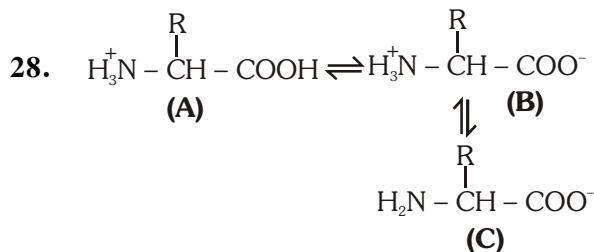


- |             |             |
|-------------|-------------|
| (1) 2 and 3 | (2) 1 and 3 |
| (3) 1 and 4 | (4) 2 and 4 |



The correct names of above amino acids are

|     | <b>AA<sub>1</sub></b> | <b>AA<sub>2</sub></b> | <b>AA<sub>3</sub></b> |
|-----|-----------------------|-----------------------|-----------------------|
| (1) | Glycine               | Serine                | Alanine               |
| (2) | Alanine               | Glycine               | Serine                |
| (3) | Serine                | Glycine               | Alanine               |
| (4) | Serine                | Alanine               | Glycine               |



Which of the above is Zwitterionic form ?

- |       |                  |
|-------|------------------|
| (1) A | (2) C            |
| (3) B | (4) All of these |

29. Which of the following statements is false ?

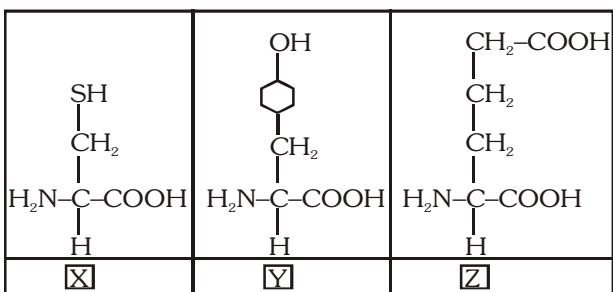
- (1) In solutions of different pH, the structure of amino acid changes
- (2) Protein is a homopolymer
- (3) Non-essential amino acids are synthesized by animals
- (4) Dietary proteins are source of essential amino acids

30. Match correctly between column-I and column-II.

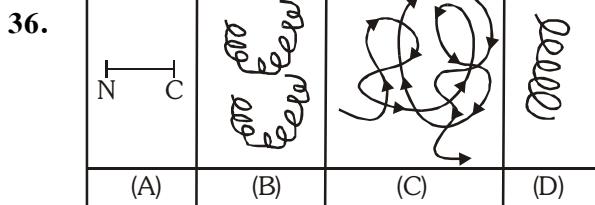
|   | <b>Column-I</b> |     | <b>Column-II</b>                                              |
|---|-----------------|-----|---------------------------------------------------------------|
| A | Collagen        | I   | Glucose transport                                             |
| B | Trypsin         | II  | Binding with some chemical, like for small taste and hormones |
| C | Insulin         | III | Hormones                                                      |
| D | Antibody        | IV  | Enzyme                                                        |
| E | Receptor        | V   | Intercellular ground substance                                |
| F | GLUT-4          | VI  | Fight infectious agents                                       |

- (1) A-V, B-IV, C-III, D-VI, E-II, F-I
- (2) A-II, B-III, C-IV, D-V, E-VI, F-I
- (3) A-VI, B-II, C-I, D-V, E-IV, F-III
- (4) A-I, B-IV, C-III, D-VI, E-II, F-V

31. In animal world, the most abundant protein is \_\_\_\_\_ while in the whole biosphere the most abundant protein is \_\_\_\_\_.  
 (1) antibody, collagen (2) collagen, RuBisCo  
 (3) RuBisCo, collagen (4) collagen, oxidase
32. In some places, a protein molecule may be folded back on itself. This is called structure and folds or coils are held together in place by \_\_\_\_\_.  
 (1)  $2^\circ$ , H-bonds (2)  $2^\circ$ , Peptide bond  
 (3)  $3^\circ$ , H-bonds (4)  $1^\circ$ , Peptide bond
33. The shape of folded protein is often determined by  
 (1) its tertiary structure  
 (2) the sequence of its amino acids  
 (3) the number of peptide bonds  
 (4) the Chargaff's rule
34. Which of the following statements concerning polymers is not true ?  
 (1) Polymers are synthesized from monomers during condensation  
 (2) Polymers are synthesized from monomers by addition of water  
 (3) Polymers consist of at least two types of monomers  
 (4) Both 2 and 3
- 35.



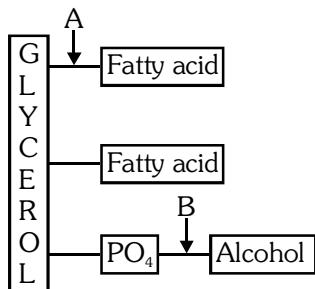
The correct name of X, Y and Z amino acids are  
 (1) Glutamic acid, tyrosine and cysteine respectively  
 (2) Tyrosine, cysteine and glutamic acid, respectively  
 (3) Cysteine, tyrosine and glutamic acid, respectively  
 (4) Cysteine, glutamic acid and tyrosine respectively



What kinds of the structures of proteins are shown in the above figure?

- (1) A =  $1^\circ$  structure, B =  $2^\circ$  structure, C =  $3^\circ$  structure, D =  $4^\circ$  structure
- (2) A =  $4^\circ$  structure, B =  $2^\circ$  structure, C =  $3^\circ$  structure, D =  $1^\circ$  structure
- (3) A =  $1^\circ$  structure, B =  $4^\circ$  structure, C =  $3^\circ$  structure, D =  $2^\circ$  structure
- (4) A =  $4^\circ$  structure, B =  $3^\circ$  structure, C =  $2^\circ$  structure, D =  $1^\circ$  structure

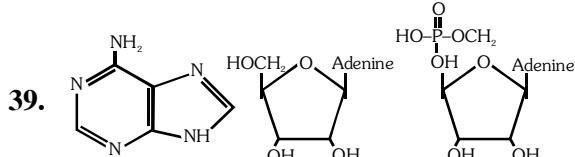
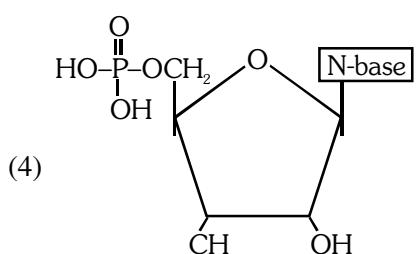
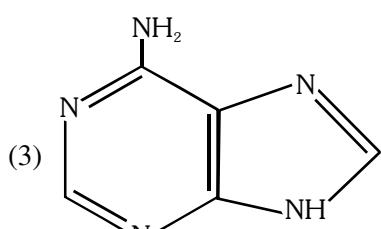
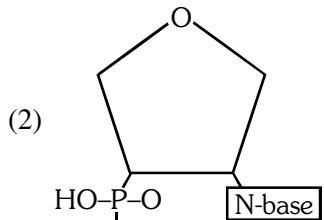
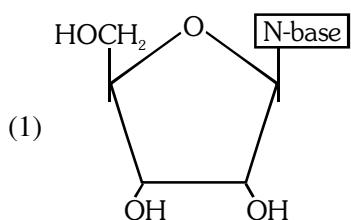
37. The molecule is as follows



The correct name of bonds indicated by A and B are

|     | A          | B                 |
|-----|------------|-------------------|
| (1) | Ester bond | Ether bond        |
| (2) | Ester bond | Amide bond        |
| (3) | Ester bond | Amide bond        |
| (4) | Ester bond | Phosphoester bond |

38. Which one of the following is the diagrammatic representation of a nucleotide?



The correct combination is

|     | <b>A</b>                  | <b>B</b>                      | <b>C</b>                      |
|-----|---------------------------|-------------------------------|-------------------------------|
| (1) | Adenine<br>(N-base)       | Adenosine<br>(Nucleotide)     | Adenylic acid<br>(Nucleoside) |
| (2) | Adenine<br>(N-base)       | Adenosine<br>(Nucleoside)     | Adenylic acid<br>(Nucleotide) |
| (3) | Adenosine<br>(Nucleoside) | Adenylic acid<br>(Nucleotide) | Adenine<br>(N-base)           |
| (4) | Uracil                    | Adenosine<br>(Nucleoside)     | Adenylic acid<br>(Nucleotide) |

40. Match the column-I with column-II correctly.

|   | <b>Column-I<br/>(Category)</b> |     | <b>Column-II<br/>(Secondary Metabolites)</b> |
|---|--------------------------------|-----|----------------------------------------------|
| A | Pigments                       | I   | Concavavalin A                               |
| B | Terpenoides                    | II  | Monoterenes, Diterpenes                      |
| C | Alkaloids                      | III | Morphine, Cadeine                            |
| D | Lectins                        | IV  | Carotenoids, Anthocyanoids                   |

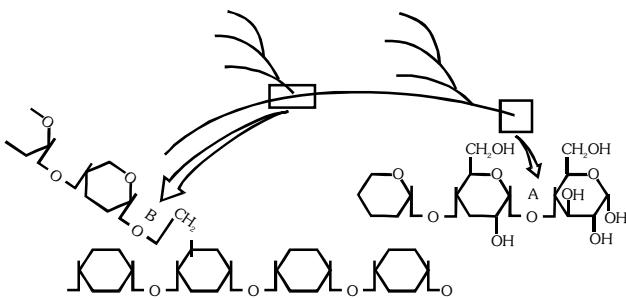
(1) A-IV, B-II, C-III, D-I

(2) A-IV, B-III, C-II, D-I

(3) A-I, B-IV, C-III, D-II

(4) A-I, B-III, C-II, D-IV

41. Identify A and B bonds in the following diagrammatic representation of a portion of glycogen.



(1) A = 1-4  $\alpha$ -glycosidic bonds,  
B = 1-6  $\alpha$ -glycosidic bonds

(2) A = 1-6  $\alpha$ -glycosidic bonds,  
B = 1-4  $\alpha$ -glycosidic bonds

(3) A = 1-1  $\alpha$ -glycosidic bonds,  
B = 1-1  $\alpha$ -glycosidic bonds

(4) A = 1-4  $\alpha$ -glycosidic bonds,  
B = 1-4  $\alpha$ -glycosidic bonds

42. The initial source of energy to all the varied forms of life is

(1) a glucose molecule

(2) an ATP molecule

(3) solar energy

(4) a protein molecule

43. The series of reactions operating within the "metabolic pool" of all living system brings about

(1) Conservation of energy

(2) Transformation of energy

(3) Stagnation of energy

(4) Destruction of energy

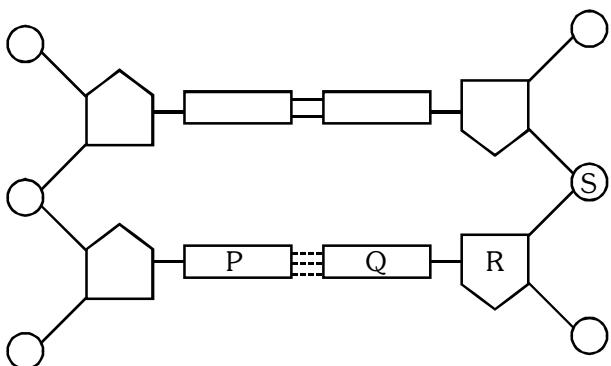
44. Given below are two statements A and B. Choose the correct answer related to the statements.

Statement A - Amino acids are amphoteric in their function.

Statement B - All amino acids are necessary for our body.

- Statement A is wrong, statement B is correct
- Both the statements A and B are wrong
- Statement A is correct, statement B is wrong
- Both the statements A and B are correct

45. The given figure illustrates the structural components of a molecule.



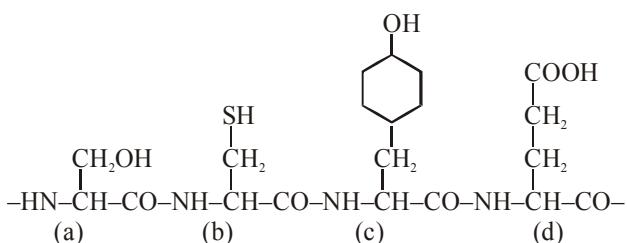
The names of the labels are identified in which alternative?

- P-cytosine; Q-thymine, R-ribose; S-phosphate
- P-adenine, Q-guanine; R-ribose; S-hydrogen
- P-cytosine; Q-guanine; R-deoxyribose; S-phosphate
- P-adenine; Q-thymine; R-deoxyribose; S-hydrogen

46. Which one of the following biomolecules is correctly characterized?

- Lecithin-a phosphorylated glyceride found in cell membrane
- Palmitic acid-an unsaturated fatty acid with 18 carbon atoms
- Adenylic acid- adenosine with a glucose phosphate molecule
- Alanine amino acid- contains an amino group and an acidic group anywhere in the molecule

47. Recognise the figure and find out the correct matching :-



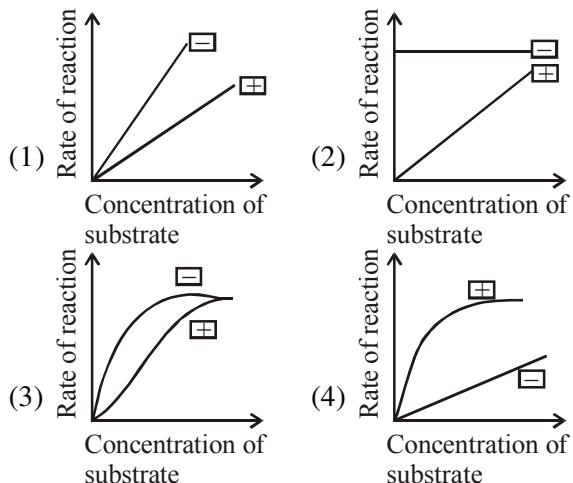
- a-cysteine, d-tyrosine, c-glutamic acid, b-serine
- b-cysteine, c-tyrosine, d-glutamic acid, a-serine
- d-cysteine, a-tyrosine, b-glutamic acid, c-serine
- c-cysteine, b-tyrosine, a-glutamic acid, d-serine

#### ANSWER KEY

| Que. | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ans. | 2  | 3  | 1  | 1  | 3  | 4  | 3  | 1  | 1  | 3  | 2  | 3  | 2  | 4  | 4  |
| Que. | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | 1  | 4  | 2  | 3  | 2  | 4  | 1  | 2  | 3  | 2  | 2  | 2  | 3  | 2  | 1  |
| Que. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Ans. | 2  | 1  | 2  | 4  | 3  | 3  | 4  | 4  | 2  | 1  | 1  | 3  | 2  | 4  | 3  |
| Que. | 46 | 47 |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Ans. | 1  | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |

# ENZYMES

1. Which of the following graphs correctly indicates the reaction in presence (indicated by +) and absence (indicated as -) of an enzyme:-



2. Which of the following statements about enzymes are true?
- Enzymes are proteins whose three dimensional shape is key to their functions
  - Enzymes speed up reactions by lowering activation energy
  - Enzymes are highly specific for reactions
  - An enzyme like any protein has the secondary and tertiary structure

**Options :-**

- All
- All except I
- Only I and II
- Only II and III

3. Which statement is **true** for all enzymes ?
- They are denatured at temperature above 40°C
  - They catalyse the breakdown of large molecules into smaller ones
  - An enzyme can bind to only one kind of substrate molecule
  - They reduce the amount of energy required to start a reaction

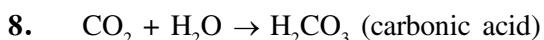
4. Sulpha drugs are used for the control of bacterial pathogens, because they cause :-
- competitive inhibition of folic acid synthesis
  - allosteric inhibition of folic acid synthesis
  - feedback inhibition of folic acid synthesis
  - irreversible inhibition of folic acid synthesis

5. Enzyme catalysing rearrangement of atomic grouping without altering molecular weight or number of atoms is :-

- ligase
- hydrolase
- isomerase
- oxidoreductase

6. Feedback inhibition quite often involves :-
- competitive inhibition
  - irreversible inhibition
  - allosteric inhibition
  - All of these

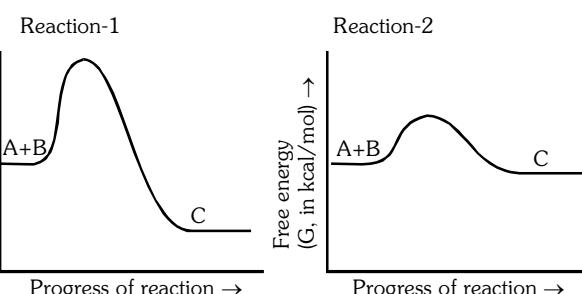
7. The enzymatic reaction for which thiamine pyrophosphate functions as a cofactor is :-
- peptide bond formation
  - phosphate group transfer
  - fixation of carbon dioxide
  - decarboxylation of keto acids



Which one is incorrect about the above reaction?

- Without enzyme, the rate of  $\text{H}_2\text{CO}_3$  formation is 200 molecules per hour
- When carbonic anhydrase catalyses the same reaction, there is no change in the rate of  $\text{H}_2\text{CO}_3$  formation
- The reaction catalysed by the enzyme shows speed with about 600,000 molecules being formed/second (10 million times more rate)
- The enzyme which catalyse the reaction occurs in cytoplasm of certain cells

9. Of the two chemical reactions showing the following figures, reaction 1 is :-



- faster and more endergonic than reaction 2
- faster and more exergonic than reaction 2
- slower and more endergonic than reaction 2
- slower and more exergonic than reaction 2

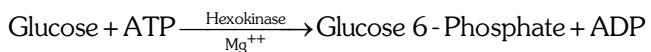
- 10.** Activation energy :-

  - (1) is the difference in the average energy content of substrate and its transition state
  - (2) helps to change reactants into unstable transition state before they can be converted into products
  - (3) is the minimum energy required from outside to overcome the energy barrier of reactant or to start a reaction
  - (4) All of the above are correct

**11.** Choose the correct statement(s) :-

  - (1)  $K_m$  (Michaelis-Menten) constant is the substrate concentration at which the enzymatic reaction attains half of its maximum velocity ( $1/2 V_{max}$ )
  - (2) At lower  $K_m$ , higher the substrate affinity for enzyme
  - (3)  $V_{max}$  is reached when all the active sites of an enzyme are saturated with substrate
  - (4) All of these

**12.** The hexokinase in the following reaction is kept under which class?

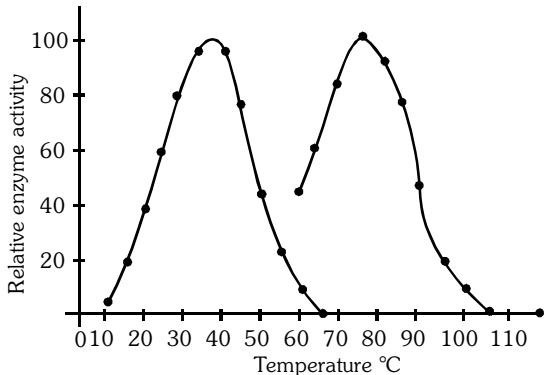





Identify the classes of enzymes for above functions :-

|     | <b>A</b>    | <b>B</b> | <b>C</b>    |
|-----|-------------|----------|-------------|
| (1) | Ligase      | Lyase    | Transferase |
| (2) | Transferase | Lyase    | Ligase      |
| (3) | Lyase       | Ligase   | Transferase |
| (4) | Transferase | Ligase   | Lyase       |

- 14.** The following graphs depict the effect of temperature on the activity of the two enzymes A and B that catalyze the same reaction. Choose the correct statement(s) for these results :-





15. Enzyme catalysts differ from inorganic catalysts as :-

  - (1) Inorganic catalysts work efficiently at high temperatures and high pressures, while enzymes get damaged at high pressure and high temperatures (above 40°C)
  - (2) Enzyme increases the activation energy while in organic catalyst decreases
  - (3) Enzymes are used up in reaction while inorganic catalysts remain unchanged
  - (4) All of the above

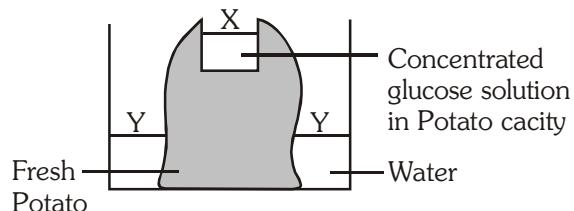
| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Ans. | 4 | 1 | 4 | 1 | 3 | 3 | 4 | 2 | 4 | 4  | 4  | 4  | 2  | 4  | 1  |

## TRANSPORT IN PLANTS

- 1.** You are monitoring the diffusion of coloured molecules across a membrane. Which of the following will result in the fastest rate of diffusion?
- An internal concentration of 5% and an external concentration of 60%
  - An internal concentration of 35% and an external concentration of 40%
  - An internal concentration of 60% and an external concentration of 5%
  - Both (1) and (3)
- 2.**
- 
- Solution A ( $\Psi_w = -2$  bars)
- Solution B ( $\Psi_w = -2$  bars)
- Choose the correct option :-
- Kinetic energy (K.E.) of water in A solution > K.E. of water in solution B
  - K.E. of water in solution B > K. E. of water in solution A
  - K.E. of water in solution A = K.E. of water in solution B
  - Water potential has nothing to do with K.E. of water in a solution
- 3.** Water will move from the root hairs through cortex to xylem if the water potentials are :-
- Root hairs = 0; Cortex = 0; Xylem = 0
  - Root hairs = 0; Cortex = -1; Xylem = -2
  - Root hairs = -2; Cortex = -1; Xylem = 0
  - Root hairs = 0; Cortex = +1; Xylem = +2
- 4.** Minerals uptake can be depressed by depriving the root of  $O_2$  which indicates (A) is required and such uptake involves (B) transport.

|     | A      | B                     |
|-----|--------|-----------------------|
| (1) | $CO_2$ | Passive               |
| (2) | $O_2$  | Facilitated transport |
| (3) | $O_2$  | Active                |
| (4) | $H_2O$ | Antiport              |

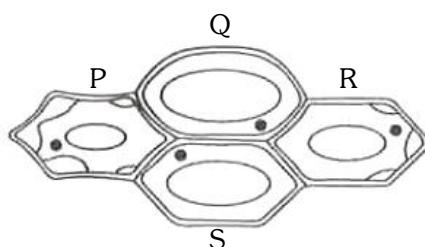
- 5.** An analysis of the xylem exudates indicates that :-
- Some of the nitrogen travel in the form of organic compounds and much of it is carried as inorganic ions
  - Small amounts of P and S are carried as organic compounds
  - I and II both are correct
  - I and II both are incorrect
  - Only I is correct
  - Only II is correct
- 6.** Go through the experiment shown in the following diagram :-



After a few days, which of the following will have occurred?

- A rise in level X and a drop in level Y
- A drop in level X and a drop in level Y
- A rise in level X and a rise in level Y
- A drop in level X and a rise in level Y

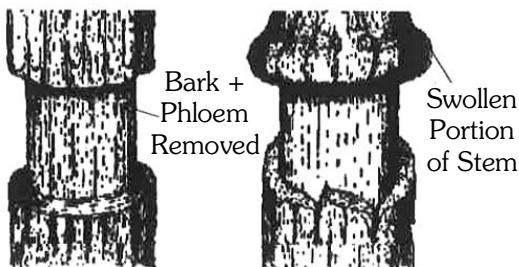
- 7.** Go through the following diagram of four plant cells :-



No wall pressure would exist in cells :-

- P and Q
- Q and S
- P and R
- R and S

8. The diagram refers the ringing or girdling experiment. Bark having phloem is removed. This experiment proves that phloem is the path for translocation of food. In this experiment swollen part of stem has been indicated. The possible cause of this swelling is :-



- (1) Accumulation of food materials just above the ring (as downward movement of food is inhibited)  
 (2) Accumulation of water and mineral just above the ring  
 (3) A repairing mechanism has taken place  
 (4) Injured parts undergo turgidity
9. If you compare the cell of a wilted tomato plant with its cells when the plant is not wilted, which one of the following choices in the table below shows the expected results ?

|     | Osmotic potential   | Turgor pressure     |
|-----|---------------------|---------------------|
| (1) | Wilted < not wilted | Wilted < not wilted |
| (2) | Wilted > not wilted | Wilted < not wilted |
| (3) | Wilted = not wilted | Wilted = not wilted |
| (4) | Wilted > not wilted | Wilted > not wilted |

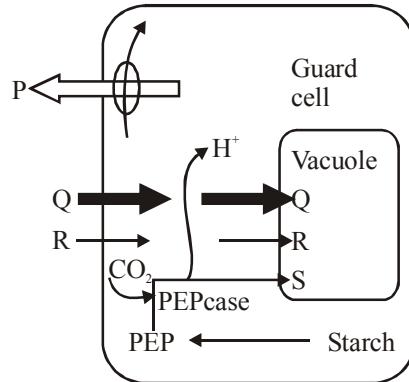
10. Bulk flow can be achieved through a hydrostatic pressure gradient. Negative hydrostatic pressure gradient and positive hydrostatic pressure gradient can be seen in :-  
 (1) suction through a straw and a garden hose respectively

- (2) a garden hose and suction through a straw respectively  
 (3) cobalt chloride paper and polyethylene respectively  
 (4) blotting paper and cobalt chloride paper respectively

11. Read the following statements and find out the incorrect statement :-

- (1) Transpiration pull does not account for the majority of water transport, most plants meet their need by root pressure.  
 (2) Water loss in liquid phase is called guttation while in vapour phase is called transpiration.  
 (3) Besides the loss of water vapour in transpiration, exchange of oxygen and carbon dioxide also occurs through stomata present on the leaf  
 (4) When guard cells becomes flaccid, stomata closes and if turgid, stomata opens.

12. Stomatal opening and closing involves the role of various ions. In the given figure, arrows depict the movement of certain ions during stomatal opening in light. Identify the ions (P, Q, R and S) and select the correct option :-



|     | P                    | Q                    | R               | S                    |
|-----|----------------------|----------------------|-----------------|----------------------|
| (1) | Malate <sup>2-</sup> | K <sup>+</sup>       | Cl <sup>-</sup> | H <sup>+</sup>       |
| (2) | K <sup>+</sup>       | H <sup>+</sup>       | Cl <sup>-</sup> | Malate <sup>2-</sup> |
| (3) | H <sup>+</sup>       | K <sup>+</sup>       | Cl <sup>-</sup> | Malate <sup>2-</sup> |
| (4) | K <sup>+</sup>       | Malate <sup>2-</sup> | H <sup>+</sup>  | Cl <sup>-</sup>      |

#### ANSWER KEY

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |  |
|------|---|---|---|---|---|---|---|---|---|----|----|----|--|
| Ans. | 4 | 3 | 2 | 3 | 4 | 1 | 3 | 1 | 1 | 1  | 1  | 3  |  |

## MINERAL NUTRITION

1. (I) Important constituent of proteins involved in ETS  
 (II) Activator of catalase

- (III) Important constituent of cytochrome  
 (IV) Essential for chlorophyll synthesis

The above roles have been assigned to :-

- (1) Cu      (2) Fe      (3) Ca      (4) Mo

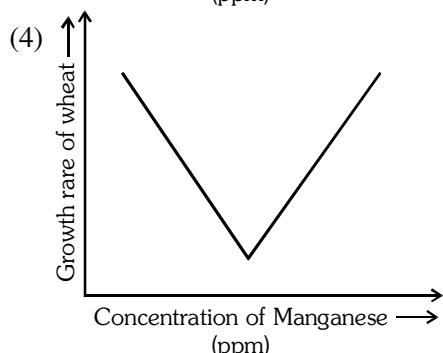
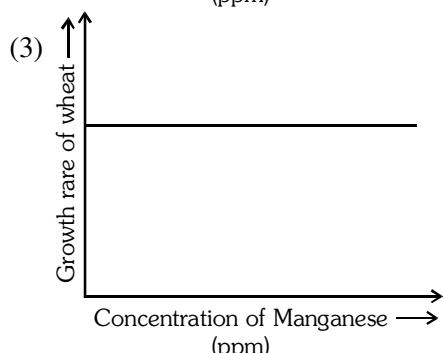
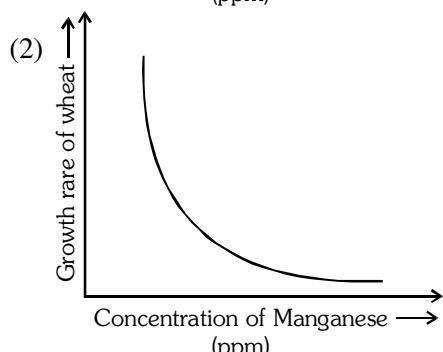
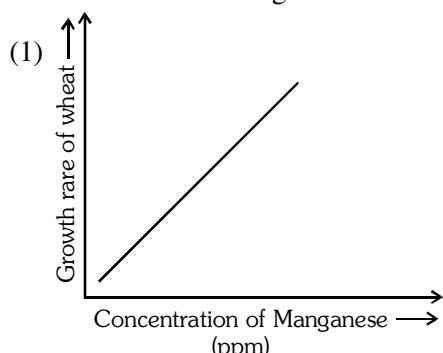
2. Match the following :-

|       | <b>Column-I</b> |     | <b>Column-II</b>                               |
|-------|-----------------|-----|------------------------------------------------|
| (I)   | K               | (A) | Stomatal movement                              |
| (II)  | Mo              | (B) | Constituent of cell membrane                   |
| (III) | P               | (C) | Photolysis of water                            |
| (IV)  | Mn              | (D) | Most free ion                                  |
|       |                 | (E) | Component of nitrogenase and nitrate reductase |

|     | I   | II | III | IV |
|-----|-----|----|-----|----|
| (1) | A,D | E  | B   | C  |
| (2) | A,E | D  | C   | B  |
| (3) | A,E | D  | B   | C  |
| (4) | D,A | C  | B   | E  |

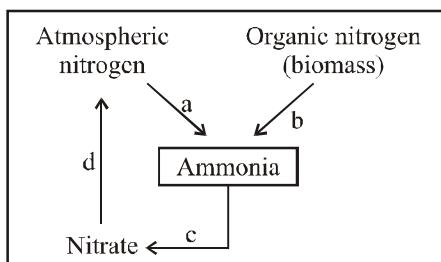
3. Corn is a crop that requires a lot of nitrogen to grow properly. Farmers will often grow corn in a particular field every year alternating it with a legume. What is the purpose of this?  
 (1) Legumes form mycorrhizal association which can convert atmospheric  $N_2$  into a form usable by plants  
 (2) Legume roots contain bacteria that convert atmospheric nitrogen into a form usable by plants  
 (3) Legumes are the only plants that can convert atmospheric nitrogen into a form usable by plants  
 (4) Legumes deplete the soil of nitrogen. Corn is grown to replenish the nitrogen in the soil

4. Mala and her classmates have given a assignment of studying the effect of concentration of micronutrients in the soil on the growth of crop plants. For this, students decide to study the effect of manganese on the growth of wheat plants in the field. Which of the following graphs correctly illustrates the relationship between growth of plants and concentration of manganese in the soil?



5. During N<sub>2</sub>-fixation by *Rhizobium* in soyabean, which one is incorrect ?
- Leghaemoglobin is a pink coloured pigment.
  - Nitrogenase helps to convert N<sub>2</sub> gas into two NH<sub>3</sub> molecules.
  - Nitrogenase requires anaerobic condition for its functioning.
  - Nitrogenase is an oxygen scavenger

6. Study the figure shown below and select the option which gives correct words for a to d :-



**Options :-**

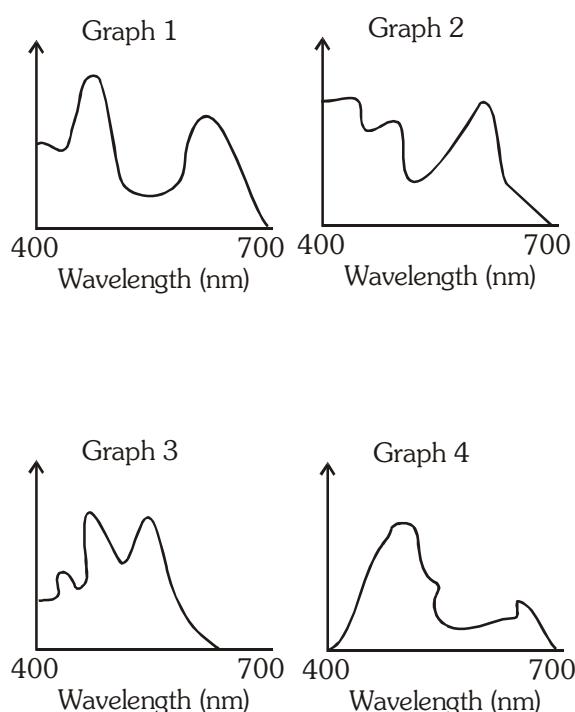
- a–Nitrification, b–Nitrogen fixation, c–Denitrification, d–Ammonification
- a–Nitrogen fixation, b–Ammonification, c–Nitrification, d–Denitrification
- a–Nitrification, b–Nitrogen fixation, c–Ammonification, d–Denitrification
- a–Nitrogen fixation, b–Nitrification, c–Ammonification, d–Denitrification

**ANSWER KEY**

| Que. | 1 | 2 | 3 | 4 | 5 | 6 |  |
|------|---|---|---|---|---|---|--|
| Ans. | 2 | 1 | 2 | 2 | 4 | 2 |  |

## PHOTOSYNTHESIS IN HIGHER PLANTS

1. Three of the graphs below show the absorption spectra of photosynthetic pigments and one graph shows the action spectrum of photosynthesis for a plant. All the x-axis show wavelengths. Three of the y-axis show light absorption and one y-axis shows the rate of photosynthesis.



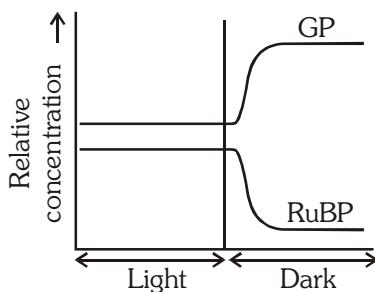
Choose correct match for graph 1 to 4 :-

|     | Absorption spectrum Chlorophyll a | Absorption spectrum Chlorophyll b | Absorption spectrum Carotenoids | Action Spectrum |
|-----|-----------------------------------|-----------------------------------|---------------------------------|-----------------|
| (1) | 1                                 | 4                                 | 3                               | 2               |
| (2) | 2                                 | 1                                 | 3                               | 4               |
| (3) | 2                                 | 4                                 | 3                               | 1               |
| (4) | 3                                 | 2                                 | 4                               | 1               |

2. Select the correct path of electrons during photosynthesis.
- $\text{CO}_2 \rightarrow \text{RuBP} \rightarrow \text{G3P} \rightarrow \text{Glucose}$
  - $\text{H}_2\text{O} \rightarrow \text{PSI} \rightarrow \text{PSII} \rightarrow \text{NADPH} + \text{H}^+ \rightarrow \text{G3P}$
  - $\text{PSII} \rightarrow \text{H}_2\text{O} \rightarrow \text{PSI} \rightarrow \text{NADPH} + \text{H}^+ \rightarrow \text{Glucose}$
  - $\text{H}_2\text{O} \rightarrow \text{PSII} \rightarrow \text{PSI} \rightarrow \text{NADPH} + \text{H}^+ \rightarrow \text{G3P}$

3. Thomas Engelmann illuminated a filament of algae with light that passed through a prism, thus exposing different segments of the algal filament to different wavelengths of light. He added aerobic bacteria and found that these bacteria congregated in the areas illuminated by red and blue light. If you ran the same experiment without passing light through a prism, what would you predict?
- There would be no difference in result
  - The number of bacteria would decrease along the entire length of the filament
  - The bacteria would be relatively evenly distributed along the length of the filament
  - The number of bacteria would increase along the entire length of the filament

4. The graph below refers to an experiment involving a species of alga. The relative concentrations of GP (Glyceraldehyde 3P) and RuBP present in the cells were monitored when the plants were in light and then in darkness.



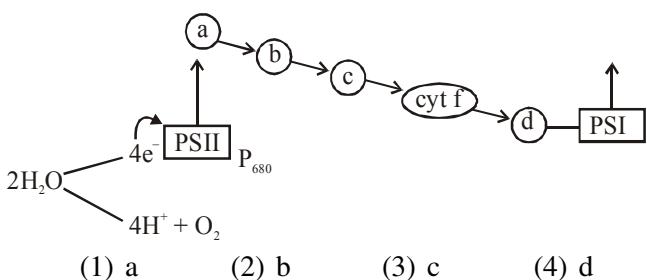
Which of the following conclusions cannot be drawn from these results?

- In darkness, the relative concentration of GP increases
- During the experiment, RuBP may be converted into GP
- The relative concentration of RuBP decreases on removal of  $\text{CO}_2$
- In light, a steady state exists between RuBP and GP

5. Two groups of isolated thylakoids are placed in an acidic bathing solution so that  $H^+$  diffuses into the thylakoids. They are then transferred to a basic bathing solution, and one group is placed in the light, while the other group is kept in the dark. Select below the choice that describes what you expect each group of thylakoids to produce?

|     | In light             | In Dark    |
|-----|----------------------|------------|
| (1) | ATP only             | Nothing    |
| (2) | ATP, $O_2$           | ATP only   |
| (3) | ATP, $O_2$ , glucose | ATP, $O_2$ |
| (4) | ATP, $O_2$           | $O_2$      |

6. A student sets up an experiment on photosynthesis and it is as follows. He takes soda water in a glass tumbler and adds chlorophyll extract and keeps the tumbler exposed to sunlight, hoping that he has provided the necessary ingredients. What will happen after, say, a few hours of exposure to light? Choose the correct answer :-
- Photosynthesis will take place and glucose would be produced turning the mixture sweet
  - Photosynthesis will take place and starch would be produced which will turn the mixture turbid
  - Photosynthesis will not take place and  $CO_2$  dissolved in soda water will escape into the atmosphere
  - Photosynthesis will not take place because intact chloroplasts are needed for the process
7. In the below schematic diagram, which is plastocyanin ?



8. Fill in the blanks :-

- Light saturation occurs at a per cent of full sunlight.
  - There is a b relationship between incident light and  $CO_2$  fixation rates at low light intensities.
  - $C_3$  plants show  $CO_2$  saturation at about c  $\mu L^{-1}$  while  $C_4$  plants corresponds to  $CO_2$  saturation at about d  $\mu L^{-1}$ .
- a-2-5%, b-sigmoid, c-350, d-460
  - a-50%, b-linear, c-460, d-350
  - a-10%, b-sigmoid, c-360, d-450
  - a-10%, b-linear, c-450, d-360

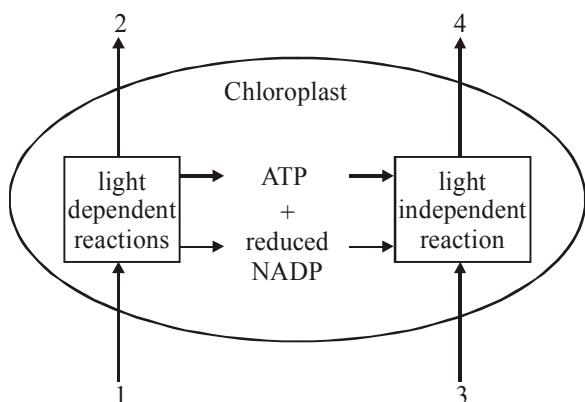
9. Assuming a thylakoid is somehow punctured so that the interior of the thylakoid is no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?
- Splitting of water
  - Absorption of light energy by chlorophyll
  - Flow of electrons from photosystem II to photosystem I
  - Synthesis of ATP

10. The following (P through U) are the main steps of chemosynthetic ATP synthesis in the light reaction. Which option places them in **correct order**?
- $H^+$  concentration gradient established
  - $H^+$  diffuses through ATP synthetase
  - Carriers use energy from electrons to move  $H^+$  across the membrane
  - Electrons from PS II pass along electron transport chain
  - Light excites electrons in PS II
  - Energy of  $H^+$  flow is used by ATP synthetase to make ATP

**Options :-**

- |            |            |
|------------|------------|
| (1) PQTSRU | (2) STPQRU |
| (3) TSRPQU | (4) TSRUQP |

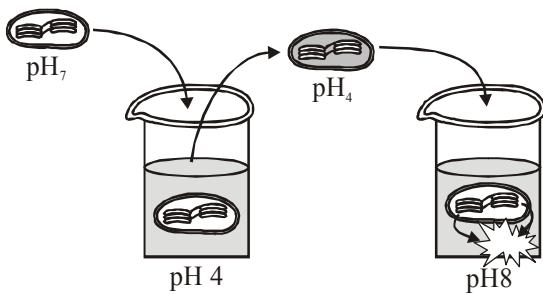
11. The diagram shows the movement of substances in and out of chloroplast -



What do labels 1 to 4 represent?

|     | 1                | 2                | 3                | 4              |
|-----|------------------|------------------|------------------|----------------|
| (1) | CO <sub>2</sub>  | ATP              | H <sub>2</sub> O | Starch         |
| (2) | CO <sub>2</sub>  | H <sub>2</sub> O | Sugar            | O <sub>2</sub> |
| (3) | H <sub>2</sub> O | O <sub>2</sub>   | CO <sub>2</sub>  | Sugar          |
| (4) | Sugar            | H <sub>2</sub> O | ATP              | O <sub>2</sub> |

- 12.** The diagram below represents an experiment with isolated chloroplasts. The chloroplasts were first made acidic by soaking them in a solution at pH 4. After the thylakoid space reached pH 4, the chloroplasts were transferred to a basic solution at pH 8. The chloroplasts are then placed in the dark. Which of these compounds would you expect to be produced?



- (1) ATP
  - (2) NAD
  - (3) G3P
  - (4)  $\text{C}_6\text{H}_{12}\text{O}_6$

| ANSWER KEY |   |   |   |   |   |   |   |   |   |    |    |    |  |
|------------|---|---|---|---|---|---|---|---|---|----|----|----|--|
| Que.       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |  |
| Ans.       | 1 | 4 | 3 | 3 | 2 | 4 | 4 | 4 | 4 | 3  | 3  | 1  |  |

# **RESPIRATION IN PLANT**

1.

Acetyl-CoA = 2C

$OAA = 4C$

Citric acid → Isocitric acid →  $\alpha$ -Ketoglutaric acid

$\alpha$ -Ketoglutaric acid → Succinyl-CoA → Succinic Acid → Fumaric acid → Malic acid → X

Succinyl-CoA → Succinic Acid → X

Isocitric acid →  $\alpha$ -Ketoglutaric acid →  $\text{CO}_2 + X$

Citric acid →  $\text{CO}_2 + X$

Malic acid → X

Fumaric acid → y

Succinic Acid → Z

$\alpha$ -Ketoglutaric acid →  $\text{CO}_2 + X$

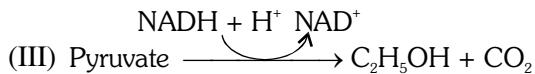
Succinyl-CoA →  $\text{CO}_2 + X$

Identify X, Y and Z :-

|     | <b>X</b>          | <b>Y</b>          | <b>Z</b>        |
|-----|-------------------|-------------------|-----------------|
| (1) | GTP               | NADH <sub>2</sub> | CO <sub>2</sub> |
| (2) | FADH <sub>2</sub> | NADH <sub>2</sub> | GTP             |
| (3) | NADH <sub>2</sub> | FADH <sub>2</sub> | GTP             |
| (4) | CO <sub>2</sub>   | NADH <sub>2</sub> | ADP             |

2. (I)  $\text{C}_6\text{H}_{12}\text{O}_6 + \text{NAD}^+ + 2\text{ADP} + 2\text{iP} \rightarrow 2\text{C}_3\text{H}_4\text{O}_3 + 2\text{ATP} + 2\text{NADH} + 2\text{H}^+$

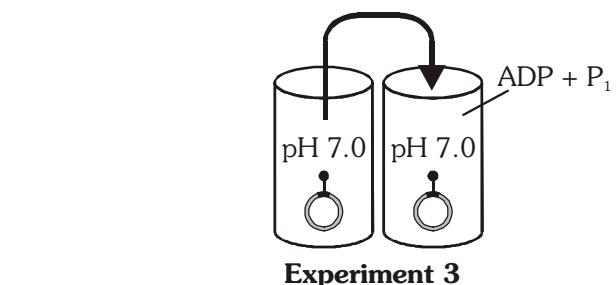
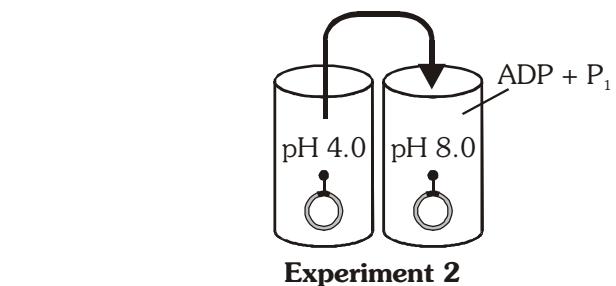
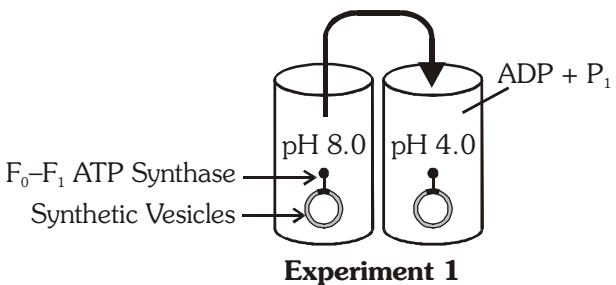
(II) Pyruvic acid + 4NAD<sup>+</sup> + FAD<sup>+</sup> + 2H<sub>2</sub>O + ADP + Pi → 3CO<sub>2</sub> + 4NADH + 4H<sup>+</sup> + ATP + FADH<sub>2</sub>



Categorize the summary equations under respective phases :-

|     | I            | II           | III          |
|-----|--------------|--------------|--------------|
| (1) | Glycolysis   | Fermentation | Kreb's cycle |
| (2) | Kreb's cycle | Fermentation | Glycolysis   |
| (3) | Kreb's cycle | Glycolysis   | Fermentation |
| (4) | Glycolysis   | Kreb's cycle | Fermentation |

3. Experiments 1, 2 and 3 were conducted wherein synthetic vesicles containing  $F_0 - F_1$ ATP synthase were prepared and incubated overnight in a tube. Subsequently, the vesicles were transferred to another tube which also contained ADP and Pi (inorganic phosphate).



- (A) A proton gradient across the vesicular membrane will be present in both experiments 1 and 2 at the time of transfer.

(B) As a consequence of the proton gradient, ATP will be synthesized in both experiments 1 and 2.

(C) ATP will be synthesized in experiment 3 because  $F_0-F_1$  ATP-synthase has the inherent property to catalyse the synthesis of ATP from ADP + Pi.

(D) ATP will be synthesized in experiment 2 because the protons have to flow out of the vesicles through the  $F_0-F_1$  ATP synthase for ATP synthesis.

**Choose the correct statements :-**

4. Read the following statements and find out the incorrect statements :-

  - a. All the food that is respired for life processes ultimately comes from photosynthesis.
  - b. The energy released by oxidation in respiration is directly used for the life processes.
  - c. The carbon skeleton produced during respiration is used as precursor for biosynthesis of other molecules in cell.
  - d. Plants, unlike animals, have no specialised organs for gaseous exchange but they have stomata and lenticels for this purpose.
  - e. During oxidation within a cell, all the energy contained in respiratory substrates is released free into the cell in a single step, which is trapped as chemical energy in the form of ATP.

### **Options :-**



- 5.** Fill in the blanks :-

1. In both lactic acid and alcoholic fermentation not much energy is released; less than a percent of the energy in glucose is released and not all of it is trapped in high energy bonds.
  2. Yeast poison themselves to death when the concentration of alcohol reaches about b percent.
  3. During the conversion of one molecule of pyruvic acid to acetyl CoA c molecule(s) of NADH is/are produced.

## **Options :-**

- (1) a-13, b-7, c-2      (2) a-7, b-13, c-2  
 (3) a-13, b-7, c-1      (4) a-7, b-13, c-1

6. The crucial events in aerobic respiration are :-

  1. The complete oxidation of pyruvate by the stepwise removal of all the hydrogen atoms, leaving three molecules of  $\text{CO}_2$ .

**Choose correct option :-**

- (1) First process is ETS and takes place in matrix of the mitochondria while second process is TCA and takes place on the inner membrane of mitochondria.
  - (2) First process is TCA and takes place in the matrix of mitochondria while the second process is ETS and is located on the inner membrane of mitochondria.
  - (3) First process is ETS and takes place on the inner membrane of mitochondria while second process is TCA and takes place in the matrix of the mitochondria.
  - (4) First process is TCA and takes place on the inner membrane of mitochondria while second process is ETS and takes place in the matrix of mitochondria.

7. How many ATP are produced by the complete oxidation of two molecules of isocitrate by ETS only?



| ANSWER KEY |   |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|---|
| Que.       | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Ans.       | 3 | 4 | 4 | 1 | 4 | 2 | 4 |

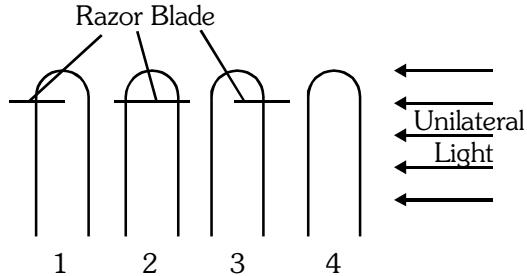
# **PLANT GROWTH AND DEVELOPMENT**



Identify the correct names of the hormones :-

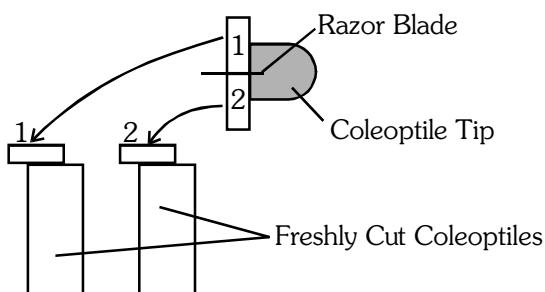
- (1) Y = ABA; X = Auxin; Z = GA
  - (2) Y = GA; X = Auxin; Z = C<sub>2</sub>H<sub>4</sub>
  - (3) Y = Auxin; X = C<sub>2</sub>H<sub>4</sub>; Z = GA
  - (4) Y = C<sub>2</sub>H<sub>4</sub>; X = C<sub>2</sub>H<sub>4</sub>; Z = ABA

4. The following diagram shows four coleoptiles set up at the start of an experiment -

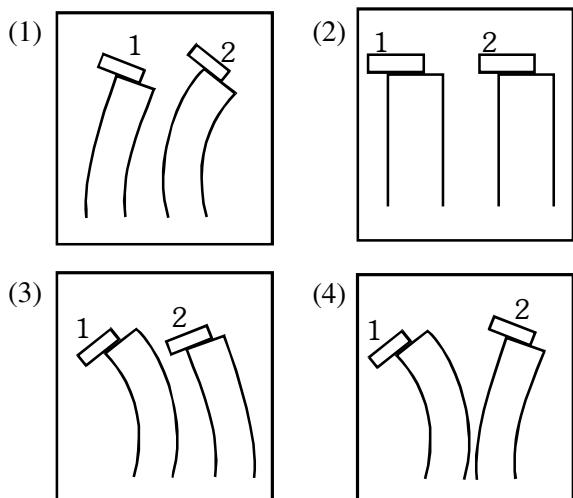


Which two coleoptiles will bend towards the light source?

5. Agar block 1 and 2 were kept in the positions shown in the diagram below for several hours and then transferred on to two freshly cut coleoptiles.



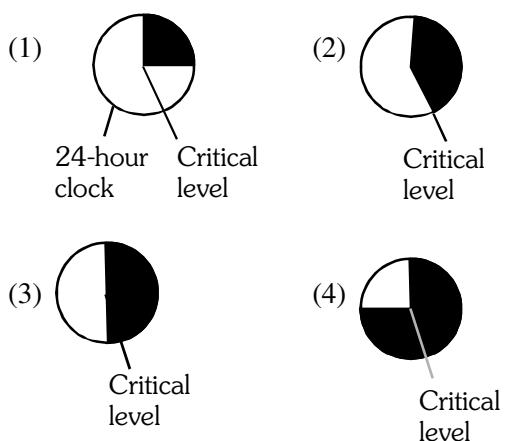
Which of the following would result after two days of growth ?



6. Maryland mammoth tobacco is a short day plant. Its critical duration of darkness is 10 hours.

Under which of the following conditions will it not flower?

Light    Dark



7. Read the following statements and find out the correct statements :-

- In plants, growth and differentiation both are open.
- The final structure of a cell or tissue at maturity is also determined by the location of the cell within the plant.
- Cells positioned away from root apical meristem differentiate as root cap cells while those pushed to the periphery mature as epidermis
- Environmental signals such as light and gravity also affect certain phases or stages of growth.
- Intrinsic factors includes both intracellular (genetic) and intercellular factors (chemicals such as plant growth regulators) while the extrinsic factors include light, temperature, water, oxygen, nutrition etc.

**Options :-**

- Only b and d
- Only c and a
- Only a and e
- All of the above

8. Fill in the blanks :-

- Spraying sugarcane crop with a increases in the length of the stem, thus increasing the yield by as much as b tonnes per acre.
- c does not occur naturally in plants.
- Search for natural substances with cytokinin like activities led to the isolation of d from corn kernels and coconut milk.

**Options :-**

- a-auxins, b-10, c-NAA, d-zeatin
- a-gibberellins, b-20, c-zeatin, d-kinetin
- a-gibberellins, b-10, c-zeatin, d-kinetin
- a-gibberellins, b-20, c-kinetin, d-zeatin

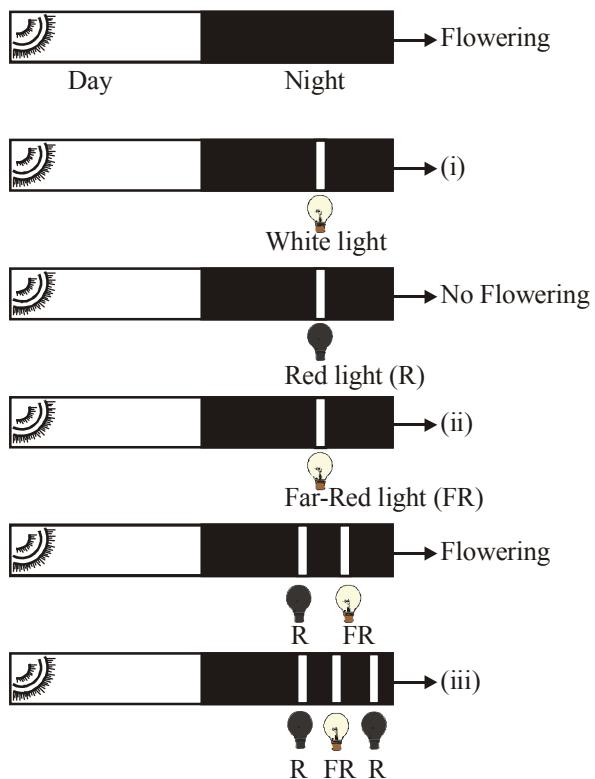
**9.** Fill in the blanks :-

1. Wheat, barley and rye have two kinds of varieties; winter and spring varieties. The 'spring' varieties are normally planted in a, come to flower and produce grain before the end of growing season.
2. 'Winter' varieties, however, if planted in b would normally fail to flower or to produce mature grains within a span of flowering season.
3. 'Winter' varieties are planted in c. They germinate, and over d come out as small seedlings, resume growth in the e and are harvested usually around mid-summer.

**Options :-**

- (1) a-spring, b-winter, c-spring, d-winter, e-spring
- (2) a-winter, b-spring, c-winter, d-spring, e-winter
- (3) a-spring, b-spring, c-autumn, d-winter, e-spring
- (4) a-spring, b-winter, c-autumn, d-spring, e-winter

- 10.** Given figure shows the effect of interruption by light of different types on scotoperiod (dark period) in a short day plant :-



Select the **correct** option for (i), (ii) and (iii):-

|     | (i)          | (ii)         | (iii)        |
|-----|--------------|--------------|--------------|
| (1) | Flowering    | Flowering    | No flowering |
| (2) | No flowering | No flowering | Flowering    |
| (3) | No flowering | Flowering    | No flowering |
| (4) | Flowering    | No flowering | No flowering |

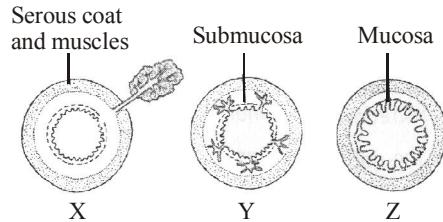
**ANSWER KEY**

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |  |
|------|---|---|---|---|---|---|---|---|---|----|--|
| Ans. | 4 | 4 | 4 | 4 | 1 | 1 | 4 | 4 | 3 | 3  |  |

## DIGESTION AND ABSORPTION

1. Which of the following statements regarding small intestine are incorrect?
  - (i) Through the small intestine, there are crypts of Lieberkühn at the base of the villi.
  - (ii) In duodenum, there are, in addition, small rounded peptic glands.
  - (iii) The small intestine is strongly self-protective, by means of a copious production of mucus and a mechanism for the rapid replacement of cells damaged by contact with food and digestive juices.
  - (iv) Each villus is richly supplied with blood capillaries only.
    - (1) (i) and (iv)
    - (2) (ii) and (iv)
    - (3) (iii) and (iv)
    - (4) (i) and (ii)
2. Which of the following inhibits gastric HCl secretion during a meal?
  - (1) Stimulation of the parasympathetic nerves to the enteric nervous system
  - (2) The sight and smell of food
  - (3) Distension of the duodenum
  - (4) Distension of the stomach
3. Which of the following statements are correct regarding secretion of oxytic cells?
  - (i) It denatures proteins and soften fibrous parts in food
  - (ii) It activates rennin.
  - (iii) It has a role in maturation of RBCs.
  - (iv) It activates trypsin
    - (1) (i) and (iv)
    - (2) (ii), (iii) and (iv)
    - (3) (i), (ii) and (iii)
    - (4) (i), (ii) and (iv)

4. Glands of the gut are of three types as shown in the figure.



Classify the following examples of glands under X, Y and Z.

- (i) Salivary gland
- (ii) Liver
- (iii) Crypts of Lieberkühn
- (iv) Brunner's gland
- (v) Pancreas
- (vi) Gastric gland

|     | <b>X</b>       | <b>Y</b>  | <b>Z</b>    |
|-----|----------------|-----------|-------------|
| (1) | (i), (ii)      | (v), (vi) | (iii), (iv) |
| (2) | (iii), (vi)    | (v), (iv) | (i), (ii)   |
| (3) | (iii), (v)     | (i), (ii) | (iv), (vi)  |
| (4) | (i), (ii), (v) | (iv)      | (iii), (vi) |

5. Which of the following is incorrect regarding the given digestion and absorption of protein?

- (1) The breakdown of proteins into peptides is catalyzed by pepsin in the stomach and by the pancreatic enzymes trypsin and chymotrypsin in the small intestine.
- (2) Peptides are broken down into amino acids by pancreatic carboxypeptidase and intestinal aminopeptidase.
- (3) Small peptides consisting of two or three amino acids can diffuse through epithelial cell and broken down into carbon dioxide and ammonia which are released into the blood
- (4) trypsin and chymotrypsin enzymes are endopeptidase in nature

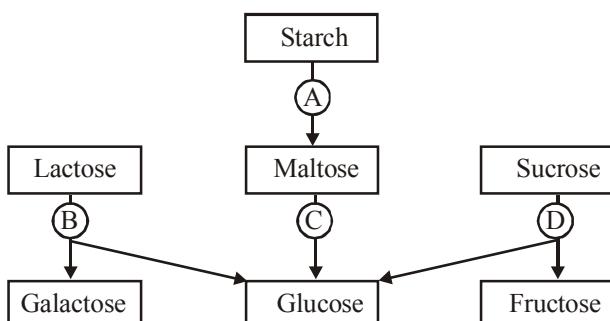
6. The back flow of faecal matter from the large intestine into the small intestine is prevented by the presence of :-

- (1) epiglottis
- (2) sphincter of Oddi
- (3) ileo-caecal valve
- (4) gastro-oesophageal sphincter

7. One of the constituent of the pancreatic juice which is pored into the duodenum in humans is:-  
 (1) trypsinogen      (2) chymotrypsin  
 (3) trypsin      (4) enterokinase

8. The contraction of gall bladder is due to:-  
 (1) cholecystokinin      (2) enterogastrone  
 (3) gastrin      (4) secretin

9. The given flow chart shows the fate of carbohydrates during digestion in the human alimentary canal. Identify the enzymes acting at stages indicated as A, B, C and D and select the correct option.



- (1) A-amylase, B-maltase, C-lactase, D-invertase  
 (2) A-amylase, B-maltase, C-invertase, D-lactase  
 (3) A-amylase, B-invertase, C-maltase, D-lactase  
 (4) A-amylase, B-lactase, C-maltase, D-invertase

10. Fill in the blanks with appropriate enzymes that bring the required changes in the following:-

- (i) Trypsinogen  $\xrightarrow{?}$  Trypsin  
 (ii) Caesin  $\xrightarrow{?}$  Paracasein + Whey proteins  
 (iii) RNA  $\xrightarrow{?}$  Ribonucleotides  
 (iv) Triglycerides  $\xrightarrow{?}$  Fatty acids + Glycerol

|     | (i)               | (ii)         | (iii)              | (iv)      |
|-----|-------------------|--------------|--------------------|-----------|
| (1) | Enterocrinin      | Pepsin       | Trypsin            | Lactase   |
| (2) | Rennin            | Enterokinase | Deoxyribo-nuclease | Lipase    |
| (3) | Carboxy-peptidase | Pepsin       | Chymotrypsin       | Detrinase |
| (4) | Enterokinase      | Rennin       | Ribonuclease       | Lipase    |

11. Consider the following four statements and select the correct option which includes true (T) & False (F) statements are correctly identify?  
 (i) The stomach has the lowest pH.  
 (ii) The liver contains lipid emulsifier  
 (iii) Large intestine secretes many enzymes.  
 (iv) All proteases function in the lumen of small intestine  
 (i) (ii) (iii) (iv)  
 (1) T F T F  
 (2) F T F T  
 (3) F F T T  
 (4) T T F F

12. If you chew on a piece of bread long enough, it will begin to taste sweet because  
 (1) maltase is breaking down maltose  
 (2) lipases are forming fatty acids  
 (3) amylase is breaking starch into disaccharides  
 (4) disaccharides are forming glucose

13. Which layer of the gut is responsible for peristalsis?  
 (1) Smooth muscles      (2) Mucosa  
 (3) Submucosa      (4) Serosa

14. Three secretions meeting into the food in small intestine are -  
 (1) Bile, gastric juice and Saliva  
 (2) Bile, Pancreatic juice and gastric juice  
 (3) Pancreatic juice, intestinal juice and gastric juice  
 (4) Bile, pancreatic juice and sucus intericus

15. Aminopeptidase, a digestive enzyme produces-  
 (1) Tripeptidases      (2) Smaller peptides  
 (3) peptones      (4) Amino acids

16. Which of the following statement is wrong about chylomicrons?  
 (I) Chylomicrons are produced in the epithelial cells of small intestinal.  
 (II) It contains triglycerides, cholesterol and phospholipids.  
 (III) It is protein coated small vesicle.  
 (IV) Chylomicrons released from the epithelial cells into lacteals.

- (1) I and IV      (2) II and III  
 (3) I, II, III and IV      (4) Only II

17. Which of the following statement is incorrect?
- Faecal accumulation in the rectum initiates a neural reflex causing an urge for its removal
  - Reflex action for vomiting is controlled by medulla.
  - Irregular bowel movements cause constipation.
  - In diarrhoea absorption of food is increased.
18. The following are the symptoms of Kwashiorkor and Marasmus. Categorize them correctly:-
- It is caused by deficiency of protein in the diet.
  - It is caused by prolonged deficiency of proteins and calories in the diet.
  - It affects infants under one year of age.
  - It commonly affects babies between 1 - 3 years of age.
  - Subcutaneous fat is used up, making ribs very prominent.
  - No oedema occurs
- Kwashiorkor - I, IV; Marasmus - II, III, V
  - Kwashiorkor - I, II, VI; Marasmus - III, IV, V
  - Kwashiorkor - II, III; Marasmus - I, IV, V, VI
  - Kwashiorkor - III, IV; Marasmus - I, II, V, VI
19. If for some reason the parietal cells of the gastric epithelium become partially non-functional, what is likely to happen?
- The Pancreatic enzymes specially the trypsin and lipase will not work efficiently
  - The pH of stomach will fall abruptly
  - Steapsin will be more effective
  - Proteins will not be adequately hydrolysed by pepsin into proteoses and peptones
20. The primary dentition in human differs from permanent dentition in not having one of the following type of teeth.
- Molars
  - Incisors
  - Canines
  - Premolars
21. Number of teeth which are monophyodont in man is
- 4
  - 20
  - 32
  - 12

22. Match the glands of column I with their secretion of column II and choose the right option.

|     | <b>Column-I</b>        |       | <b>Column-II</b>      |
|-----|------------------------|-------|-----------------------|
| (A) | Neck cells             | (i)   | HCl, intrinsic factor |
| (B) | Peptic/Chief cells     | (ii)  | Mucous                |
| (C) | Parietal/Oxyntic cells | (iii) | Pepsinogen            |
| (D) | Hepatocyte             | (iv)  | Bile                  |

- A-ii; B-iii; C-i; D-iv
- A-iii; B-i; C-iv; D-ii
- A-iv; B-ii; C-iii; D-i
- A-i; B-iv; C-iii; D-ii

23. Which is not the function of HCl in stomach?

- Breaking down proteins into peptones
- Killing the bacteria ingested with food and drinks
- Promoting the formation of pepsin
- Softening fibrous food elements

24. What will happen if the secretion of parietal cells of the gastric glands is blocked with an inhibitor?

- Gastric juice will be deficient in prorennin
- Gastric juice will be deficient in pepsinogen
- In the absence of HCl secretion, inactive pepsinogen is not converted into the active enzyme pepsin
- Enterokinase will not be released from the duodenal mucosa and so trypsinogen is not converted to trypsin

25. Just as hydrochloric acid is for pepsinogen, so is the

- bile juice for fats
- glucagon for glycogen
- haemoglobin for oxygen
- enterokinase for trypsinogen

- 26.** If the chyme of a person, who had orally consumed only starch as food, is analysed before it enters the duodenum, it will show the presence of  
(1) maltose and glucose  
(2) peptide and maltose  
(3) starch and maltose  
(4) starch, peptide and glucose

**27.** Glucose metabolism in the body is controlled by the secretion of the  
(1) Liver  
(2) Crypts of Lieberkuhn  
(3) Pancreas  
(4) Salivary glands

**28.** Chyme is acidic and contains  
(1) partly digested proteins and fats but undigested carbohydrates  
(2) partly digested carbohydrates and proteins but undigested fats  
(3) completely digested proteins and carbohydrates but partly digested fats  
(4) partly digested fats and carbohydrates but undigested proteins

**29.** Dentine of tooth differs from bone by the  
(1) Presence of canaliculi  
(2) Absence of Haversian canals  
(3) Absence of canaliculi  
(4) Presence of Haversian canals and canaliculi

**30.** Choose correct the match option for columns I, II and III.

|     | <b>Column-I</b>     |       | <b>Column-II</b> |     | <b>Column-III</b> |
|-----|---------------------|-------|------------------|-----|-------------------|
| (A) | Parotid gland       | (i)   | Whartson's Duct  | (a) | 70%               |
| (B) | Submandibular gland | (ii)  | Duct of Rivinus  | (b) | 5%                |
| (C) | Sublingual gland    | (iii) | Stenson's duct   | (c) | 25%               |

- (1) A-i-c      B-ii-a      C-iii-b
  - (2) A-ii-c      B-i-a      C-iii-b
  - (3) A-iii-c      B-i-a      C-ii-b
  - (4) A-iii-c      B-i-b      C-ii-a

- 34.** Read the following statements thoroughly and identify whether they are true and false. Choose the right option accordingly.

(I) Bile is produced and stored in the liver and gall bladder, respectively

(II) Common hepatic duct is the fusion of all the right and left hepatic ducts

(III) Hepto-pancreatic duct opens into the proximal part of the small intestine

(IV) Pancreas consists of two parts, exocrine and endocrine, which secretes insulin and glucagon hormone and pancreatic juice containing enzymes, respectively.

(1) All statements are true

(2) All statements are false

(3) Statement I, II and III are true while IV is false

(4) Statement I and III are true while II and IV are false

**35.** Go through the following statements regarding the disorders of the digestive system. Choose the correct statement and select appropriate option from the codes given below.

(I) Indigestion is caused by the poor supply of digestive enzyme, overeating, anxiety and eating a lot of junk food

(II) Constipation, an irregular movement of bowel is caused due to fiberless diet and emotional stress

(III) Kidneys are affected in jounadirce

(IV) Ejection of stomach content is controlled by hypothalamus

(1) All statements are correct

(2) All statements are incorrect.

(3) I and II statements are correct

(4) III and IV statements are correct

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## **ANSWER KEY**

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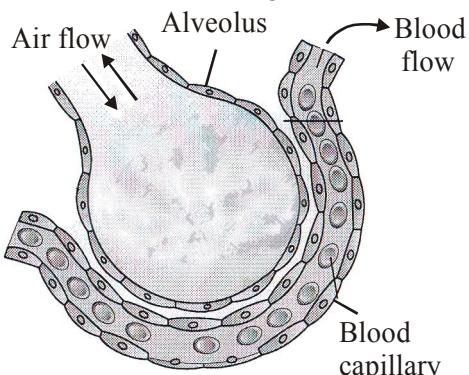
## BREATHING AND EXCHANGE OF GASES

1. The largest quantity of air than can be expired in a single respiration after a maximum inspiratory effort is called :-
    - (1) residual volume
    - (2) tidal volume
    - (3) Vital capacity
    - (4) total lung volume
  2. Which of the following statements is correct about blood constituents and transport of most accurate respiratory gases?
    - (1) RBCs transport oxygen, whereas plasma transports only carbon dioxide
    - (2) RBCs as well as WBCs transport both oxygen and carbon dioxide
    - (3) RBCs transport oxygen, whereas WBCs transport carbon dioxide
    - (4) RBCs as well as plasma transport both oxygen and carbon dioxide
  3. Persons living at high altitude will have:-
    - (1) high alveolar capacity
    - (2) more number of erythrocytes
    - (3) haemoglobin curve shifts towards right
    - (4) All of the above
  4. Combination of haemoglobin with oxygen in lungs can be promoted by:-
    - (1) increasing carbon dioxide concentration in blood
    - (2) increasing oxygen concentration in blood
    - (3) decreasing oxygen concentration in blood
    - (4) introducing carbon monoxide in blood
  5. If a reduced oxygen supply weakens the heart cells but does not actually kill them, the condition is called:-
    - (1) myocardial infarction
    - (2) tachycardia
    - (3) bradycardia
    - (4) ischemia
  6. Which of the following statement correctly defines Bohr's effect?
    - (1) Rise in  $P_{50}$  with an increase in  $CO_2$  concentration
    - (2) Rise in  $P_{50}$  with decrease in pH
    - (3) Rise in  $P_{50}$  with an increase in temperature
    - (4) Fall in  $P_{50}$  with a decrease in pH
  7. A person met with an accident and died instantly without any injury to heart, brain, stomach and kidney. One of the following is a reason for his death:-
    - (1) Intestine got twisted
    - (2) RBCs became coagulated
    - (3) Stomach stopped digestion
    - (4) Diaphragm got punctured
  8. One of the following is a difference between pulmonary respiration of frog and human:-
    - (1) Diaphragm and ribs play role in respiration
    - (2) Lungs are respiratory organs
    - (3) Respiration occurs due to pressure gradient
    - (4) None of the above
  9. Asphyxia occurs due to:-
    - (1) rise in level of  $CO_2$
    - (2) fall in level of  $CO_2$
    - (3) rise of  $O_2$  level
    - (4) fall in  $O_2$  level
  10. Reduction in respiratory surface of the lungs due to breakdown of partition in the alveoli is known as:-
    - (1) asphyxia
    - (2) bronchitis
    - (3) asthma
    - (4) emphysema
  11. Match the following columns:-
 

|     | Column-I                   |   | Column-II              |
|-----|----------------------------|---|------------------------|
| (A) | Tidal volume               | 1 | 2500 to 3000 mL of air |
| (B) | Inspiratory reserve volume | 2 | 1000 mL of air         |
| (C) | Expiratory reserve volume  | 3 | 500 mL of air          |
| (D) | Residual volume            | 4 | 3000 to 3500 mL of air |
| (E) | Inspiratory capacity       | 5 | 1200 mL of air         |
- Codes:**
- |     | A | B | C | D | E |
|-----|---|---|---|---|---|
| (1) | 3 | 4 | 2 | 1 | 5 |
| (2) | 3 | 1 | 2 | 5 | 4 |
| (3) | 3 | 1 | 4 | 5 | 4 |
| (4) | 5 | 4 | 2 | 1 | 2 |
12. Increased asthmatic attacks in certain seasons are related to:-
    - (1) hot and humid environment
    - (2) eating fruits preserved in tin containers
    - (3) inhalation of seasonal pollen
    - (4) low temperature

13. If  $O_2$  concentration in tissue was almost as high as at the respiratory surface then:-
- oxyhaemoglobin would dissociate to supply to the tissue
  - haemoglobin would combine with more  $O_2$  at respiratory surface
  - oxyhaemoglobin would not dissociate to supply  $O_2$  to the tissue
  - $CO_2$  will interfere the  $O_2$  transport

14. The following diagram shows a section of an alveolus in a human lung.



Which conditions would result in the maximum rate of diffusion of oxygen from the alveolus into the blood capillary?

|     | Amount of oxygen in alveolar air | Amount of oxygen in blood | Rate of blood flow |
|-----|----------------------------------|---------------------------|--------------------|
| (1) | Small                            | Large                     | Fast               |
| (2) | Small                            | Large                     | Slow               |
| (3) | Large                            | Small                     | Fast               |
| (4) | Large                            | Small                     | Slow               |

15. **Assertion:**  $CO_2$  transport occurs very fast through RBCs with respect to  $O_2$ .

**Reason:** Enzyme carbonic anhydrase is absent in blood plasma

- Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
- Assertion is true, but Reason is false
- Assertion is false and Reason is true

16. Why is CO poisonous for man:-
- CO affects the nerves of the lungs
  - CO affects the diaphragm and intercostal muscles
  - CO reacts with oxygen reducing percentage of  $CO_2$  in air
  - Haemoglobin combines with CO instead  $O_2$  and the product cannot dissociate

17. Oxyhaemoglobin is an unstable compound because:-

- $O_2$  and haemoglobin reaction depends upon partial pressure
- haemoglobin is a conjugated protein
- haemoglobin is contained within RBC
- one haemoglobin binds with four molecules of  $O_2$

18. Mammalian lungs have an enormous number of minute alveoli (air sacs). This is to allow:-

- more space for increasing the volume of inspired air
- more surface area for diffusion of gases
- more spongy texture for keeping lungs in proper shape
- more nerve supply to keep the lungs working

19. Which of the following statements best summarises the relationship between respiratory rate and body size in related animals?

- Smaller the animal higher the respiratory rate
- Smaller the animal lower the respiratory rate
- Larger the animal higher the respiratory rate
- Size and respiratory rate are not related in any orderly fashion

20. The blood leaving the lungs has all its haemoglobin oxygenated and gives up oxygen to the tissues, because:-

- The tissue can absorb  $O_2$  from oxyhaemoglobin
- $O_2$  concentration in tissues is lower and  $CO_2$  concentration higher than in lungs
- $O_2$  concentration in tissues is higher and  $CO_2$  concentration lower than in lungs
- Oxyhaemoglobin undergoes reduction

- 21.** Asthma is caused due to:-  
 (1) Infection of lungs  
 (2) Spasm in bronchial muscles  
 (3) Bleeding into pleural cavity  
 (4) Infection of trachea
- 22.** How the transport of  $O_2$  and  $CO_2$  by blood happens?  
 (1) with the help of RBCs and blood plasma  
 (2) with the help of RBCs and WBCs  
 (3) with the help of WBCs and blood serum  
 (4) with the help of platelets and corpuscles
- 23.** How does carbon monoxide, a poisonous gas emitted by automobiles, prevent transport of oxygen to body tissues?  
 (1) by obstructing the reaction of oxygen with haemoglobin  
 (2) by destroying the haemoglobin  
 (3) by changing oxygen into carbon dioxide  
 (4) by forming a stable compound with haemoglobin
- 24.** With reference to human respiration, which is correct?  
 (1) Pulmonary ventilation is equal to alveolar ventilation  
 (2) Alveolar ventilation is less than pulmonary ventilation  
 (3) Alveolar ventilation is more than pulmonary ventilation  
 (4) Pulmonary ventilation is less than alveolar ventilation
- 25.** The 'blue baby' syndrome results from:-  
 (1) methemoglobin  
 (2) excess of chloride  
 (3) excess of dissolved oxygen  
 (4) excess of TDS (Total Dissolved Solids)
- 26.** Mark the incorrect statement in context to  $O_2$  binding to Hb.  
 (1) Higher pH cause association  
 (2) Lower temperature cause association  
 (3) Lower  $pCO_2$  cause association  
 (4) Higher  $PO_2$  cause association
- 27.** Identify the correct and incorrect match about respiratory volume and capacities and mark the correct answer  
 (i) Inspiratory Capacity (IC) = Tidal Volume + Residual Volume  
 (ii) Vital Capacity (VC) = Tidal Volume (TV) + Inspiratory Reserve Volume (IRV) + Expiratory Reserve Volume (ERV)  
 (iii) Residual Volume (RV) = Vital Capacity (VC) – Inspiratory Reserve Volume (IRV)  
 (iv) Tidal Volume (TV) = Inspiratory Capacity (IC) – Inspiratory Reserve Volume (IRV)
- Options**
- (1)(i) Incorrect, (ii) Incorrect, (iii) Incorrect, (iv) Correct  
 (2)(i) Incorrect, (ii) Correct, (iii) Incorrect, (iv) Correct  
 (3)(i) Correct, (ii) Correct, (iii) Incorrect, (iv) Correct  
 (4)(i) Correct, (ii) Incorrect, (iii) Correct, (iv) Incorrect
- 28.** Select correct statement related to human beings respiratory system.  
 (1) Cigarette smoking may lead to inflammation of mouth and nose  
 (2) Neural signals from the pneumotoxic centre in the pons region of the brain cannot increase the duration of inspiration  
 (3) Workers in grinding and stone breaking industries may suffer from lung fibrosis  
 (4) About 7% of  $CO_2$  is carried out by haemoglobin as carbaminohaemoglobin
- 29.** Find out correct match the following columns.
- |   | <b>Column-I</b> |     | <b>Column-II</b>    |
|---|-----------------|-----|---------------------|
| A | Hyponoëa        | i   | Difficult breathing |
| B | Hypernoëa       | ii  | Painful breathing   |
| C | Apnoëa          | iii | No breathing        |
| D | Dyspœa          | iv  | Rapid breathing     |
| E | Orthopnoëa      | v   | Slow breathing      |
- (1) A-v; B-iii; C-iv; D-ii; E-i  
 (2) A-v; B-iii; C-i; D-ii; E-iv  
 (3) A-v; B-iv; C-iii; D-ii; E-i  
 (4) A-v; B-iv; C-ii; D-iii; E-i

30. Which one condition suitable for greatest degree of O<sub>2</sub> saturation for haemoglobin, if pO<sub>2</sub> remains constant?
- Increased CO<sub>2</sub> level, decreased temperature
  - Decreased CO<sub>2</sub> level, decreased temperature
  - Increased CO<sub>2</sub> level, increased temperature
  - Decreased CO<sub>2</sub> level, increased temperature
31. Which of the following statements are true/false?
- The blood transports CO<sub>2</sub> comparatively easily due to its high solubility
  - Approximately, 8.9% of CO<sub>2</sub> is transported being dissolved in the plasma of blood
  - The CO<sub>2</sub> produced by the tissues diffuses passively into the blood stream and passes in the red blood corpuscles and reacts with water to form H<sub>2</sub>CO<sub>3</sub>
  - The oxyhaemoglobin (HbO<sub>2</sub>) in erythrocytes is basic in nature
  - The chloride ions diffuses from the plasma into the erythrocytes to maintain the ionic balance

Choose the correct option

|     | <b>True</b>  | <b>False</b> |
|-----|--------------|--------------|
| (1) | I, III and V | II and IV    |
| (2) | II and IV    | I, III and V |
| (3) | I, II and IV | III and V    |
| (4) | III and V    | I, II and IV |

32. Which fact suggest that most of the oxygen is transported from the lungs to the tissues, combined with the haemoglobin rather than dissolved in the blood plasma?
- Oxygen carrying capacity of the whole blood is much higher than that of plasma and oxygen content of the blood after leaving the lungs is greater than that of the blood entering the lungs
  - haemoglobin can combine with oxygen
  - Oxyhaemoglobin can dissociate into haemoglobin and oxygen
  - Increase in the CO<sub>2</sub> concentration decreases the oxygen affinity of haemoglobin

33. When there is no air in initial bronchioles, they do not collapse. It is due to presence of
- lecithin
  - incomplete cartilagenous rings
  - complete cartilagenous rings
  - transformed elastin cartilage
34. The Contraction of which muscle is responsible for normal expiration?
- Diaphragm
  - EICM
  - IICM
  - Abdominal muscles
- A, B and D
  - C and D
  - A and C
  - No muscles contract during expiration
35. Which one of the following is the correct statement for respiration in human beings?
- Workers in grinding and stone-breaking industries may suffer, from lung fibrosis
  - About 90% of carbon dioxide (CO<sub>2</sub>) is carried by haemoglobin as carbaminohaemoglobin
  - Cigarette smoking may lead to inflammation of bronchi
  - Neural signals from pneumo toxic centre in pons region of the brain can increase the duration of inspiration
36. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breath?
- rising CO<sub>2</sub> and falling O<sub>2</sub> concentration
  - falling O<sub>2</sub> concentration
  - rising CO<sub>2</sub> concentration
  - falling CO<sub>2</sub> concentration
37. Fill in the blanks :-
- The a is utilised by the organisms to indirectly breakdown nutrient molecule like glucose to derive b for performing various activities.
  - For catabolism, c has to be continuously provided to the cells and d produced by cells have to be released out.
- a-energy, b-oxygen, c-oxygen, d-CO<sub>2</sub>
  - a-O<sub>2</sub>, b-energy, c-CO<sub>2</sub>, d-O<sub>2</sub>
  - a-energy, b-O<sub>2</sub>, c-CO<sub>2</sub>, d-O<sub>2</sub>
  - a-O<sub>2</sub>, b-energy, c-O<sub>2</sub>, d-CO<sub>2</sub>

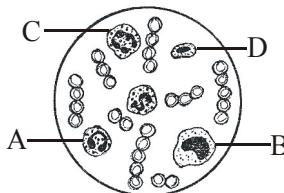
- 38.** Mechanism of breathing vary among different groups of animals depending mainly on their :-
- Habits
  - Habitats
  - Levels of organisation
  - Demand of situation
- (1) a and b                                  (2) b and c  
 (3) b, c and d                              (4) a, c and d
- 39.** Which of the following factors affect the rate of diffusion ?
- Pressure gradient
  - Concentration of gases
  - Solubility of gases
  - Reactivity of gases
  - Thickness of the membrane involved in diffusion.
- (1) a, b and c  
 (2) a, c, d and e  
 (3) a, b, c and e  
 (4) a, b, c, d and e
- 40.** Read the following statements and find out the incorrect statement(s) :-
- The binding of  $\text{CO}_2$  with haemoglobin is related to the partial pressure of  $\text{CO}_2$ .  $\text{pO}_2$  is a major factor which could affect this binding.
  - When  $\text{pCO}_2$  is low and  $\text{pO}_2$  is high as in the alveoli, more binding of  $\text{CO}_2$  occurs, whereas when the  $\text{pCO}_2$  is high and  $\text{pO}_2$  is low as in the tissues, dissolution of  $\text{CO}_2$  from carbamino-haemoglobin takes place.
  - At the tissue site, where partial pressure of  $\text{CO}_2$  is high due to catabolism,  $\text{CO}_2$  diffuses into blood (RBCs and plasma) and forms  $\text{HCO}_3^-$  and  $\text{H}^+$ . at the alveolar site where  $\text{pCO}_2$  is low, the reaction proceeds in the opposite direction leading to the formation of  $\text{CO}_2$  and  $\text{H}_2\text{O}$ .
  - Oxygen dissociation curve is highly useful in studying the effect of factor like  $\text{pCO}_2$ ,  $\text{H}^+$  concentration, etc., on binding of  $\text{O}_2$  with haemoglobin.
- (1) a and b                                    (2) b and c  
 (3) c and d                                    (4) b only
- 41.** Increase in  $\text{CO}_2$  concentration will cause :-
- Slower and shallower breathing
  - Slower and deeper breathing
  - Faster and deeper breathing
  - No effect on breathing
- 42.** Forced deep breathing during rest for some time is followed by temporary stoppage of breathing because of :-
- Little  $\text{CO}_2$  in blood
  - High  $\text{CO}_2$  content in blood
  - High oxygen content in blood
  - Little oxygen content in blood
- 43.** In which of the following subjects, the dead space is the highest ?
- Old man                                    (2) Old woman  
 (3) Young man                              (4) Young woman
- 44.** Protective respiratory blast is :-
- Hiccupping                                (2) Sneezing  
 (3) Coughing                                (4) Yawning
- 45.** During transport of  $\text{CO}_2$ , blood does not become acidic due to :-
- Neutralisation of  $\text{H}_2\text{CO}_3$  by  $\text{Na}_2\text{CO}_3$
  - Absorption by leucocytes
  - Blood buffers
  - Non-accumulation

**ANSWER KEY**

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

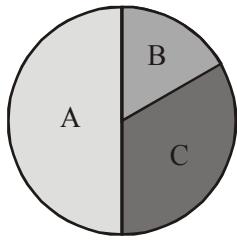
## BODY FLUIDS AND CIRCULATION

1. Study the given figure and identify the cells labelled as A, B, C and D :-



- (1) A - Eosinophil, B - Erythrocyte  
C - Neutrophil, D - Basophil  
(2) A - Eosinophil, B - Lymphocyte  
C - Neutrophil, D - Monocyte  
(3) A - Erythrocyte, B - Basophil  
C - Neutrophil, D - Lymphocyte  
(4) A - Eosinophil, B - Monocyte  
C - Neutrophil, D - Lymphocyte

2. In the given figure the durations of the events of the cardiac cycle are given, Identify these events and select the correct option.

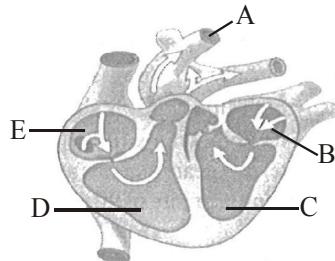


|     | A                   | B                 | C                   |
|-----|---------------------|-------------------|---------------------|
| (1) | Auricular systole   | Joint diastole    | Ventricular Systole |
| (2) | Ventricular systole | Joint diastole    | Auricular systole   |
| (3) | Ventricular systole | Auricular systole | Joint diastole      |
| (4) | Joint diastole      | Auricular systole | Ventricular systole |

3. Which of the following term (column-I) is correctly matched with its functions (column-II):-

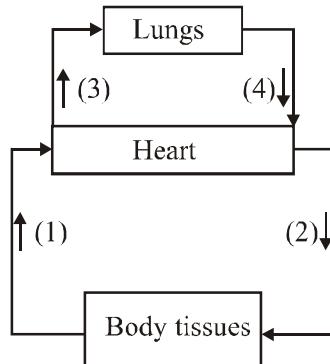
|     | Column-I<br>(Term) | Column-II<br>(Functions)                                    |
|-----|--------------------|-------------------------------------------------------------|
| (1) | Plasma             | Straw coloured fluid that consists of suspended blood cells |
| (2) | Heart              | Site where exchanges of nutrients and gases are made        |
| (3) | Capillary          | A red colour fluid that provides food to the cells          |
| (4) | Blood              | Pumping station of the body                                 |

4. In the human heart, blood from the lungs enters the heart through the left atrium, pumps into the left ventricle, out the aorta and through the body, and then returns into the right atrium, pumps into the right ventricle and exits to the lungs. Using the diagram, which set of letters (A, B, C, D, E) correctly represents the process describe above?



- (1) E, D, A, B, C      (2) B, C, A, E, D  
(3) C, D, A, B, E      (4) D, C, A, E, B

5. The given figure represents the pathway of blood through the body:-



Identify the correct match of marked number 1, 2, 3 and 4.

- (1) 1-Artery      (2) 2-Pulmonary vein  
(3) 3-Pulmonary artery      (4) 4-Systemic Vein

6. During systemic circulation, blood leaves the \_\_\_\_\_ (i) and \_\_\_\_\_ (ii) :-  
 (1) (i)-left ventricle, (ii)-goes directly to the aorta  
 (2) (i)-right ventricle, (ii)-goes directly to the aorta  
 (3) (i)-right ventricle, (ii)-moves to the lungs.  
 (4) (i)-left ventricle, (ii)-moves to the lungs
7. In order for the blood to flow from right ventricle to left ventricle in mammalian heart, it must flow through:-  
 (I) Right ventricle      (II) Pulmonary veins  
 (III) Left atrium      (IV) Lungs  
 (V) Pulmonary arteries      (VI) Left ventricle  
 (1) I-V-IV-II-III-VI      (2) I-II-III-IV-V-VI  
 (3) III-V-I-II-IV-VI      (4) III-II-I-IV-V-VI
8. "X" is a fibrous tissue of the membranous septum of the heart just above the septal cusp of the tricuspid valve. It separates the atrium and the ventricle of the same side. Identify "X":-  
 (1) Sino atrial node  
 (2) Atrioventricular septum  
 (3) Atrioventricular node  
 (4) Interventricular septum
9. When a leopard runs after you, the increase in heart rate is probably due to the \_\_\_\_\_:-  
 (1) hypothalamus  
 (2) parasympathetic nerves  
 (3) increase in blood pressure  
 (4) medullary accelerator centre
10. The characteristic of human erythrocyte are  
 (I) absence of nucleus  
 (II) formed in bone marrow  
 (III) possess healing properties  
 (IV) biconcave in shape  
 (V) help in antibody production  
 Choose the option with correct properties.  
 (1) III, IV and V  
 (2) I, II and III  
 (3) I, II and IV  
 (4) III, II and IV

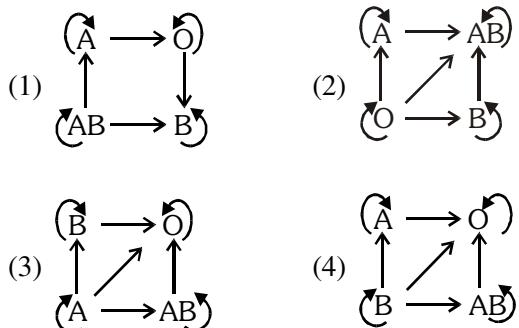
11. Which of the following statement is incorrect about the lymph?  
 (I) Lymph is coloured as it has haemoglobin but no RBC  
 (II) The fluid present in the lymphatic system is called lymph  
 (III) It contains specialized lymphocytes which are responsible for the immunity of the body  
 (IV) Lymph is an important carrier for nutrients and hormones  
 (V) Fats are absorbed through the lymph in the lacteals present in the intestinal villi  
 Choose the correct option.  
 (1) II and III      (2) Only I  
 (3) III and IV      (4) Only IV
12. Cardiac activity could be moderated by the autonomous neural system. Tick the correct answer.  
 (1) The parasympathetic system stimulates heart rate and stroke volume  
 (2) The sympathetic system stimulates heart rate and stroke volume  
 (3) The parasympathetic system decreases the heart rate but increases the stroke volume  
 (4) The sympathetic system decreases the heart rate but increase stroke volume
13. Which of the following are erythropoietic organs?  
 (I) Liver  
 (II) Yolk Sac  
 (III) Spleen  
 (IV) White bone marrow  
 (V) Red bone marrow  
 Choose the correct option.  
 (1) All, except I  
 (2) All, except V  
 (3) All except III  
 (4) All, except IV

14. Match the following columns.

|   | <b>Column-I</b>               | <b>Column-II</b>                                                             |
|---|-------------------------------|------------------------------------------------------------------------------|
| A | Heart failure                 | i Heart muscle is suddenly damaged by an inadequate blood supply.            |
| B | Cardiac arrest                | ii Chest pain due to inadequate $O_2$ reaching the heart muscles             |
| C | Heart attack                  | iii Atherosclerosis                                                          |
| D | Coronary Artery Disease (CAD) | iv Heart not pumping blood effectively enough to meet the needs of the body. |
| E | Angina pectoris               | v Heart stops beating                                                        |

- (1) A-iv; B-v; C-i; D-iii; E-ii
- (2) A-v; B-iv; C-i; D-iii; E-ii
- (3) A-iv; B-v; C-i; D-ii; E-iii
- (4) A-v; B-iv; C-ii; D-iii; E-i

15. Which of the given option is correct about the blood groups and donor compatibility?



16. Which of the following events occur during joint diastole?

- (I) All four-chambers are in relaxed state
- (II) Tricuspid and bicuspid are open
- (III) Semilunar valves are closed
- (IV) Blood from the pulmonary veins and vena cava flows into the left and right ventricles, respectively through the left and right atria

The **correct** option :-

- (1) Only I
- (2) Only III
- (3) Only II and IV
- (4) All of these

17. Which of the following sentences is correct?

- (I) ECG is of great clinical significance
- (II) Electrocardiograph is the recording to electrical changes during the cardiac cycle.
- (III) To obtain a standard ECG, a patient is connected to the machine with three electrical electrodes (one to each wrist and to the left ankle)
- (IV) Normal activities of the heart are regulated intrinsically
- (V) Electrocardiogram is the electrical activity of heart

The option with correct statements is

- (1) I, II, III and IV
- (2) I, III, IV and V
- (3) II, III, IV and V
- (4) I, II, IV and V

18. Fill in the blanks :-

- Simple organisms like sponges and coelenterates circulate 1 from their surroundings through their body cavities to facilitate the cells to exchange of  $O_2$ ,  $CO_2$ , nutrients and waste products.
  - More complex organisms use special fluids within their bodies to transport such materials. The 2 is most commonly used body fluid by most of the higher organisms including humans for this purpose.
  - Another body fluid 3 also helps in the transport of certain substances.
- (1) 1-lymph, 2-water, 3-blood
  - (2) 3-lymph, 1-water, 2-blood
  - (3) 2-lymph, 3-water, 1-blood
  - (4) 2-lymph, 1-water, 3-blood

- 19.** Match the columns I and II, and choose the correct combination from the option given :-

| Column-I<br>(WBCs) |              | Column-II<br>(Function) |                                    |
|--------------------|--------------|-------------------------|------------------------------------|
| a.                 | Eosinophils  | 1.                      | Involved in inflammatory reactions |
| b.                 | Basophils    | 2.                      | Allergic reactions                 |
| c.                 | Neutrophils  | 3.                      | Responsible for immune response    |
| d.                 | Lymphocytes  | 4.                      | Phagocytic cells                   |
| e.                 | Erythrocytes | 5.                      | Gas transport                      |

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

- 20.** Match the column I and II, and choose the correct combination from the options given :-

| Column-I |             | Column-II |                      |
|----------|-------------|-----------|----------------------|
| a.       | Eosinophils | 1.        | Coagulation          |
| b.       | RBC         | 2.        | Universal Recipient  |
| c.       | AB group    | 3.        | Resist infection     |
| d.       | Platelets   | 4.        | Contraction of Heart |
| e.       | Systole     | 5.        | Gas transport        |

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

- 21.** Read the following statements and find out the incorrect statements :-

- a. Heart is situated in the thoracic cavity, is between the two lungs, slightly tilted to the right.  
b. Heart has the size of a clenched fist.  
c. Heart is protected by double walled membranous bag, pericardium, enclosed the pericardial fluid.

d. Human heart has four chambers, two relatively larger upper chambers called atria and two smaller lower chambers called ventricles.

e. A thick muscular wall called the inter-atrial septum separates the right and the left atria, whereas a thin-walled, the inter-ventricular septum, separates, the left and right ventricles.

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

- 22.** Read the following statements and find out the incorrect statement :-

- (1) The entire heart is made of cardiac muscles.  
(2) A specialised cardiac musculature called the nodal tissue is also distributed in the heart.  
(3) The walls of ventricles are much thicker than that of the atria.  
(4) Single heart circuit occurs in whale.

- 23.** Neural signals through parasympathetic neural signals (another component of ANS) can :-

- a. Increase the heart beat rate  
b. Decrease the heart beat rate  
c. Increase the strength of ventricular contraction  
d. Decrease the speed of conduction of action potential  
e. Increase cardiac output  
f. Decrease cardiac output  
(1) b, c and e                          (2) a, d and f  
(3) b, d and f                          (4) a, c and e

- 24.** Blood pressure is also controlled by :-

- (1) Thyroid gland                      (2) Adrenal gland  
(3) Thymus gland                      (4) Parathyroid gland

#### ANSWER KEY

|             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
| <b>Ans.</b> | <b>4</b> | <b>4</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>2</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       |          |          |          |          |          |          |
| <b>Ans.</b> | <b>4</b> | <b>2</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>1</b> | <b>4</b> | <b>3</b> | <b>2</b> |          |          |          |          |          |          |

## EXCRETORY PRODUCTS AND THEIR ELIMINATION

- 1.** Choose the least toxic excretory product :-
- (1) Urea
  - (2) Uric acid
  - (3) Ammonia
  - (4) Carbon dioxide
- 2.** Filtration of the blood takes place at
- (1) PCT
  - (2) DCT
  - (3) Collecting ducts
  - (4) Malpighian body
- 3.** The characteristic(s) common to urea, uric acid and ammonia is/are :-
- (i) They are nitrogenous wastes
  - (ii) They all need very large amount of water for excretion
  - (iii) They are all equally toxic
  - (iv) They are produced in the kidneys
- (1) (i), (iii) and (iv)
  - (2) (i) only
  - (3) (i) and (iii)
  - (4) (i) and (iv)
- 4.** Match Column - I with Column - II and select the **correct** option from the codes given below.

| Column - I |                                | Column - II |             |
|------------|--------------------------------|-------------|-------------|
|            |                                |             |             |
| (A)        | Nephridia                      | (i)         | Crustaceans |
| (B)        | Malpighian tubules             | (ii)        | Annelids    |
| (C)        | Antennal gland or green glands | (iii)       | Insects     |

- (1) (A) - (i), B - (ii), C - (iii)
- (2) A - (iii), B - (ii), C - (i)
- (3) A - (ii), B - (iii), C - (i)
- (4) A - (ii), B - (i), C - (iii)

- 5.** The principal nitrogenous excretory compound in humans is synthesized
- (1) In kidneys but eliminated mostly through liver
  - (2) as well as eliminated by kidneys
  - (3) in liver and also eliminated through bile
  - (4) in the liver, but eliminated mostly through kidneys
- 6.** Which of the following options shows the **correct** measurement of an adult human kidney?

|     | Length   | Width    | Thickness | Weight     |
|-----|----------|----------|-----------|------------|
| (1) | 10-12 cm | 5-7 cm   | 2-3 cm    | 120-170 gm |
| (2) | 10-20 cm | 10-12 cm | 6-12 cm   | 40-50 cm   |
| (3) | 2-6 cm   | 8-10 cm  | 5-10 cm   | 60-70 cm   |
| (4) | 10-12 mm | 5-7 mm   | 2-3 mm    | 120-170 mg |

- 7.** Read the given statements and select the **correct** option.
- Statement-1 :-** The urinary bladder dilates a good deal as urine trickles into it from the ureters.
- Statement-2 :-** Urinary bladder is lined throughout by transitional epithelium.
- (1) Both statement 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
  - (2) Both statement 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
  - (3) Statement 1 is correct and statement 2 is incorrect.
  - (4) Both statements 1 and 2 are incorrect.

8. The dotted appearance of cortex of kidney is due to  
 (1) ducts of Bellini  
 (2) malpighian corpuscles  
 (3) loop of Henle  
 (4) collecting tubes
9. Consider the following four statements (i - iv) and select the option that correctly identifies the true (T) and false (F) ones.  
 (i) Atrial natriuretic factor can cause vasodilation (dilation of blood vessels) and thereby decreases the blood pressure.  
 (ii) On an average, 60 - 70 gm of urea is excreted out per day.  
 (iii) Sebaceous glands eliminate certain substances like NaCl, urea and lactic acid through sebum.  
 (iv) PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

|     | (i) | (ii) | (iii) | (iv) |
|-----|-----|------|-------|------|
| (1) | F   | F    | T     | T    |
| (2) | F   | T    | T     | T    |
| (3) | T   | F    | F     | T    |
| (4) | T   | T    | F     | T    |

10. Match Column - I with Column - II and select the **correct** option from the codes given below.

| Column - I |                      | Column - II |                        |
|------------|----------------------|-------------|------------------------|
| (A)        | Lungs                | (i)         | Lactic acid            |
| (B)        | Liver                | (ii)        | Hypertonic urine       |
| (C)        | Micturition          | (iii)       | Counter-Current System |
| (D)        | Sweat                | (iv)        | CO <sub>2</sub>        |
| (E)        | Vasa recta           | (v)         | Urinary bladder        |
| (F)        | Sebum                | (vi)        | Glucose                |
| (G)        | ADH                  | (vii)       | Bilirubin              |
| (H)        | Tubular reabsorption | (viii)      | Sterols                |

- (1) A-(iv), B-(vii), C-(v), D-(i), E-(iii), F-(viii), G - (ii), H - (vi)  
 (2) A-(iii), B-(i), C-(iv), D-(viii), E-(ii), F-(v), G-(vii), H-(vi)  
 (3) A-(iv), B-(viii), C-(i), D-(vi), E-(v), F-(iii), G-(ii), H-(vii)  
 (4) A-(vii), B-(i), C-(iv), D-(iii), E-(viii), F-(vi), G-(v), H-(ii)

11. Consider the following statements each with two blanks.  
 (i) Annelids have (1) and insects have (2) for excretion.  
 (ii) Blood enters the glomerulus via (3) arteriole and leaves via (4) arteriole.  
 (iii) During micturition, the urinary bladder (5) and the urethral sphincters (6).

Which one of the following options correctly fills the blanks in any two of the above statements?

- (1) (1) - Malpighian tubules, (2) - flame cells, (5) - contracts, (6) - relax  
 (2) (3) - afferent, (4) - efferent, (5) - contracts, (6) - relax  
 (3) (1) - nephridia, (2) - Malpighian tubules, (5) - relaxes, (6) - contract  
 (4) (3) - efferent, (4) - afferent, (5) - relaxes, (6) - contract

12. An X - ray of the lower abdomen shows a shadow in the region of the ureter suspected to be an uretic calculus. A possible clinical symptom would be

- (1) acute renal failure (ARF)  
 (2) anuria and haematuria  
 (3) Motor aphasia  
 (4) chronic renal failure (CRF)

13. In peritoneal dialysis

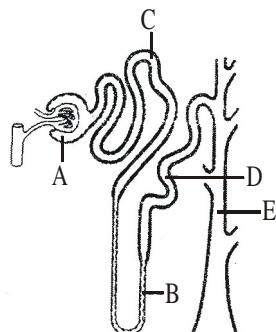
- (1) the blood is removed from the body and a natural filter is used.  
 (2) the blood is not removed from the body and a natural filter is used.  
 (3) the blood is not removed from the body and an artificial filter is used.  
 (4) the blood is removed from the body and an artificial filter is used.

- 14.** Which of the following sequences is correct regarding regulation of kidney function?
- An excess loss of water from body → Hypothalamus → Osmoreceptors → Neurohypophysis → ADH → Increases water permeability of DCT and CT → Prevention of diuresis
  - An excess loss of fluid from body → Osmoreceptors → Hypothalamus → Neurohypophysis → ADH → Increase water permeability of DCT and CT → Prevention of diuresis
  - An excess loss of fluid from body → Osmoreceptors → Hypothalamus → Neurohypophysis → Aldosterone → Water permeability of DCT and CT increase → Prevention of diuresis
  - An excess loss of fluid from body → Osmoreceptor → Hypothalamus → Adenohypophysis → ADH → Increase water permeability of DCT and CT → Prevention of diuresis
- 15.** Which of the following statements is correct?
- Water reabsorption in descending limb of loop of Henle and collecting duct occur under similar conditions.
  - Sodium reabsorption in ascending limb of loop of Henle and collecting duct occur under similar conditions.
  - Water reabsorption in descending limb of loop of Henle and collecting duct occur under different conditions.
  - Water reabsorption in descending limb and sodium reabsorption in ascending limb of loop of Henle occur under similar conditions.
- 16.** Complete the following paragraph by selecting the option that correctly fills the blanks (i) - (iv).
- The kidneys have built - in mechanisms for the regulation of glomerular filtration rate. One such efficient mechanism is carried out by (i).

It is a special sensitive region formed by cellular modifications in the (ii) and the (iii) at the location of their contact. A fall in GFR can activate the JG cells to release (iv). Which can stimulate the glomerular blood flow and thereby brings GFR back to normal.

|     | (i) | (ii) | (iii)              | (iv)            |
|-----|-----|------|--------------------|-----------------|
| (1) | ANF | PCT  | Efferent arteriole | Angiotensin     |
| (2) | ANF | DCT  | Afferent arteriole | Renin           |
| (3) | JGA | PCT  | Efferent arteriole | Angiotensinogen |
| (4) | JGA | DCT  | Afferent arteriole | Renin           |

- 17.** The given figure represents a single nephron from a mammalian kidney. Identify the labelled parts, match them with the functions (i - iv) and select the **correct** option :-



- The site of ultrafiltration
  - Particularly sensitive to ADH
  - The main site for the reabsorption of glucose and amino acids
  - Largely responsible for the maintenance of blood pH
- (i) - A; (ii) - E; (iii) - C; (iv) - D
  - (i) - A; (ii) - B; (iii) - C; (iv) - D
  - (i) - A; (ii) - B; (iii) - C; (iv) - E
  - (i) - A; (ii) - B; (iii) - D; (iv) - E

18. Read the given statements and select the **correct** option :-

**Statement-1 :** The final reabsorption of water from the urine into the blood occurs through the collecting duct of a mammalian nephron resulting in the production of hyperosmotic urine.

**Statement-2 :** The loop of Henle creates a sodium gradient in the interstitial fluid.

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement - 1.
- (2) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1
- (3) Statement 1 is correct and statement 2 is incorrect.
- (4) Both statements 1 and 2 are incorrect

19. Read the given statements and select the **correct** option.

**Statement - 1 :** In the descending limb of loop of Henle, the nephric filtrate is hypertonic, while in the ascending limb of loop of Henle, the nephric filtrate becomes hypotonic.

**Statement - 2 :** Descending limb is impermeable to  $\text{Na}^+$ , while ascending limb is impermeable to  $\text{H}_2\text{O}$ .

- (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
- (2) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1
- (3) Statement 1 is correct and statement 2 is incorrect.
- (4) Both statements 1 and 2 are incorrect.

20. Following are the steps of dialysis -

- (A) Blood is passed into a vein.
- (B) Blood is mixed with heparin.
- (C) Blood is mixed with anti - heparin.
- (D) Blood is drained from convenient artery.

(E) Blood is passed through a coiled and porous cellophane tube bathing in dialysis fluid.

(F) Removal of nitrogenous wastes from blood.

- (1) A → B → C → D → E → F
- (2) F → C → E → B → A → D
- (3) D → B → E → F → C → A
- (4) D → C → E → F → B → A

21. Which of the following does not favour the formation of large quantities of dilute urine?

- (1) Renin
- (2) Atrial - natriuretic factor
- (3) Alcohol
- (4) Caffeine

22. The urine of man under normal conditions does not contain glucose because :-

- (1) glucose in the glomerular filtrate is converted into glucogen
- (2) glucose in the glomerular filtrate is reabsorbed in the uriniferous tubules
- (3) glucose of the blood is not filtered in the glomerulus
- (4) the normal blood sugar is fructose

23. The main function of pyramids of kidney is to

- (1) contain collecting tubules of kidney
- (2) direct the urine to flow in ureter
- (3) support the openings of collecting canals
- (4) store fats and protein

24. The four structures listed are part of the human excretory system.

- |            |            |
|------------|------------|
| 1. Bladder | 2. Kidney  |
| 3. Ureter  | 4. Urethra |

In which order does a molecule of urea pass through these structures?

| First → Last |   |   |        |
|--------------|---|---|--------|
| (1)          | 1 | 2 | 3    4 |
| (2)          | 2 | 3 | 1    4 |
| (3)          | 3 | 1 | 3    4 |
| (4)          | 4 | 3 | 1    4 |

- 25.** Which one of the four parts mentioned below does not constitute a part of a single uriniferous tubule?
- Bowman's capsule
  - Distal convoluted tubule
  - Loop of Henle
  - Collecting duct
- 26.** Uricotelic mode of passing out nitrogenous wastes is found in
- birds and annelids
  - amphibians and reptiles
  - insects and amphibians
  - reptiles and birds
- 27.** Then net pressure gradient that causes the fluid to filter out of the glomeruli into the capsule is:-
- 20 mm Hg
  - 75 mm Hg
  - 30 mm Hg
  - 50 mm Hg
- 28.** Facultative reabsorption of water occurs in
- Kidney
  - Ascending loop of Henle
  - Collecting duct
  - All of the above
- 29.** What will happen if, the stretch receptors of urinary bladder wall are totally removed ?
- Urine will not collect in the bladder
  - Micturition will continue
  - Urine will continue to collect normally in the bladder
  - No micturition at all
- 30.** Almost all the aquatic animals excrete ammonia as the nitrogenous waste product. Which of the following statement is not in agreement with this situation?
- Ammonia is easily soluble in water.
  - Ammonia is released from the body in a gaseous state.
  - Ammonia is highly toxic and needs to be eliminated as and when formed.
  - Ammonia gets converted into a less toxic form called urea.

- 31.** Consider the following statement -
- Flame cells are excretory structures in flatworms.
  - Green glands are excretory organs in annelids.
  - Columns of Bertini are the conical projections of renal pelvis into renal medulla between the renal pyramids.
- I and II correct
  - II and III incorrect
  - I, II and III correct
  - I, II and III incorrect
- 32.** Match the following columns.
- |     | Column - I             | Column - II               |
|-----|------------------------|---------------------------|
| (A) | Ultrafiltration        | (P) Henle's loop          |
| (B) | Concentration of urine | (Q) Ureter                |
| (C) | Transport of urine     | (R) Urinary bladder       |
| (D) | Storage of urine       | (S) Malpighian corpuscles |
- 
- |     | A | B | C | D |
|-----|---|---|---|---|
| (1) | P | S | Q | R |
| (2) | S | P | R | Q |
| (3) | S | P | Q | R |
| (4) | P | R | Q | S |
- 33.** Which is not a nephric function?
- Reabsorption
  - Secretion
  - Perfusion
  - Filtration
- 34.** In nephrons, there is complete absorption of :-
- urea
  - salt
  - glucose
  - water
- 35.** Which of the following statements is incorrect?
- ADH-facilitates water reabsorption from latter parts of the tubule
  - Aldosterone-facilitates water reabsorption
  - ANF-enhances sodium reabsorption
  - Renin-causes constriction

- 36.** Marine teleosts undergoing putrefaction emit sharp characteristic foul odour, which is due to the production of  
 (1) Trimethylamine  
 (2) Hydrogen sulphide  
 (3) Ammonia  
 (4) Lactic acid

**37.** An advantage of excreting nitrogenous wastes in the form of uric acid is that  
 (1) uric acid can be excreted in almost solid form  
 (2) the formation of uric acid requires a great deal of energy  
 (3) uric acid is the first metabolic breakdown product of acids  
 (4) uric acid may be excreted through the lungs

**38.** Identify the correct match the columns, I, II and III?

|   | <b>Column-I</b>  |   | <b>Column-II</b>           |     | <b>Column-III</b>                  |
|---|------------------|---|----------------------------|-----|------------------------------------|
| A | PCT              | a | In medulla of kidney       | i   | Concentration of urine             |
| B | Loop of Henle    | b | Simple squamous epithelium | ii  | Main area of tubular reabsorption  |
| C | DCT              | c | Brush border               | iii | Ultrafiltration                    |
| D | Bowman's capsule | d | In cortex of kidney        | iv  | Conditional reabsorption of $H_2O$ |

(1) B-a-i, A-c-iv, C-d-ii, D-b-iii  
 (2) A-c-ii, B-b-i, C-d-iv, D-a-iii  
 (3) B-a-i, A-c-ii, D-b-iii, C-d-iv  
 (4) C-d-iv, A-c-i, B-a-ii, D-b-iii

**39.** Which statement is true with the regard to reabsorption?  
 (1) Mammals have the ability to pass concentrated urine  
 (2) Nearly all of the essential nutrients are reabsorbed by PCT  
 (3) DCT is also capable of reabsorption of  $HCO_3^-$   
 (4) All the above

- 40.** Which of the following option shows correct match of all three columns

|     | <b>Column-I</b> | <b>Column-II</b>   | <b>Column-III</b>          |
|-----|-----------------|--------------------|----------------------------|
| i   | ANF             | Atria of heart     | Vasoconstriction           |
| ii  | ADH             | Neurohypophysis    | Prevent diuresis           |
| iii | RAAS            | Low blood pressure | Juxta glomerular apparatus |



41. Which one of the following options given the correct categorization of six animals according to the type of nitrogenous wastes (A, B, C) they give out?

|     | <b>(A)<br/>Ammonotelic</b> | <b>(B)<br/>Ureotelic</b>       | <b>(C)<br/>Uricotelic</b>        |
|-----|----------------------------|--------------------------------|----------------------------------|
| (1) | Aquatic amphibian          | Frog,<br>humans                | Pigeon,<br>lizards,<br>cockroach |
| (2) | Aquatic amphibian          | Cockroach,<br>humans           | Frog, pigeon,<br>lizard          |
| (3) | Pigeon,<br>humans          | Aquatic<br>amphibia,<br>lizard | Cockroach,<br>frog               |
| (4) | Frog, lizards              | Aquatic<br>amphibia,<br>humans | Cockroach,<br>pigeon             |

- 42.** Which one of the following statements is incorrect?

  - (1) The medullary zone of kidney is divided into a few conical masses called medullary pyramids projecting into the calyces
  - (2) Inside the kidney, the cortical region extends in between the medullary pyramids as renal pelvis
  - (3) Glomerulus along with Bowman's capsule is called the renal corpuscle
  - (4) Renal corpuscle, proximal convoluted tubule (PCT) and distal convoluted tubule (DCT) of the nephron are situated in the cortical region of kidney

- 43.** Find out correct match.

  - (1) Uraemia - Rise in urea in urine
  - (2) Polyurea - Rise in urea in urine
  - (3) Diuresis - Decrease in volume of urine
  - (4) Glomerulonephritis - Inflammation of glomeruli

**44.** What causes the liquid part of the blood to filter out from the glomerulus into the renal tubule?

  - (1) Osmosis
  - (2) High (hydrostatic) pressure
  - (3) Diapedesis
  - (4) Dialysis

**45.** Find the incorrect statement regarding mechanism of urine formation in man.

  - (1) The glomerular filtration rate is about 125 ml per minute
  - (2) The ultrafiltration is opposed by the colloidal osmotic pressure of plasma
  - (3) Tubular secretion takes place in the PCT
  - (4) The counter current system contributes in diluting the urine

**46.** Match the structure and function of the following in given columns.

|   | <b>Column-I</b>                         |     | <b>Column-II</b>              |
|---|-----------------------------------------|-----|-------------------------------|
| A | Delivers blood to glomerulus            | i   | Ascending and descending limb |
| B | Carries urine to pelvis                 | ii  | Renal artery                  |
| C | Collects filtrate from Bowman's capsule | iii | Collecting duct               |
| D | Loop of Henle                           | iv  | Proximal convoluted tubules   |

- (1) A-iv, B-iii, C-ii, D-i
  - (2) A-i, B-ii, C-iii, D-iv
  - (3) A-ii, B-iii, C-iv, D-i
  - (4) A-ii, B-iii, C-i, D-iv



|   | <b>Column-I</b>                  |     | <b>Column-II</b>                |
|---|----------------------------------|-----|---------------------------------|
| A | Ascending limb of Loop of Henle  | i   | Permeable to H <sub>2</sub> O   |
| B | Descending limb of Loop of Henle | ii  | Impermeable to H <sub>2</sub> O |
|   |                                  | iii | Permeable to electrolyte        |
|   |                                  | iv  | Impermeable to electrolytes     |

- (1) A-ii, iv; B-i, iii      (2) A-ii, iii; B-i, iv  
(3) A-i, iv; B-ii, iii      (4) A-i, iii; B-ii, iv

- 51.** A person who is on a long hunger strike and is surviving only on water will have
- less urea in his urine
  - more sodium in his urine
  - less amino acids in his urine
  - more glucose in his blood
- 52.** Consider the following four statements (i-iv) about certain desert animals such as kangaroo-rat.
- They have dark colour and excrete solid urine.
  - They do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs
  - They feed on dry seeds and do not require drinking water
  - They excrete very concentrated urine and do not use water to regulate body temperature
- Out of these four, which two are correct?
- iii and i
  - i and ii
  - iii and iv
  - ii and iii
- 53.** Which one of the following statements is correct with respect to kidney function regulation?
- During summer, have body loses lot of water by evaporation, the release of ADH is suppressed
  - When someone drinks lot of water, ADH release is suppressed
  - Exposure to cold temperature stimulates ADH release
  - An increase in glomerular blood flow stimulates formation of Angiotensin II

- 54.** Which one of the following correctly explains the function of a specific part of a human nephron?
- Afferent arteriole - Carries the blood away from the glomerulus towards renal vein
  - Podocytes - Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule
  - Henle's loop - Most reabsorption of the major substances from the glomerular filtrate
  - Distal convoluted tubule - Re-absorption of  $K^+$  ions into the surrounding blood capillaries
- 55.** The figure shows human urinary system with structure labeled A to D. Select the option which correctly identifies them and gives their characteristics and/or functions.
- 
- (1) A-Adrenal gland is located at the anterior part of Kidney secretes catecholamines which stimulate glycogen breakdown
- (2) B-pelvis is broad funnel shaped space inner to hilum, directly connected to loop of Henle
- (3) C-Medulla is inner zone of kidney and contains complete nephrons
- (4) D-Cortex is the outer part of kidney and does not contain any part of nephrons
- 56.** Ornithine cycle removes two waste products from blood in liver
- Urea and carbon dioxide
  - Carbon dioxide and ammonia
  - Ammonia and uric acid
  - Ammonia and urea

- 57.** Number of nephrons of a kidney is equal to  
 (1) Sum of Bowman's capsules and glomeruli  
 (2) Sum of Bowman's capsules and malpighian corpuscles  
 (3) Double the number of Bowman's capsules  
 (4) Equal to number of Bowman's capsules
- 58.** What is the osmolarity (in mosmol L<sup>-1</sup>) in the outer cortex and inner medulla region?  
 (1) 300 and 600 respectively  
 (2) 600 and 300 respectively  
 (3) 1200 and 300 respectively  
 (4) 300 and 1200 respectively
- 59.** Indicate whether the following statements are true(T) or False(F).  
 (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-T, b-F, c-T, d-T, e-T  
 (2) a-T, b-F, c-T, d-F, e-T  
 (3) a-F, b-F, c-F, d-T, e-F  
 (4) a-T, b-F, c-F, d-T, e-T
- 60.** Our lungs remove large amounts of CO<sub>2</sub>. The amount is  
 (1) 18 litres/day                   (2) 180 litre/day  
 (3) 200 ml/minute               (4) 200 ml/day

- 61.** Match the columns.

|   | <b>Column-A</b>      |     | <b>Column-B</b>                              |
|---|----------------------|-----|----------------------------------------------|
| a | Glycosuria           | i   | Accumulation of uric acid in joints          |
| b | Renal calculi        | ii  | Inflammation of glomeruli                    |
| c | Glomerulao nephritis | iii | Mass of crystallised salts within the kidney |
| d | Gout                 | iv  | Presence of glucose in urine                 |
| e | Proteinuria          | v   | Presence of protein in urine.                |

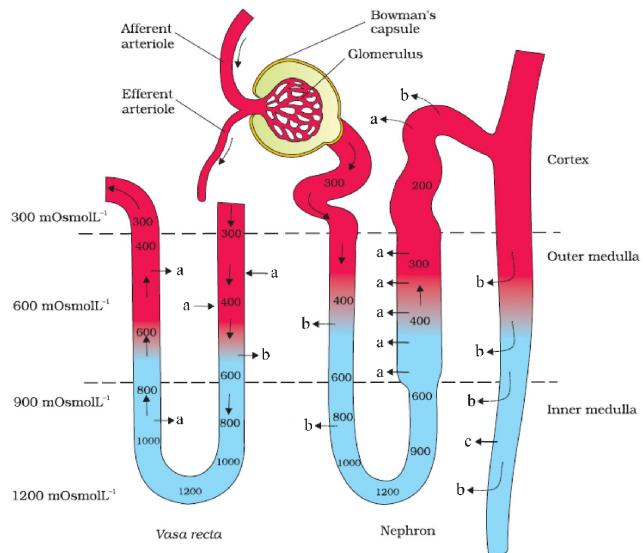
**Options :**

- (1) a-ii, b-i, c-iii, d-iv, e-v
- (2) a-iii, b-v, c-ii, d-i, e-iv
- (3) a-v, b-iii, c-iv, d-ii, e-i
- (4) a-iv, b-iii, c-ii, d-i, e-v

- 62.** A person on long hunger strike and surviving only on water will have  
 (1) Less amino acids in urine  
 (2) More glucose in blood  
 (3) Less urea in urine  
 (4) More sodium in urine
- 63.** When a litre of water is introduced in human blood.  
 (1) BMR decreases  
 (2) RBCs collapse and urine production increase  
 (3) BMR increase  
 (4) RBCs collapse and urine production decrease
- 64.** Pressure which favours filtration and one which opposes filtration of blood are \_\_\_\_\_ and \_\_\_\_\_ respectively.  
 (1) Capsular hydrostatic pressure and glomerular osmotic pressure.  
 (2) Glomerular hydrostatic pressure and glomerular osmotic pressure, capsular hydrostatic pressure  
 (3) Glomerular osmotic pressure and glomerular hydrostatic pressure  
 (4) Glomerular osmotic pressure and arterial pressure.

- 65.** Human urine is usually acidic because  
 (1) Excreted plasma proteins are acidic  
 (2) Potassium and sodium exchange generates acidity  
 (3) Hydrogen ions are actively secreted into the filtrate  
 (4) The sodium transporter exchange one hydrogen ion for each sodium ion, in peritubular capillaries.
- 66.** What is true of urea biosynthesis ?  
 (1) Uric acid is starting point  
 (2) Urea is synthesized in lysosomes  
 (3) Urea cycle enzymes are present inside hepatic cells  
 (4) Urea is synthesized in kidney
- 67.** Read the following statements and find out the incorrect statements :-  
 a. During urine formation, the tubular cells secrete substances like  $H^+$ ,  $K^+$  and  $HCO_3^-$  into the filtrate.  
 b. As glomerular filtrate move down in descending limb of HL it gets concentrated and as concentrated filtrate pass upward in ascending limb of HL it gets diluted.  
 c. Conditional reabsorption of  $Na^+$  and water takes place in PCT.  
 d. Reabsorption in ascending limb of HL is minimum.  
 (1) a and b                                 (2) b and c  
 (3) c and d                                 (4) a and c
- 68.** Counter-current mechanism helps to maintain a concentration gradient in the medullary interstitium. Presence of such interstitial gradient helps in an easy passage of water from the :-  
 (1) Vasa recta                             (2) Henle's loop  
 (3) PCT                                     (4) DCT
- 69.** If Henle's loop were absent from mammalian nephron, which of the following is to be expected :-  
 (1) There will be no urine formation  
 (2) The urine will be more concentrated  
 (3) The urine will be more dilute  
 (4) No change

- 70.** Recognise the figure and find out the correct matching :-



- (1) a- $H_2O$ , b-Urea, c- $NaCl$   
 (2) c- $H_2O$ , a-Urea, b- $NaCl$   
 (3) b- $H_2O$ , c-Urea, a- $NaCl$   
 (4) a- $H_2O$ , c-Urea, b- $NaCl$

- 71.** Which of the following statements is correct ?  
 (1) ADH can not affect the kidney functions by its constrictory effects on blood vessels  
 (2) Aldosterone-facilitates water reabsorption  
 (3) ANF-enhances sodium reabsorption  
 (4) Renin-causes vasodilation
- 72.** Indicate whether the following statements are true (T) or false (F) :-  
 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-T, b-F, c-T, d-T, e-T  
 (2) a-T, b-F, c-T, d-F, e-T  
 (3) a-F, b-T, c-F, d-T, e-F  
 (4) a-T, b-F, c-F, d-T, e-T

- 73.** Out lungs remove large amount of CO<sub>2</sub>. The amount is :-  
 (1) 18 litres/day      (2) 180 litres/day  
 (3) 200 ml/minute      (4) 200 ml/day
- 74.** Which one acts as artificial kidney in haemodialysis ?  
 (1) Dialysis liquid      (2) Bubble trap  
 (3) Blood pump      (4) Dialyser
- 75.** What will happen if one kidney is removed from the body of a human being ?  
 (1) Death due to poisoning  
 (2) Uremia and death  
 (3) Stoppage of urination  
 (4) Nothing, the person will survive and remain normal

**ANSWER KEY**

|             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
| <b>Ans.</b> | <b>2</b> | <b>4</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>3</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       | 25       | 26       | 27       | 28       | 29       | 30       |
| <b>Ans.</b> | <b>4</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>3</b> | <b>1</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>4</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>2</b> |
| <b>Que.</b> | 31       | 32       | 33       | 34       | 35       | 36       | 37       | 38       | 39       | 40       | 41       | 42       | 43       | 44       | 45       |
| <b>Ans.</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>3</b> | <b>1</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>2</b> | <b>4</b> |
| <b>Que.</b> | 46       | 47       | 48       | 49       | 50       | 51       | 52       | 53       | 54       | 55       | 56       | 57       | 58       | 59       | 60       |
| <b>Ans.</b> | <b>3</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>4</b> | <b>1</b> | <b>3</b> |
| <b>Que.</b> | 61       | 62       | 63       | 64       | 65       | 66       | 67       | 68       | 69       | 70       | 71       | 72       | 73       | 74       | 75       |
| <b>Ans.</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>4</b> | <b>2</b> | <b>3</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>4</b> |

## LOCOMOTION AND MOVEMENT

1. Match Column-I with Column-II and select the **correct** option from the codes given below.

|   | <b>Column-I</b>    |       | <b>Column-II</b> |
|---|--------------------|-------|------------------|
| A | Amoeboid movement  | (i)   | Limbs            |
| B | Ciliary movement   | (ii)  | Leucocytes       |
| C | Flagellar movement | (iii) | Trachea          |
| D | Muscular movement  | (iv)  | Spermatozoa      |

|     | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|----------|----------|----------|----------|
| (1) | (iii)    | (ii)     | (i)      | (iv)     |
| (2) | (ii)     | (iii)    | (iv)     | (i)      |
| (3) | (i)      | (ii)     | (iii)    | (iv)     |
| (4) | (iv)     | (ii)     | (i)      | (iii)    |

2. During muscular contraction, which of the following events occur?

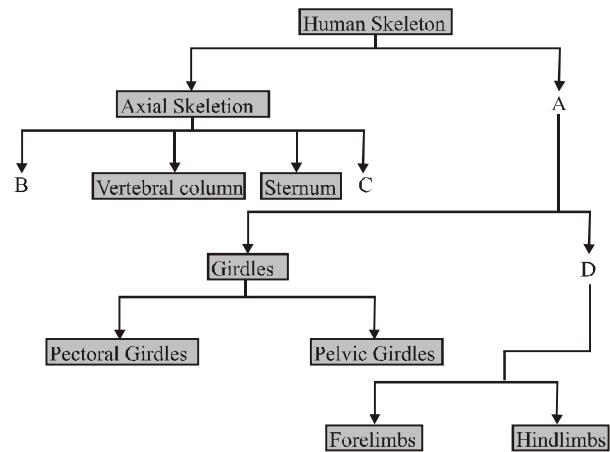
- (i) H-zone disappears
  - (ii) A band widens
  - (iii) I band reduces in width
  - (iv) Width of A band is unaffected
  - (v) M line and Z line come closer
- (1) (i), (iii), (iv) and (v) (2) (i), (ii) and (v)  
 (3) (ii), (iv) and (v) (4) (i), (ii) and (iii)

3. Match Column-I with Column-II and select the correct option from the codes given below.

|     | <b>Column-I</b> |       | <b>Column-II</b> |
|-----|-----------------|-------|------------------|
| (A) | True ribs       | (i)   | 3 pairs          |
| (B) | False ribs      | (ii)  | 2 pairs          |
| (C) | Floating ribs   | (iii) | 7 pairs          |

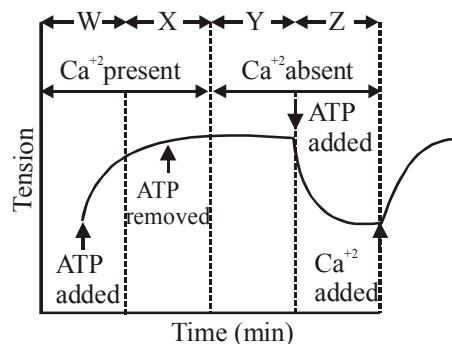
- (1) A-(i), B-(ii), C-(iii)  
 (2) A-(iii), B-(i), C-(ii)  
 (3) A-(iii), B-(ii), C-(i)  
 (4) A-(ii), B-(i), C-(iii)

4. Study the following flowchart and fill up the blanks by selecting the correct option.



|     | <b>A</b>              | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|-----------------------|----------|----------|----------|
| (1) | Thoracic skeleton     | Limbs    | Skull    | Ribs     |
| (2) | Appendicular skeleton | Skull    | Ribs     | Limbs    |
| (3) | Appendicular skeleton | Limbs    | Ribs     | Skull    |
| (4) | Lumbar skeleton       | Limbs    | Skull    | Ribs     |

5. Refer the given graph carefully and answer the following question.



Which of the labelled parts on the graph represents rigor mortis?

- (1) X (2) W  
 (3) Z (4) Y

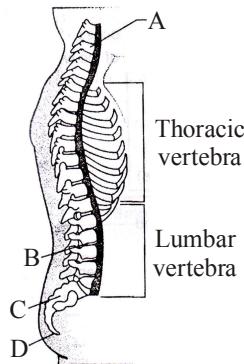
6. Match the following and mark the correct option.

|   | <b>Column-I</b>      |       | <b>Column-II</b> |
|---|----------------------|-------|------------------|
| A | Sternum              | (i)   | Synovial fluid   |
| B | Glenoid cavity       | (ii)  | Vertebrae        |
| C | Freely movable joint | (iii) | Pectoral girdle  |
| D | Cartilaginous joint  | (iv)  | Flat bone        |

- (1) A-(ii), B-(i), C-(iii), D-(iv)
- (2) A-(iv), B-(iii), C-(i), D-(ii)
- (3) A-(ii), B-(i), C-(iv), D-(iii)
- (4) A-(iii), B-(i), C-(ii), D-(iv)

7. (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  
 (A) Red muscles (B) White muscles  
 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

8. The following indicates vertebral column of human (right lateral view). Parts labelled as A, B, C and D respectively indicate -



- (1) Lumbar vertebra, Intervertebral disc, Sacrum and Coccyx
- (2) Cervical vertebra, intervertebral disc, Sacrum and Coccyx

- (3) Cervical vertebra, Intervertebral disc, Lumbar vertebra and Coccyx
- (4) Cervical vertebra, intervertebral disc, Sacrum and Lumbar vertebra

9. Select the correct statement with respect to locomotion in humans :-

- (1) Accumulation of uric acid crystals in joints causes their inflammation
- (2) The vertebral column has 10 thorasic vertebrae
- (3) The joint between adjacent vertebrae is a fibrous joint
- (4) The decreased level of progesterone causes osteoporosis in old people

10. In human beings ciliary movement is found in
- (1) Macrophages and leucocytes
  - (2) Fallopian tube and vasa efferentia
  - (3) Fallopian tube and trachea
  - (4) Small intestine

11. Match the following and mark the correct option.

|   | <b>Column-I</b>     |     | <b>Column-II</b> |
|---|---------------------|-----|------------------|
| A | Fast muscles fibres | i   | Myoglobin        |
| B | Slow muscle fibres  | ii  | Lactic acid      |
| C | Actin filament      | iii | Contractile unit |
| D | Sarcomere           | iv  | I-band           |

- (1) A-i, B-ii, C-iv, D-iii
- (2) A-ii, B-i, C-iii, D-iv
- (3) A-ii, B-i, C-iv, D-iii
- (4) A-iii, B-ii, C-iv, D-i

12. Correctly match column-I with column-II.

|   | <b>Column-I</b>    |     | <b>Column-II</b>                            |
|---|--------------------|-----|---------------------------------------------|
| A | Tetany             | i   | Autoimmune disorder                         |
| B | Osteoporosis       | ii  | Progressive degeneration of skeletal muscle |
| C | Muscular dystrophy | iii | Inflammation of joints                      |
| D | Arthritis          | iv  | Rapid spasms in muscle                      |
| E | Myasthenia gravis  | v   | Bone mass decreased                         |

- (1) A-i, B-ii, C-iii, D-iv, E-v
- (2) A-iv, B-v, C-i, D-iii, E-ii
- (3) A-iv, B-v, C-ii, D-iii, E-i
- (4) A-ii, B-iii, C-i, D-v, E-iv

13. During muscle contraction

- (1) mechanical energy is changed into chemical energy
- (2) chemical energy is changed into electrical energy
- (3) chemical energy is changed into potential energy
- (4) chemical energy is changed into mechanical energy

14. Joint between incus and stapes is

- (1) Ball and socket joint
- (2) Hinge joint
- (3) Pivot joint
- (4) Gliding joint

15. Obturator foramen is present between

- (1) Ilium and ischium
- (2) Ischium and Pubis
- (3) Ilium and pubis
- (4) None of these

16. Which vertebra has the odontoid process?

- (1) 7th vertebra of frog
- (2) Second vertebra of frog
- (3) Second cervical vertebra of mammal
- (4) Second thoracic vertebra of mammal

17. Thoracic cage in human beings is made up of

- (1) Ribs, vertebral column and diaphragm
- (2) Ribs, diaphragm and collar bone
- (3) Vertebral column, diaphragm and sternum
- (4) Ribs, vertebral column and sternum

18. Match the columns and pick out the correct answer

|     | <b>Column-A</b>            |   | <b>Column-B</b>       |
|-----|----------------------------|---|-----------------------|
| i   | Atlas/axis                 | A | Saddle joint          |
| ii  | Carpal/metacarpal of thumb | B | Hinge joint           |
| iii | Between phalanges          | C | Fibrous joint         |
| iv  | Femur/acetabulum           | D | Ball and socket joint |
| v   | Between cranial bones      | E | Pivot joint           |

|     |     |      |       |      |     |
|-----|-----|------|-------|------|-----|
| (1) | i-E | ii-A | iii-B | iv-C | v-D |
| (2) | i-E | ii-A | iii-B | iv-D | v-C |
| (3) | i-E | ii-A | iii-D | iv-D | v-C |
| (4) | i-E | ii-A | iii-D | iv-C | v-B |

19. Find out the true and false statements

- (A) Human skeleton has 206 bones
- (B) There are 12 pairs of ribs in human beings
- (C) Sternum is present on the dorsal side of the body
- (D) All mammals (except of few) have 8 cervical vertebrae
- (E) Ribs are bicephalic
- (1) ABC - True, DE - False
- (2) ABD - True, CE - False
- (3) ABE - True, CD - False
- (4) ACE - True, BD - False

20. Match the columns

|   | <b>Column-A</b> |     | <b>Column-B</b> |
|---|-----------------|-----|-----------------|
| A | Ribs            | i   | 26              |
| B | Vertebrae       | ii  | 14              |
| C | Phalanges       | iii | 1               |
| D | Sternum         | iv  | 24              |

- (1) A-iv, B-i, C-iii, D-ii
- (2) A-iv, B-iii, C-ii, D-i
- (3) A-iv, B-i, C-ii, D-iii
- (4) A-iv, B-iii, C-i, D-ii

- 21.** Intervetbral disc is found in the vertebral column of  
(1) Birds (2) Reptiles  
(3) Mammals (4) Amphibians

**22.** Which one of the following is the correct description of a certain part of a normal human skeleton?  
(1) First vertebra is axis which articulates with the occipital condyles  
(2) The 9th and 10th pairs of ribs are called the floating ribs  
(3) Glenoid cavity is a depression to which the thigh bone articulates  
(4) Parietal bone and the temporal bone of the skull are joined by the fibrous joint

**23.** Which of the following pairs is correctly matched?  
(1) Fibrous joint - between phalanges  
(2) Cartilaginous joint - Skull bones  
(3) Gliding joint - between zygapophyses of the successive vertebrae  
(4) Hinge joint - between vertebrae

**24.** Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the non-matching pair.

|     | <b>Pairs of skeletal parts</b> | <b>Category</b>       |
|-----|--------------------------------|-----------------------|
| (1) | Malleus and stapes             | Ear ossicles          |
| (2) | Sternum and ribs               | Axial skeleton        |
| (3) | Clavicle and glenoid cavity    | Pelvic girdle         |
| (4) | Humerus and ulna               | Appendicular skeleton |

25. Consider the following four statements (a-d) and select the option which includes all the correct ones

  - (a) Skeletal muscle fibre is a syncytium as the sarcoplasm contains many nuclei.
  - (b) In the centre of each "I band" is an elastic fibre called H-line which bisects it.

- (c) In the resting state a subunit of troponin masks the active binding sites for myosin on the actin filaments.

(d) The contraction of a muscle fibre takes place by the sliding of the thick filaments over the thin filaments

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

(A) Plenty of mitochondria

(B) Myoglobin content is high

(C) Amount of sarcoplasmic reticulum is high

(D) Depend on aerobic process for ATP

(E) Gives a reddish appearance

How many points are correct about Red fibres of muscle?

(1) Three    (2) Four    (3) Five    (4) Six

Consider the following four statements (a-d) and select the option which includes all the correct ones only.

(a) Each organised skeletal muscle is made of a number of muscle bundles or Fasciculi

(b) Each muscle fibre has many parallelly arranged myofibrils.

(c) Each myofibril contains many serially arranged units called sarcomere

(d) Each sarcomere as a central "A"-band and two half "I" bands.

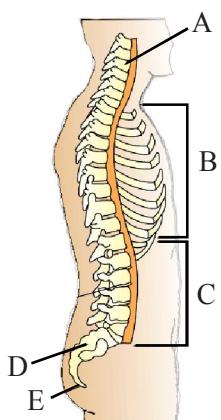
## **Options :**

- (1) Statements (b), (c) and (d)
  - (2) Statements (a) and (b)
  - (3) Statements (c) and (d)
  - (4) Statements (a), (b), (c) and (d)

28. Which of the following is/are not correctly matched pairs ?

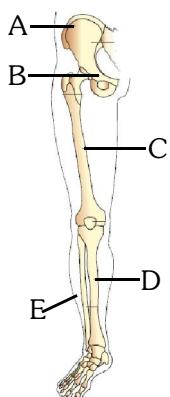
|     | <b>Column-I</b>       | <b>Column-II</b>                    |
|-----|-----------------------|-------------------------------------|
| i   | Ball and socket joint | Between humerus and pectoral girdle |
| ii  | Pivot joint           | Between carpal and metacarpal       |
| iii | Saddle joint          | Between atlas and axis              |
| iv  | Gliding               | Between the carpal s                |
| v   | Fibrous joint         | In flat skull bones                 |

29. Identify the parts labelled as A to E in the given figure of a vertebral column and select the correct option.



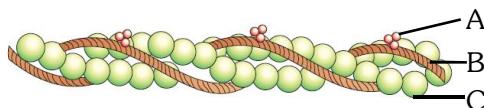
|     | A                 | B                 | C                 | D      | E      |
|-----|-------------------|-------------------|-------------------|--------|--------|
| (1) | Thoracic vertebra | Cervical vertebra | Lumbar vertebra   | Sacrum | Coccyx |
| (2) | Thoracic vertebra | Cervical vertebra | Lumbar vertebra   | Coccyx | Sacrum |
| (3) | Lumbar vertebra   | Thoracic vertebra | Cervical vertebra | Coccyx | Sacrum |
| (4) | Cervical vertebra | Thoracic vertebra | Lumbar vertebra   | Sacrum | Coccyx |

30. The figure showing part of right pelvic girdle and lower limb bones is given here. Identify the parts labelled as A to E and select the correct option.



|     | A       | B       | C       | D          | E      |
|-----|---------|---------|---------|------------|--------|
| (1) | Sacrum  | Pubis   | Petella | Metatarsal | Fibula |
| (2) | Ilium   | Pubis   | Femur   | Tibia      | Fibula |
| (3) | Ilium   | Ischium | Femur   | Fibula     | Tibia  |
| (4) | Ischium | Ilium   | Patella | Tibia      | Tarsal |

31. The given figure shows actin (thin) filament. Identify the labelled parts A, B and C and select the correct option.



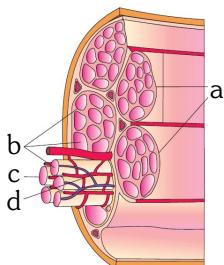
|     | A           | B           | C           |
|-----|-------------|-------------|-------------|
| (1) | Tropomyosin | Troponin    | F-actin     |
| (2) | Troponin    | Myosin      | Tropomyosin |
| (3) | Troponin    | Tropomyosin | Myosin      |
| (4) | Troponin    | Tropomyosin | F-actin     |

32. Select the correct statement regarding the specific disorder of muscular skeletal system.
- Myasthenia gravis - Autoimmune disorder which inhibits sliding of myosin filaments
  - Gout - Inflammation of joints due to extra deposition of calcium
  - Muscular dystrophy - Age related shorting of muscles
  - Osteoporosis - Decrease in bone mass and higher chances of fractures with advancing age

33. The H-zone in the skeletal muscle fibre is due to
- the absence of myofibrils in the central portion of A-band
  - the central gap between myosin filaments in the A-band
  - the central gap between where myosin filaments are not overlapped by actin filaments
  - extension of myosin filaments in the central portion of the A-band

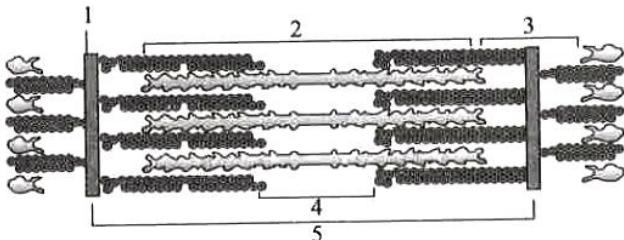
34. Find out the correct statement.
- All locomotions are movements but all movement are not locomotions.
  - All movements are locomotions but all locomotion are not movements.
  - All locomotions are movements and all movements are locomotions.
  - All locomotions are not movements and all movements are not locomotions.

35. Recognise the figure and find out the correct matching



- (1) a-muscle fibre, b-muscle cell, c-fascicle, d-muscle bundle
- (2) a-fascicle, b-muscle fibre, c-sarcolemma, d-blood capillary
- (3) a-muscle bundle, b-muscle cell, c-sarcolemma, d-blood capillary
- (4) Both 2 and 3

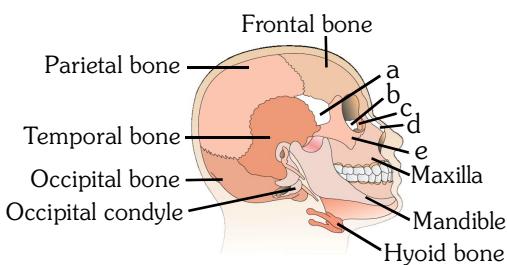
36. Recognise the figure and find out the correct matching.



- (1) 2-I band, 3-A band, 1-Z line, 4-sarcomere, 5-H zone
- (2) 3-I band, 2-A band, 1-Z line, 5-sarcomere, 4-H zone
- (3) 2-I band, 3-A band, 1-Z line, 5-sarcomere, 4-H zone
- (4) 3-I band, 2-A band, 1-Z line, 4-sarcomere, 5-H zone

37. Gout that leads to arthritis is associated with abnormality of  
 (1) Pyrimidine metabolism  
 (2) Purine metabolism  
 (3) Fat metabolism  
 (4) Protein metabolism

38. Recognise the figure and find out the correct matching.



- (1) d-nasal bone, c-lacrimal bone, e-zygomatic bone, b-ethmoid bone, a-sphenoid bone
- (2) d-nasal bone, a-lacrimal bone, b-zygomatic bone, c-ethmoid bone, e-sphenoid bone
- (3) c-nasal bone, a-lacrimal bone, e-zygomatic bone, d-ethmoid bone, b-sphenoid bone
- (4) d-nasal bone, c-lacrimal bone, b-zygomatic bone, e-ethmoid bone, a-sphenoid bone

39. Read the following statements and find out the incorrect statement :-

- (1) Skeletal muscles are closely associated with the skeletal components of the body.
- (2) Visceral muscles are located in the inner wall of hollow visceral organs of the body like the alimentary canal, reproductive tract, etc.
- (3) Skeletal muscles have a striped appearance under the microscope and hence are called striated muscles.
- (4) Each organised skeletal muscle in human body is made of a number of muscle bundles or fascia.

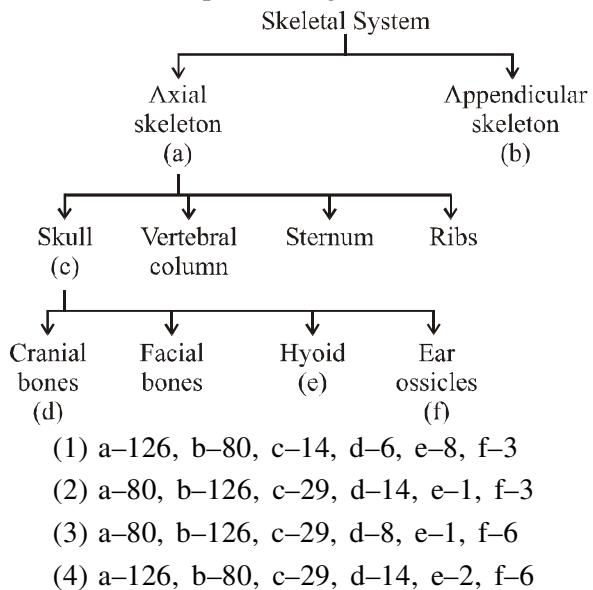
40. Read the following statements and find out the incorrect statements :-

- a. Each actin (thin) filament is made of two 'G' (Globular) actins helically wound to each other.
- b. Each 'G' actin is a polymer of monomeric 'F' (Filamentous) actins.
- c. Two filaments of another protein, troponin also run close to the 'F' actin throughout its length
- d. In the resting state a subunit of troponin masks the active binding sites for myosin on the actin filaments.
- e. Each meromyosin has two parts, a globular head with a short arm (HMM) and a tail (LMM).

- |                                  |                                  |
|----------------------------------|----------------------------------|
| (1) a, b and c<br>(3) c, d and e | (2) b, c and d<br>(4) a, b and e |
|----------------------------------|----------------------------------|

- 41.** The heavy meromyosin (HMM) component, i.e the head and short arm projects outwards at regular distance and angle from each other from the surface of a polymerised myosin filament and is known as :-  
 (1) Neuromuscular Junction  
 (2) Motor unit  
 (3) Cross bridge  
 (4) Cross arm
- 42.** Read the following statements and find out the incorrect statements :-  
 (1) White fibre has high amount of sarcoplasmic reticulum but the number of mitochondria are few.  
 (2) White fibre depends on an anaerobic process for energy.  
 (3) The reaction time of the fibres can vary in different muscles.  
 (4) The process of cross-bridge formation and breaking continues till the calcium ions are pumped back to the sarcoplasmic cisternae resulting in the masking of myosin filaments.
- 43.** Which is true of muscle contraction ?  
 (1) Sarcolemma becomes permeable to  $\text{Ca}^{2+}$  ions.  
 (2) Sarcolemma becomes permeable to  $\text{Na}^+$  ions.  
 (3) Sarcolemma becomes non-permeable to  $\text{Na}^+$  ions.  
 (4) Concentration of  $\text{Ca}^{2+}$  ions is reduced in myoplasm.
- 44.** EDTA injected into muscles combines with  $\text{Ca}^{2+}$  and :-  
 (1) Stops contraction  
 (2) Causes contraction  
 (3) Slows down contraction  
 (4) None of the above

- 45.** Recognise the figure and find out the number of bones in specified regions a, b, c, d, e and f :-



- (1) a-126, b-80, c-14, d-6, e-8, f-3  
 (2) a-80, b-126, c-29, d-14, e-1, f-3  
 (3) a-80, b-126, c-29, d-8, e-1, f-6  
 (4) a-126, b-80, c-29, d-14, e-2, f-6

- 46.** Match the column I and II, and choose the correct combination from the option given :-

| Column I |               | Column II |                                                                    |
|----------|---------------|-----------|--------------------------------------------------------------------|
| a.       | True ribs     | 1.        | Attached to vertebral column dorsally and to seventh rib ventrally |
| b.       | False ribs    | 2.        | Do not connect ventrally                                           |
| c.       | Floating Ribs | 3.        | Attached to vertebral column dorsally and to sternum ventrally     |

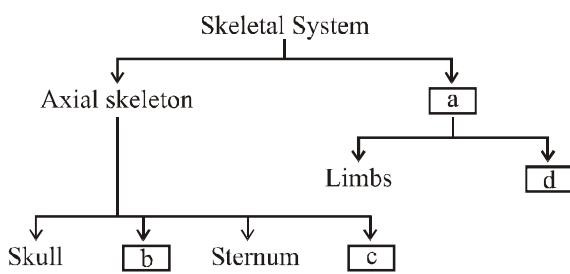
- (1) a-1, b-2, c-3  
 (2) a-3, b-1, c-2  
 (3) a-1, b-3, c-2  
 (4) a-3, b-2, c-1

- 47.** Match the column I and II, and choose the correct combination from the options given :-

| Column I |                   | Column II |          |
|----------|-------------------|-----------|----------|
| a.       | Cup-shaped bone   | 1.        | Clavicle |
| b.       | U-shaped bone     | 2.        | Patella  |
| c.       | Long slender bone | 3.        | Rib      |
| d.       | Thin flat bone    | 4.        | Hyoid    |

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

48. Recognise the figure and find out the correct matching :-



- (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 bones, d—girdles

49. Choose the correct matching :-

|     | Synovial Joint  |       | Bones Involved                |
|-----|-----------------|-------|-------------------------------|
| (a) | Ball and socket | (i)   | Carpal and metacarpa of thumb |
| (b) | Hinge           | (ii)  | Atlas and axis                |
| (c) | Pivot           | (iii) | Frontal and parietal bones    |
| (d) | Saddle          | (iv)  | Knee                          |
|     |                 | (v)   | Humerus and pectoral girdle   |

- (1) a—v, b—iv, c—ii, d—i
- (2) a—ii, b—v, c—iv, d—i
- (3) a—i, b—ii, c—v, d—iv
- (4) a—v, b—iv, c—iii, d—i

50. Match the column I and II, and choose the correct combination from the options given :-

| Column I |                      | Column II |                        |
|----------|----------------------|-----------|------------------------|
| a.       | Cartilaginous joints | 1.        | No movement            |
| b.       | Fibrous joints       | 2.        | Considerable movements |
| c.       | Synovial joints      | 3.        | Limited movement       |

- (1) a—1, b—2, c—3
- (2) a—1, b—3, c—2
- (3) a—3, b—1, c—2
- (4) a—2, b—1, c—3

51. Match the followings and mark the correct option :-

| Column I |                      | Column II |                 |
|----------|----------------------|-----------|-----------------|
| a.       | Sternum              | i.        | Synovial fluid  |
| b.       | Glenoid cavity       | ii.       | Vertebrae       |
| c.       | Freely movable joint | iii.      | Pectoral girdle |
| d.       | Cartilaginous joint  | iv.       | Flat bones      |

**Options :**

- (1) a—ii, b—i, c—iii, 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—iv

52. Shape of human skeleton is :-

- (1) J-shaped
- (2) M-shaped
- (3) L-shaped
- (4) S-shaped

53. A cricket player is chasing a ball. Which group of bones is contributing in this movement ?

- (1) Femur, Malleus, Tibia, Metatarsals
- (2) Pelvis, Ulna, Patella, Tarsals
- (3) Sternum, Femur, Tibia, Fibula
- (4) Tarsals, Femur, Metatarsals, Tibia

54. True joints are :-

- (1) Synovial joints
- (2) Synchondrosis
- (3) Syndesmoses
- (4) Symphyses

55. Cervical vertebrae are characterised by :-

- (1) Transverse processes
- (2) Neural spines
- (3) Vertebro-arterial canals
- (4) Odontoid process

**ANSWER KEY**

| Que. | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ans. | 2  | 1  | 2  | 2  | 4  | 2  | 2  | 2  | 1  | 3  | 3  | 3  | 4  | 1  | 2  |
| Que. | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | 3  | 4  | 2  | 3  | 3  | 3  | 4  | 3  | 3  | 3  | 2  | 4  | 1  | 4  | 2  |
| Que. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Ans. | 4  | 4  | 3  | 1  | 4  | 2  | 2  | 1  | 4  | 1  | 4  | 4  | 2  | 1  | 3  |
| Que. | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 |    |    |    |    |    |
| Ans. | 2  | 2  | 3  | 1  | 3  | 2  | 4  | 4  | 1  | 3  |    |    |    |    |    |

## NEURAL CONTROL AND COORDINATION

- 1.** Which of the following statement is incorrect?
- Sympathetic neural system is also known as cranio sacral division of autonomous neural system
  - Deficiency of vitamin A can cause night blindness
  - Malleus is the largest ear ossicle.
  - Cranial nerve IX is a mixed nerve
- 2.** Read the given statements and select the correct options :
- Synaptic cleft of neurons is protoplasmic space
  - In PNS Myelinated nerve fibres are enveloped with Schwann cells, which form a myelin sheath around the axon
  - In PNS Non - myelinated nerve fibre is enclosed by a Schwann cell that does not form a myelin sheath.
  - Spinal and cranial nerves are made of only non-myelinated nerve fibres.
- Statements (i) and (ii) are correct
  - Statements (i), (ii) and (iii) are correct
  - Statements (iii) and (iv) are correct
  - Statements (ii) and (iii) are correct
- 3.** Which of the following statements is/are incorrect about the electrical synapse?
- At electrical synapses, the membranes of pre and post synaptic neurons are in very close proximity.
  - Electrical current can flow directly from one neuron into the other across the synapses
  - Transmission of an impulse across electrical synapses is very similar to impulse conduction along single axon
  - Electrical synapses are fast
  - Electrical synapses are more in our system.
- |                     |                        |
|---------------------|------------------------|
| (1) (ii), (iv) only | (2) (i) and (iii) only |
| (3) (v) only        | (4) (iii) only         |
- 4.** Match Column-I with column-II and select the correct option from the codes given below.
- |   | <b>Column-I</b>      |       | <b>Column-II</b>                |
|---|----------------------|-------|---------------------------------|
| A | Medulla oblongata    | (i)   | Involuntary breathing movements |
| B | Floor of mid brain   | (ii)  | Accurate voluntary movements    |
| C | Thalamus             | (iii) | Seat of memory                  |
| D | Cerebral hemispheres |       |                                 |
| E | Cerebellum           |       |                                 |
- (1) A-(i), C(ii), (D)-(iii)  
 (2) A-(i), E(ii), (B)-(iii)  
 (3) A-(i), E(ii), (D)-(iii)  
 (4) E-(i), C(ii), (B)-(iii)
- 5.** .... prevent the spreading of impulses within the neighbouring fibres.
- Nodes of Ranvier
  - Synapse
  - Medullary sheaths
  - None of these
- 6.** Extension of sympathetic nervous system is
- adrenal medulla
  - adrenal cortex
  - pineal
  - neurohypophysis
- 7.** Cytons of both central and autonomic sensory fibres occur in
- spinal ganglia
  - dorsal part of spinal cord
  - ventral part of spinal cord
  - autonomic ganglia

- 8.** The mesencephalic (cerebral) aqueduct links the  
 (1) lateral ventricles  
 (2) lateral ventricles and the third ventricle  
 (3) third and fourth ventricle  
 (4) lateral ventricles and the fourth ventricle
- 9.** The rectus eye muscle capable of causing the eye ball to turn laterally in a horizontal plane is innervated by which cranial nerve?  
 (1) Optic nerve  
 (2) Abducens nerve  
 (3) Facial nerve  
 (4) Oculomotor nerve
- 10.** The white matter of the central nervous system is always  
 (1) deep to the grey matter  
 (2) unmyelinated  
 (3) arranged into tracts  
 (4) composed of sensory fibres only
- 11.** Acetylcholine takes part in  
 (1) enhancing membrane permeability  
 (2) synaptic transmission  
 (3) electrical synapse  
 (4) None of the above
- 12.** Consider the following statements about the parasympathetic division of the ANS.  
 (I) All its neurons release acetylcholine as their primary neurotransmitter substance  
 (II) The cell bodies of its post - ganglionic neurons lie in or near the organ innervated  
 (III) The cell bodies of its pre - ganglionic neurons lie in the spinal cord these statement  
 (1) All are true  
 (2) None are true  
 (3) I and II are true  
 (4) II and III are true
- 13.** Identify the organ/innervation mismatch.  
 (1) Glossopharyngeal nerve - Tongue  
 (2) Optic nerve - Eye muscles  
 (3) Ophthalmic nerve - Olfactory epithelium  
 (4) Cochlear nerve - Spiral organ
- 14.** Common feature amongst acetylcholine, noradrenaline and serotonin is  
 (1) all are anticoagulants  
 (2) they lower blood pressure  
 (3) they raise heart beat  
 (4) all are neurotransmitters
- 15.**  $\text{Na}^+ - \text{K}^+$  pump is found in membrane of many cells, like nerve cells. It works against electro - chemical gradient and involve an integral protein ATPase. For each molecule of ATP used  
 (1) three ion of  $\text{Na}^+$  are taken in and two  $\text{K}^+$  are taken in  
 (2) three ions of  $\text{Na}^+$  and taken in and three  $\text{K}^+$  are pumped out  
 (3) two ions of  $\text{Na}^+$  are thrown out and three  $\text{K}^+$  are absorbed  
 (4) three ions of  $\text{K}^+$  are absorbed and three  $\text{Na}^+$  are pumped out
- 16.** In the central nervous system, myelinated fibres form the ....., while the non - myelinated fibre cells form the .....,  
 (1) grey matter; white matter  
 (2) white matter; grey matter  
 (3) ependymal cells; neurosecretory cells  
 (4) neurosecretory cells; ependymal cells
- 17.** The function of our visceral organs is controlled by  
 (1) Central and somatic nervous system  
 (2) Sympathetic and somatic neural system  
 (3) Sympathetic and parasympathetic neural system  
 (4) None of the above

18. Consider the following four statement (A-D) and select the option which includes the correct one only.

- (A) Nissl's granules are mass of ribosomes and endoplasmic reticulum.  
 (B) Nissl's granule are mass of ribosomes only  
 (C) Nissl's help in all proteins synthesis. Functions carried out by nervous system  
 (D) Nissl's granule are present in cell body and dendron
- (1) Statement (C), (D)  
 (2) Statement (B), (C) and (D)  
 (3) Statement (A), (B)  
 (4) Statement (A), (C) and (D)

19. Consider the following four statement (A-D) and select the option which includes the correct one only.

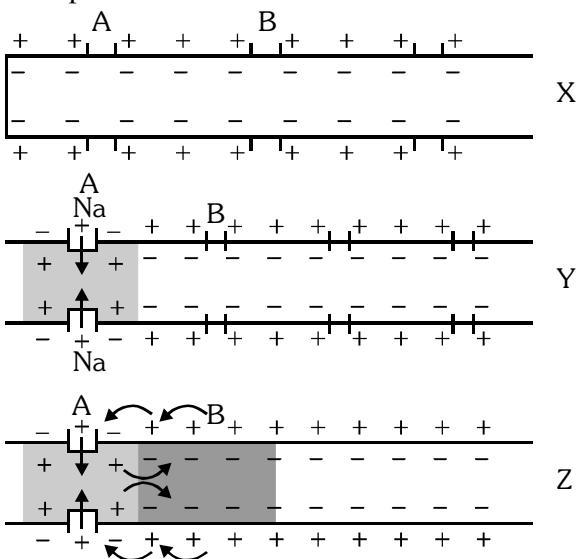
- (A) The gap in between two unmyelinated sheath is called nodes of ranvier  
 (B) Myelinated nerve fibres are present in spinal and cranial nerve only  
 (C) Unmyelinated nerve fibre is enclosed by a Schwann cell that does not form a myelin sheath around the axon. It is commonly found in autonomous and somatic neural system  
 (D) Each branch of axon terminates into a bulb like structure called synaptic knob which possesses synaptic vesicles, which contain a chemical called neurotransmitter.
- (1) Statement (C), (D)  
 (2) Statement (B), (C) and (D)  
 (3) Statement (A), (B)  
 (4) Statement (A), (C) and (D)

20. Identify the correct match from the column I, II and III.

|   | <b>Column-I</b> |   | <b>Column-II</b> |     | <b>Column-III</b>         |
|---|-----------------|---|------------------|-----|---------------------------|
| A | Dendron         | a | Myelinogenesis   | i   | Transduction              |
| B | Cell body       | b | Receptor         | ii  | P.N.S.                    |
| C | Myelinated Axon | c | Grey matter      | iii | Information co-ordination |
| D | Schwann cell    | d | White matter     | iv  | Fast conduction           |

- (1) A-a-i, B-d-iv, C-c-iii, D-b-ii  
 (2) A-b-i, B-c-iii, C-d-ii, D-a-iv  
 (3) A-b-i, B-c-iii, C-d-iv, D-a-ii  
 (4) B-a-i, A-d-iv, C-c-ii, D-b-iii

21. The figure below show three steps X,Y,Z of conduction of a nerve impulse. Select the option given correct identification together with what represent.



- (1) Z-The current flows in inner surface from site A to B and outer surface flows from site B to A to complete circuit of current flow. Hence polarity is reversed and action potential is generated at site 'B'  
 (2) X-It show that stimulus is applied at site A thus leads to repaid influx of  $\text{Na}^+$  followed by reversal of polarity  
 (3) Y-Ionic gradient across the resting membrane maintained by active transportation of ion by sodium-potassium pump as result outer surface of axonal membrane possess positive charge while inner surface becomes negatively charged there for called polarized state at site A  
 (4) Z-show axonal membrane of neuron is polarized state at site A is responsible for excitability

22. Which one of the following option gives the correct categorisation according to A, B, C.

|     | <b>A<br/>Polarized</b>           | <b>B<br/>Depolarized</b>        | <b>C<br/>Excitable<br/>cell</b> |
|-----|----------------------------------|---------------------------------|---------------------------------|
| (1) | Resting stage                    | Excitable stage                 | Neuron                          |
| (2) | Repolarization                   | Excited stage                   | Nissl's granule                 |
| (3) | Resting stage                    | Excited stage                   | Neurons                         |
| (4) | Na <sup>+</sup> high in axoplasm | Na <sup>+</sup> low in axoplasm | Effector organ                  |

23. In the following list, how many properties are present in the neural system?

Transmission, elasticity, contractability, detection, chemical co-ordination, and receive

- (1) Four
- (2) Three
- (3) Two
- (4) Five

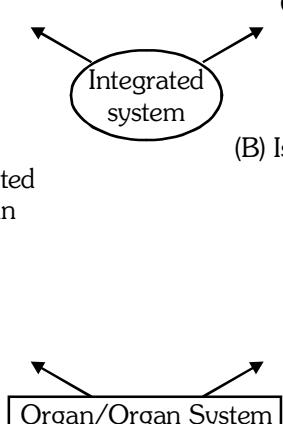
24. Identify the likely steps A, B, C, D in human physiology.

(C) Provides an Organized Network of Point to Point

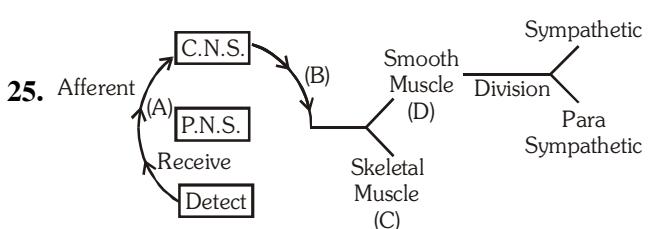
(D) Provides information intercellular throughout Organ

(A) Must be Co-ordinated to Maintain

(B) Is the Process which two or more organs Interact and complement the function of each other



|     | <b>A</b>        | <b>B</b>      | <b>C</b>         | <b>D</b>         |
|-----|-----------------|---------------|------------------|------------------|
| (1) | Excited stage   | Detection     | Endocrine system | Nervous system   |
| (2) | Excitable stage | Transmission  | Nervous system   | Endocrine system |
| (3) | Homeostasis     | Co-ordination | Nervous system   | Endocrine system |
| (4) | Homeostasis     | Co-ordination | Nervous system   | Endocrine system |



|     | <b>A</b>      | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|---------------|----------|----------|----------|
| (1) | Conduction    | Afferent | S.N.S.   | A.N.S.   |
| (2) | Co-ordination | Efferent | A.N.S.   | S.N.S.   |
| (3) | Transmission  | Efferent | S.N.S.   | A.N.S.   |
| (4) | Co-ordination | Sensory  | S.N.S.   | A.N.S.   |

26. Read the following statements about synapse and choose the wrong statement.

- (1) At chemical synapse, neurotransmitters are involved in transmission of the impulse
- (2) The conduction that takes place at electric synapse is similar to conduction across axon
- (3) Impulse transmission across chemical synapse is always faster than a electrical synapse
- (4) At post synaptic membrane, the new potential developed may be excitatory or inhibitory

- 27.** Across synapse, the following steps of transmission of nerve impulse are given. Arrange in sequence.
- Opening of specific ions channels allows the entry of ions a new excitatory or inhibitory potential are generated
  - Arrival of action potential at axon terminal.
  - Depolarization of presynaptic membrane
  - Synaptic vesicle fuses with the synaptic membrane and neurotransmitter releases in synaptic cleft by influx of  $\text{Ca}^{+2}$  ions
  - Neurotransmitter binds to the receptor on post synaptic membrane
- $B \rightarrow A \rightarrow C \rightarrow D \rightarrow E$
  - $B \rightarrow C \rightarrow D \rightarrow E \rightarrow A$
  - $E \rightarrow D \rightarrow C \rightarrow B \rightarrow A$
  - $E \rightarrow C \rightarrow E \rightarrow D \rightarrow A$
- 28.** Which statement is wrong about the function of brain?
- Medulla oblongata regulates involuntary activity of our body
  - Hypothalamus mainly controls A.N.S.
  - Voluntary muscle activity is started by cerebellum
  - Cerebrum is responsible for voluntary activity in voluntary muscles.
- 29.** The cerebrum wraps around a structure called thalamus, which is
- a major coordinating centre for sensory and motor signaling
  - a major coordinating centre for sensory signal only
  - a major centre for motor signaling only
  - not a nervous part of a brain
- 30.** Which of the following statement is false regarding synapse?
- Electric synapse is very similar to impulse conduction along a single axon
- (2) Synapse is formed by two membranes first presynaptic membrane of synaptic knob and second post synaptic membrane of dendrite
- (3) Synaptic membrane always be separated by a gap called synaptic cleft
- (4) In chemical synapse, neurotransmitter is released and either excitatory or inhibitory potential is generated on post synaptic membrane.
- 31.** If after, cutting through dorsal root of a spinal cord of a mammal, the associated receptor in skin was stimulated the animal would
- Still be able to feel the stimulation
  - Show no response
  - Show a normal but slow response
  - Respond but only at a different level of spinal cord
- 32.** Route of reflex arc is
- Effectors, grey matter, motor fibres, sensory fibres and receptors
  - Receptors sensory fibres, grey matter and motor fibres
  - Receptors sensory fibres, grey matter, motor fibres and effectors
  - Sensory fibres, grey matter, motor fibres, receptors and effectors
- 33.** Read the following statements and find out the incorrect statements :-
- The CNS is the site of information processing and control.
  - The somatic neural system relays impulses from the CNS to the involuntary organs and smooth muscles of the body.
  - The autonomic neural system transmits impulses from the CNS to skeletal muscles.
  - The autonomic neural system is further classified into sympathetic and parasympathetic neural system.
- a and b
  - b and c
  - c and
  - a and d



43. Injury to vagus nerve will not affect
- Gastrointestinal movements
  - Tongue movements
  - Cardiac movements
  - Pancreatic secretion

**ANSWER KEY**

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

## SENSE ORGAN (EYE & EAR)

- 1.** A list of steps involved in mechanism of vision is given below in a order :-
- Neural impulses are analysed and image formed on retina is recognised by visual cortex
  - Membrane permeability changes
  - Ganglion cells are excited
  - Bipolar cells are depolarised
  - Action potentials (impulse) are transmitted by optic nerves to visual cortex
  - Potential differences are generated in the photoreceptor cells
  - Light energy causes a change in shape of rhodopsin, leading to the dissociation of retinal (an aldehyde of vitamin A) from opsin (a protein)
  - Structure of opsin is changed
- Which of the following options represents these events in a correct order
- (i), (ii), (iii), (v), (vi), (vii), (viii)
  - (viii), (vii), (vi), (v), (iv), (iii), (ii), (i)
  - (i), (iv), (iii), (ii), (vii), (viii), (vi), (v)
  - (vii), (viii), (ii), (vi), (iv), (iii), (v), (i)
- 2.** A diagrammatic cross section of a single loop of human cochlea is shown in the figure.
- 
- Which one of the following options correctly represents the names of any three of the labelled parts?
- D-sensory hair cells, A-endolymph  
B-tectorial membrane
  - A=perilymph, B-tectorial membrane  
C-endolymph
  - B-tectorial membrane, C-perilymph,  
D-secretory cells
  - C-endolymph, D-sensory hair cells,  
A-serum
- 3.** Cornea transplant in humans is almost never rejected. This is because:-
- it is composed of nucleated cells
  - it is non-living layer
  - its cells are least penetrable by bacteria
  - it has no blood supply
- 4.** Through which aperture, the spinal cord passes out of the skull?
- Foramen ovale
  - Foramen magnum
  - Foramen of Monro
  - Foramen of Panizzae
- 5.** In old age, the vision of eye becomes dim. It may be due to
- myopia      (2) trachoma
  - cataract      (4) astigmatism
- 6.** Which one of the following statements is correct?
- Neurons regulate endocrine activity, but not vice versa
  - Neither hormones control neural activity nor the neurons control endocrine activity
  - Endocrine glands regulate neural activity, but not vice versa
  - Endocrine glands regulate neural activity and nervous system regulates endocrine glands
- 7.** The III, VI and XI cranial nerves are
- trigeminal, abducens and vagus
  - optic, facial and spinal nerves
  - oculomotor, trigeminal and accessory spinal
  - oculomotor, abduces and accessory spinal
- 8.** The inner layer of eyeball is called retina and it contains three layers of cells in which order from outside to inside
- Photoreceptor, Ganglion, Bipolar
  - Photoreceptor, Amacrine, Bipolar
  - Photoreceptor, Bipolar, Ganglion
  - Ganglion, Bipolar, Photoreceptor

- 9.** Dancers and sports person are able to maintain their proper body position by using their internal sense of balance. Sensing of this sort of body's internal condition and position is performed by  
 (1) Organ of corti      (2) Crista  
 (3) Macula              (4) Otolithic organ
- 10.** A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system?  
 (1) Hypothalamus activates the parasympathetic division of brain  
 (2) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal cortex  
 (3) Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal medulla  
 (4) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse
- 11.** Which one of the following statements is not correct?  
 (1) Retinal is the light absorbing portion of visual photo pigments  
 (2) In retina, the rods have the photopigments rhodopsin while cones have three different photopigments  
 (3) Retinal is a derivative of vitamin C  
 (4) Rhodopsin is the purplish red protein present in rods only
- 12.** In man, abducens nerve is injured. Which one of the following function will be affected?  
 (1) Movement of eye ball  
 (2) Movement of tongue  
 (3) Swallowing  
 (4) Movement of neck
- 13.** In myopia or short sightedness  
 (1) Image is formed slightly in front of retina because eye ball is longer  
 (2) Eye ball is normal but image is formed over blind spot  
 (3) Eye ball is normal but images is formed slightly behind the retina due to faulty lens  
 (4) Curvature of cornea becomes irregular
- 14.** Which part of the ear is influenced by gravity and movements?  
 (1) Vestibular apparatus  
 (2) Cochlea  
 (3) Organ of Corti  
 (4) Ear ossicles
- 15.** Which one is correctly matched ?
- |     | Feature                | Sympathetic Nervous system | Parasympathetic Nervous system |
|-----|------------------------|----------------------------|--------------------------------|
| (1) | Salivary Glands        | Stimulates Secretion       | Inhibits Secretion             |
| (2) | Pupil of eye           | Dilates                    | Constricts                     |
| (3) | Heart rate             | Decrease                   | Increases                      |
| (4) | Intestinal Peristalsis | Stimulates                 | Inhibits                       |
- 16.** Unidirectional transmission of nerve impulse is maintained by :-  
 (1) Synapses  
 (2) Myelin sheath  
 (3) Membrane polarity  
 (4) Interneurons
- 17.** Vater's corpuscles are sensitive to :-  
 (1) Pressure              (2) Smell  
 (3) Temperature           (4) Touch
- 18.** Pacinian corpuscles are :-  
 (1) Glands  
 (2) Pain receptors  
 (3) Naked tactile receptors  
 (4) Encapsulated pressure receptors

- 19.** Which is the incorrect about the mechanism of vision ?
- Light rays in visible wavelength focused on the retina induces dissociation of the retinal from opsin resulting in changes in the structure of the opsin.
  - Due to change in the surface of opsin membrane permeability changes and potential difference are generated in the photoreceptor cells.
  - A signal is produced in photoreceptor cells that generates action potential in the bipolar cells through the ganglion cells.
  - The action potentials (impulses) are transmitted by the optic nerve to the visual cortex area of the brain, where the neural impulses are analysed and the image formed on the retina is recognised based on earlier memory and experience.
- 20.** A person wears convex lenses for proper vision. Without glasses the image of the object is produced :-
- On blind spot
  - On yellow spot
  - In front of retina
  - Behind the retina
- 21.** Muller's fibres occur in :-
- Heart
  - Kidney
  - Pancreas
  - Retina
- 22.** Read the following statements and find out the incorrect statements :-
- Anatomically, the ear can be divided into three major sections called the outer ear, the middle ear and the inner ear.
  - The outer ear consists of the pinna and external auditory meatus (canal).
  - The tympanic membrane (ear drum) is composed of connective tissues covered with mucus membrane outside and with skin inside.
- d.** The ear ossicles reduces the efficiency of transmission of sound waves to the inner ear.  
**e.** The pinna collects the vibrations in the air which produce sound.
- a and b
  - b and c
  - c and d
  - d and e
- 23.** Recognise the figure and find out the correct matching :-
- 
- ```

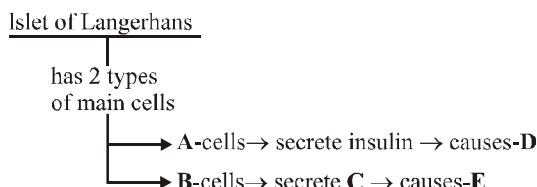
graph TD
    VA[Vestibular apparatus] --> SC[Semicircular canals]
    VA --> a[a]
    SC --> e[e]
    a --> b[b]
    a --> c[c]
    b --> d[d]
    c --> d
  
```
- a—saccule, b—crista, c—macula, d—ampulla, e—utricle
 - a—otolith organ, b—saccule, c—utricle, d—ampulla, e—macula
 - a—otolith organ, b—saccule, c—utricle, d—macula, e—ampulla
 - a—crista ampullaris, b—ampulla, c—macula, d—saccule, e—otolith organ
- 24.** Our ear can hear sound waves of frequency between :-
- 5–100 cycles/sec
 - 50–20000 cycles/sec
 - 20000–50000 cycles/sec
 - 2000–3000 cycles/sec

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	2	4	3	3	3	4	3	2	3	3	3	1	1	2
Que.	16	17	18	19	20	21	22	23	24						
Ans.	1	1	4	3	4	4	3	3	2						

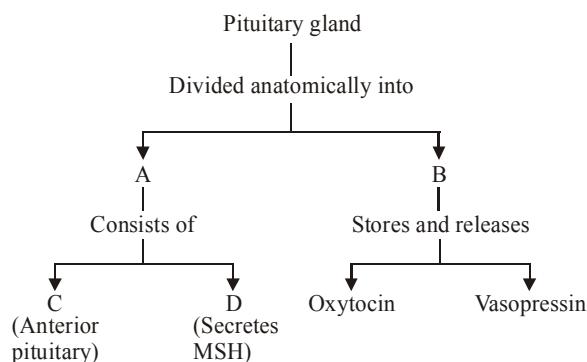
ENDOCRINE GLANDS

1. Select the option that correctly identifies A to E in the given flow chart.



	A	B	C	D	E
(1)	α	β	Glucagon	Hyperglycaemia	Hypoglycaemia
(2)	β	α	Cortisol	Hypoglycaemia	Hyperglycaemia
(3)	β	α	Cortisol	Hyperglycaemia	Hypoglycaemia
(4)	β	α	Glucagon	Hypoglycaemia	Hyperglycaemia

2. Identify A, B, C and D in the given flow chart and select the correct option.



	(A)	(B)	(C)	(D)
(1)	Neuro - hypophysis	Adeno - hypophysis	Pars distalis	Pars intermedia
(2)	Adeno hypophysis	Neuro hypophysis	Pars intermedia	Pars distalis
(3)	Adeno hypophysis	Neuro hypophysis	Pars distalis	Pars intermedia
(4)	Neuro hypophysis	Adeno hypophysis	Pars intermedia	Pars distalis

3. Read the given paragraph and select the option that correctly fills the blanks in it.

Hormones produce their effect on target tissue by binding to specific **A** called hormone receptors located in the target tissues only. Water soluble hormones usually need **B** receptor that generate **C** messenger for regulating cellular metabolism. **D** soluble hormones can pass through cell membrane. The hormone which interact with **E** receptor and mostly regulate gene expression or chromosome function by interaction of hormone - receptor complex with the genome.

	A	B	C	D	E
(1)	Proteins	Membrane bound	Second	lipid	Intra cellular
(2)	Lipids	Membrane	Second	Water	Intra cellular
(3)	Proteins	Intra cellular	second	lipid	extra cellular
(4)	Proteins	membrane bound	primary	lipid	intra cellular

4. Match Column - I with Column - II and select the option from the codes given below.

Column - I		Column - II	
(A)	ANF	(i)	Regulates blood calcium levels
(B)	MSH	(ii)	Decreases blood pressure
(C)	GIP	(iii)	Pigmentation
(D)	TCT	(iv)	Inhibits gastric secretion

- (1) A - (iv); B - (i), C - (ii), D - (iii)
 (2) A - (ii); B - (i), C - (iv), D - (iii)
 (3) A - (iv); B - (i), C - (iii), D - (ii)
 (4) A - (ii); B - (iii), C - (iv), D - (i)

5. Source of somatostatin is same as that of
 (1) TCT and PTH
 (2) vasopressin and oxytocin
 (3) thyroxine and calcitonin
 (4) somatotropin and prolactin
6. Which regulates cell division, protein synthesis and growth of the bone?
 (1) Prolactin
 (2) Somatotropic hormone
 (3) TSH
 (4) MSH
7. Gluconeogenesis, proteolysis in body is promoted by
 (1) GH
 (2) TSH
 (3) Cortisol
 (4) Thyroxine
8. The steroid hormones transmit their information by
 (1) stimulating the receptors present on cell membrane
 (2) entering into the cell and modifying cellular contents
 (3) entering into the cell and modifying nuclear organization
 (4) the help of an intracellular secondary messenger
9. A tumour in the adrenal zona glomerulosa can cause hyper secretion of hormones produced in that region. Which of the following you might expect to find in a patient with such a tumour?
 (1) Increased blood sodium levels
 (2) Increased blood sodium levels
 (3) Decreased blood calcium levels
 (4) Increased dehydration
10. Both adrenaline and cortisol are secreted in response to stress. Which of the following statements is also true for both of these hormones?
 (1) They act to increase blood glucose
 (2) They are secreted by the adrenal cortex
 (3) Their secretion is stimulated by adrenocorticotropin
 (4) They are secreted into the blood within seconds of the onset of stress
11. If ovaries from a pregnant woman are removed in 4th month of pregnancy, then
 (1) development of embryo becomes abnormal
 (2) abortion occurs after some time
 (3) embryo develops normally till birth
 (4) none of these
12. Which of the following pairs correctly matches a hormone with a disease resulting from its deficiency ?
 (1) Insulin-Diabetes insipidus
 (2) Thyroxine-Tetany
 (3) Parathyroid hormone-Diabetes mellitus
 (4) Luteinizing hormone-Failure of ovulation
13. Grave's disease results in :-
 (1) hyperactivity of thyroid gland
 (2) hypoactivity of adrenal cortex
 (3) hyperactivity of adrenal medulla
 (4) hypoactivity of islets of langerhans
14. Which of the following statement are false/true?
 (A) Calcitonin regulates the metabolism of calcium
 (B) Oxytocin stimulates contraction of uterine muscle during birth
 (C) Grave's disease is caused by malfunctioning of adrenal gland
 (D) ADH stimulates absorption of water and increase the urine production
 (1) A and C are true B and D are false
 (2) A and B are true C and D are false
 (3) A and D are true B and C are false
 (4) A, B and C are true, D only false
15. Acromegaly is due to the
 (1) over secretion of growth hormone in adulthood
 (2) over secretion of growth hormone in childhood
 (3) under secretion of growth hormone in adulthood
 (4) under secretion of growth hormone in childhood

- 16.** Find out the suitable match for the following hormones and related organ?
- ANF-Heart, Calcitonin-Parathyroid
 - Renin-Kidney, Relaxin - Placenta
 - Calcitonin - Kidney, HCG → Ovary
 - Relaxin - Testes, Progesteron → Graafian follicle
- 17.** Identify incorrect labelling in given diagram.
-
- The diagram illustrates the pituitary gland's structure. At the top left is the Hypothalamus, which contains Hypothalamic neurons. Lines from these neurons point down to the Pituitary stalk. The Pituitary stalk is labeled 'Portal circulation' and 'Axonal Transport'. At the bottom is the Posterior pituitary, and at the base of the stalk is the Anterior pituitary.
- Axonal transport and anterior pituitary
 - Portal circulation and posterior pituitary
 - Anterior pituitary and posterior pituitary
 - Portal circulation and axonal transport
- 18.** Addison's disease results from
- hyposecretion from adrenal cortex
 - hypersecretion from adrenal cortex
 - hyposecretion from adrenal medulla
 - hypersecretion from adrenal medulla
- 19.** Aldosterone helps in the
- conservation of sodium as well as water and elimination of potassium
 - elimination of sodium, potassium and water
 - conservation of sodium, potassium and water
 - conservation of potassium as well as water and elimination of sodium
- 20.** If a person is passing out large amount of urine and feeling thirsty but his urine has no glucose. The most likely cause is the
- oversecretion of anterior pituitary hormone
 - oversecretion of posterior pituitary hormone
 - undersecretion of anterior pituitary hormone
 - undersecretion of posterior pituitary hormone

- 21.** Tadpoles of frog can be made of grow as giant sized tadpoles, if they are
- administered antithyroid substance like thiourea
 - administered large amounts of thyroxine
 - reared on a diet rich in egg yolk
 - reared on a diet rich in both egg yolk and glucose
- 22.** A health disorder that results from the deficiency of thyroxine in adults and characterised by
- A low metabolic rate
 - Increase in body weight and
 - Tendency to retain water in tissues is
- Simple goitre
 - Myxoedema
 - Cretinism
 - Hypothyroidism
- 23.** Select the correct matching of a hormone, its source and function.
- | | Hormone | Source | Function |
|-----|----------------|------------------------------------|--|
| (1) | Norepinephrine | Adrenal medulla | Increase heart beat, rate of respiration and alertness |
| (2) | Glucagon | Beta-cells of Islets of langerhans | Stimulates glycogenolysis |
| (3) | Prolactin | Posterior pituitary | Regulates growth of mammary glands and milk formation in females |
| (4) | Vasopressin | Posterior pituitary | Increases loss of water through urine |
- 24.** Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and binds to a receptor inside in (mostly in the nucleus)
- Somatostatin, oxytocin
 - Cortisol, testosterone
 - Insulin, glucagon
 - Thyroxine, Insulin

- 25.** 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) Over secretion of pars distalis
 (2) Deficiency of iodine in diet
 (3) Low secretion of growth hormone
 (4) Cancer of the thyroid gland
- 26.** Which of the following hormone is correctly matched with its source and function?
 (1) Vasopressin - Anterior pituitary - Induces reabsorption of water in nephron
 (2) Oxytocin - Anterior pituitary - Contraction in uterine muscles during birth (parturition)
 (3) Thymosin - Thymus - Helps in differentiation of T-Lymphocyte
 (4) Glucagon - Pancreatic α -cells - Induces the uptake and utilization of glucose inside cells.
- 27.** Identify the hormone with its correct matching of source and function.
 (1) Oxytocin - posterior pituitary, growth and maintenance of mammary glands
 (2) Melatonin - pineal gland, regulates the normal rhythm of sleepwake cycle.
 (3) Progesterone - corpus-luteum, stimulation of growth and activities of female secondary sex organs
 (4) Atrial natriuretic factor - ventricular wall increases the blood pressure.
- 28.** Fight-or-flight reactions cause activation of
 (1) the parathyroid glands, leading to increased metabolic rate
 (2) the kidney, leading to suppression of renin-angiotensin - aldosterone pathway
 (3) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrine
 (4) the pancreas leading to a reduction in the blood sugar levels
- 29.** Which of the following is correct regarding hormones?
 (1) Parathyroid is essential for absorption of potassium ions
 (2) Insulin and glucagon maintains blood glucose homeostasis
 (3) Old person is ageing person due to lack of progesterone
 (4) Thymus gland increases in size with age
- 30.** Which one of the following hormones though synthesised elsewhere, is stored and released by the master gland?
 (1) Melanocyte stimulating hormone
 (2) Antidiuretic hormone
 (3) Luteinizing hormone
 (4) Prolactin
- 31.** Infertility can occur in both the sexes due to deficiency of
 (1) Oxytocin (2) Prolactin
 (3) LH (4) FSH
- 32.** Identify the hormone produced by the pituitary gland in both males and females but functional only in females.
 (1) Vasopressin (2) Relaxin
 (3) Prolactin (4) Somatotropin
- 33.** Which of the following is incorrect in relation to the catecholamines
 (1) These are called emergency hormones or hormones of fight or flight
 (2) These hormones increase the heart beat, the strength of heart contraction and the rate of respiration
 (3) They inhibit the lipolysis and proteolysis
 (4) They increases alertness, pupillary dilation, piloerection (raising of hairs) and sweating.
- 34.** Pituitary gland of adult rat is surgically removed. Which of the following endocrine glands will be less effected
 (1) Thyroid (2) Gonads
 (3) Adrenal cortex (4) Adrenal medulla

- 35.** Hormones involved in carbohydrate metabolism are
 (1) Insulin, glucagon, epinephrine and parathormone
 (2) Insulin, glucagon, epinephrine and glucocorticoid
 (3) Insulin, glucagon, glucocorticoid and calcitonin
 (4) Insulin, glucagon, norepinephrine and melatonin
- 36.** Hormone receptors present on the cell membrane of the target cells are called
 (1) Hormone-receptor complex
 (2) Intercellular receptor
 (3) Intracellular receptor
 (4) Membrane bound receptor
- 37.** A patient of diabetes mellitus excretes glucose in urine even when he is kept on a carbohydrate free diet because
 (1) Fats are catabolised to form glucose
 (2) Amino acids are catabolised in liver
 (3) Amino acids are discharged in blood stream from liver
 (4) Glycogen from muscles is released in blood stream
- 38.** Hormone that initiates ejection of milk; stimulates milk production and growth of ovarian follicles are respectively known as :-
 (1) PRL, OT and LH
 (2) OT, PRL and FSH
 (3) LH, PRL and FSH
 (4) PRH, OT and LH
- 39.** Hypothyroidism during pregnancy causes defective development and maturation of growing baby leading to :-
 a. Cretinism (stunted growth)
 b. Dwarfism
 c. Mental retardation
 d. Low intelligence quotient (I.Q.)
- 40.** Abnormal skin
 f. Deaf-mutism
 (1) a, b, d and f only (2) b, c, d and e only
 (3) a, b, c, d, e and f (4) a, b, c, e and f only
- 40.** Blood calcium level is a resultant of how much dietary calcium is absorbed, how much calcium is lost in the urine, how much bone dissolves releasing calcium into the blood and how much calcium from blood enters tissues. A number of factors play an important role in these processes. Mark the one which has no role :-
 (1) Vitamin D
 (2) Parathyroid hormone
 (3) Thyrocalcitonin
 (4) Thymosin
- 41.** A woman may develop beard and moustaches due to :-
 (1) Hypersecretion of adrenal cortex
 (2) Hypersecretion of thyroxine
 (3) Hyposecretion of adrenaline
 (4) Hyposecretion of thyroxine
- 42.** Disease which may result in hyper-or-hypo secretion of thyroxine is :-
 (1) Cretinism (2) Acromegaly
 (3) Goitre (4) All of the above
- 43.** Read the following statements and find out the incorrect statements :-
 a. Glucocorticoids stimulates gluconeogenesis, lipolysis and proteolysis.
 b. Glucocorticoids stimulate cellular uptake and utilisation of amino acids.
 c. Cortisol is involved in the cardio-vascular system as well as kidney functions.
 d. Cortisol stimulates the RBC production.
 e. Aldosterone acts mainly at the renal tubules and stimulates the reabsorption of Na^+ , K^+ and water an excretion of phosphate ions.
 (1) b and e (2) a and d
 (3) b and c (4) d and e

44. Hassall's corpuscles are found in :-

- (1) Thyroid gland
- (2) Thymus gland
- (3) Adrenal gland
- (4) Pineal gland

ANSWER KEY

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

IMPORTANT NOTES

REPRODUCTION IN ORGANISMS

1. Fill in the blanks :

1. The ...a... reproduction is the common mode of reproduction in organisms that have a relatively simple organisation like algae and fungi and they shift to ...b... method of reproduction just before the onset of adverse conditions.
 2. Asexual (vegetative) as well as sexual modes of reproduction are exhibited by the ...c...
 3. Only sexual mode of reproduction is present in most of the ...d...
- (1) a-sexual, b-asexual, c-higher plants, d-animals
 (2) a-sexual, b-asexual, c-animals, d-higher plants
 (3) a-asexual, b-sexual, c-higher plants, d-animals
 (4) a-asexual, b-sexual, c-animals, d-higher plants

- 2.** Read the following statements and find out the incorrect statement.
- (1) Plant, animals and fungi differ so greatly in external morphology, internal structure and physiology.

(2) In annual and biennial plants, there is a clear cut vegetative, reproductive and senescent phases, but in the perennial species it is very difficult to clearly define these phases.

- (3) In animals, the juvenile phase is followed by morphological and physiological changes prior to active reproductive behaviour.
- (4) The females of the marsupial mammals exhibit no cyclical changes in the activities of ovaries and accessory ducts as well as hormones during the reproductive phase.

- 3.** The capacity for generating an entire new individual from a fragment of tissue, is called
- (1) Sporulation
 (2) Budding
 (3) Vegetative propagation
 (4) Fragmentation
- 4.** Which of the following regenerated with the help of tubers ?
- | | |
|------------|------------|
| (1) Cactus | (2) Rose |
| (3) Mango | (4) Potato |

ANSWER KEY

Que.	1	2	3	4
Ans.	3	4	4	4

SEXUAL REPRODUCTION IN FLOWERING PLANTS

- 1.** A typical angiosperm anther is :-
 (1) Bilobed, monothecous and bisporangiate
 (2) Bilobed, monothecous and tetrasporangiate
 (3) Bilobed, dithecos and tetraporangiate
 (4) Bilobed, dithecos and bisporangiate
- 2.** Match the options

	Structure		Shape
a	Anther	i	Spindle shaped
b	Microsporangia	ii	Spherical shaped
c	Pollen grain	iii	Tetragonal (four sided)
d	Generative cell	iv	Near circular in outline

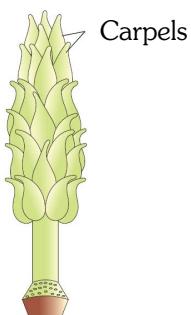
(1) a-iv, b-iii, c-i, d-ii (2) a-iii, b-iv, c-ii, d-i
 (3) a-i, b-ii, c-iii, d-iv (4) a-ii, b-i, c-iv, d-iii

- 3.** Match the columns-I and II and choose the correct combination from the options given.

	Column-I		Column-II
a	Male gametophyte	i	Ovule
b	Female gametophyte	ii	Locule
c	Megasporangium	iii	Pollen grain
d	Ovarian cavity	iv	Embryo sac

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

- 4.** The following figure shows the



- (1) Multicarpellary, syncarpous gynoecium of *Papaver*
 (2) Multicarpellary, apocarpous gynoecium of *Michelia*
 (3) Pentacarpellary, syncarpous gynoecium of the *Michelia*
 (4) Multicarpellary, apocarpous gynoecium of the *Papaver*

- 5.** The central cell after triple fusion becomes the
 (1) PEC (primary endosperm cell)
 (2) PEN (primary endosperm nucleus)
 (3) Diploid
 (4) PEC and develops into embryo

- 6.** Embryonal axis above the level of attachment of cotyledons is known as

(1) Hypocotyl (2) Funicle
 (3) Epicotyl (4) Raphe

- 7.** False fruits are found in

(1) Guava, pear and sapota
 (2) Black pepper and beet
 (3) Apple, strawberry and cashew
 (4) Mango and apple

- 8.** Match the columns-I and II and choose the correct combinations from the options given.

	Column-I		Column-II
a	Apomixis	i	Mango
b	Polyembryony	ii	Seedless fruit
c	Parthenocarpy	iii	Asteraceae

(1) a-iii, b-i, c-ii
 (2) a-ii, b-iii, c-i
 (3) a-i, b-ii, c-iii
 (4) a-iii, b-ii, c-i

- 9.** Male gametophyte of angiosperms is :-

(1) Microsporangium
 (2) Nucellus
 (3) Pollen grain
 (4) Stamen

- 10.** Uebisch bodies are related with the formation of

(1) Nucellus
 (2) Intine and pollenkit
 (3) Exine
 (4) Pollenkitt and pollinia

- 11.** Read the following statements and find out the **incorrect** statements.
- The placenta is located inside the locule of ovary. Arising from the placenta are the ovules.
 - The number of ovules in an ovary may be one (papaya, watermelon and orchids) to many (wheat, paddy and mango).
 - Each ovule has one of two protective envelopes called integuments.
 - Enclosed within the integuments is a huge mass of cells called the perisperm.
- (1) b and d (2) c and d
 (3) b and c (4) a and d
- 12.** Fill in the blanks :
- The male and female gametes in angiosperms are produced in the ...a... and ...b..., respectively.
 - In angiosperms, both male and female gametes are ...c..., they have to be brought together for ...d... to occur. The ...e... is the mechanism to achieve this objective.
- (1) a-pollen grain, b-embryo sac, c-motile, d-pollination, e-fertilisation.
 (2) a-generative cell, b-nucellus, c-non motile, d-pollination, e-fertilisation.
 (3) a-pollen grain, b-embryo sac, c-motile, d-fertilisation, e-pollination.
 (4) a-pollen grain, b-embryo sac, c-non-motile, d-fertilisation, e-pollination.
- 13.** Read the following statements and find out the **correct** statements ?
- Majority of flowering plants use a range of animals as pollinating agents.
 - Bees, butterflies, flies, beetles, wasps, ants, moth, birds (sunbirds and humming birds) and bats are the common pollinating agents.
 - Among the animals, insects particularly bees are the dominant biotic pollinating agents.
 - Even larger animals such as some primates (lemurs), arboreal (tree dwelling) rodents, or even reptiles (gecko lizard and garden lizard) have also been reported as pollinators in some species.
 - Often flowers of animal pollinated plants are specifically adapted for a particular species of animal.
- (1) a and b (2) b and c
 (3) d and e (4) All of the above
- 14.** Which of the following are outbreeding devices?
- Non-synchronisation pollen release and stigma receptivity.
 - Different position of the anther and stigma so that pollen cannot come in contact with the stigma of the same flower.
 - Production of the unisexual flowers
- (1) only a and b
 (2) only b and c
 (3) only c
 (4) a, b and c
- 15.** Read the following statements and find out the **incorrect** statements.
- Embryo development precedes endosperm development.
 - Though the seeds differ greatly, the early stages of embryo development (embryony) are similar in both monocotyledons and dicotyledons.
 - A typical dicotyledonous embryo consists of an embryonal axis and two cotyledons.
 - Endosperm may either be completely consumed by the developing embryo (e.g. castor and coconut) before seed maturation or it may persist in the mature seed (e.g. wheat, rice, maize, pea, groundnut and beans).
 - The coconut water from tender coconut is cellular endosperm and the surrounding white kernel is the nuclear endosperm.
- (1) a, b and c (2) b, c and d
 (3) c, d and e (4) a, d and e
- 16.** Even after killing the generative cell with a laser beam, the pollen grain is of a flowering plant germinate and produce normal pollen tube because
- Laser beam stimulates pollen germination and pollen tube growth
 - Laser beam destroy the region from which pollen tube emerges
 - The contents of the killed generative cell permit germination of pollen grain
 - The vegetative cell has not been damaged

- 17.** In tape grass (*Vallisneria*)
- Both male and female flowers break from the plant
 - Only the female flowers break from the plant, while the male flowers are brought to the water surface by long stalks
 - Only the male flowers break from the plant and reach to the surface, while the female flowers are brought to the surface by long pedicels (stalks)
 - Any of the two types of flowers can break
- 18.** Cross - pollination offers certain advantages as well as disadvantages to plants, which one of the following statements is **not true** about cross - pollination.
- It can fail to take place due to distance barrier
 - It is less economic because plants have to produce large number of pollen grains
 - It often gives high yield of crop
 - It takes place only in monoecious plants
- 19.** Collar - like outgrowth arising from the base of ovule and forming a sort of third integument is known as
- Pperculum
 - Aril
 - Coma
 - Caruncle
- 20.** The ovule curvature is more pronounced and the embryo sac becomes horse - shoe shaped in the following ovule ?
- Amphitropous
 - Campylotropous
 - Anatropous
 - Orthotropous
- 21.** Archesporium of ovule is
- Single celled, derived from nucellar epidermis
 - Single celled, derived from nucellar hypodermis
 - Multicellular, derived from nucellar epidermis
 - Multicellular, derived from nucellar hypodermis

ANSWER KEY

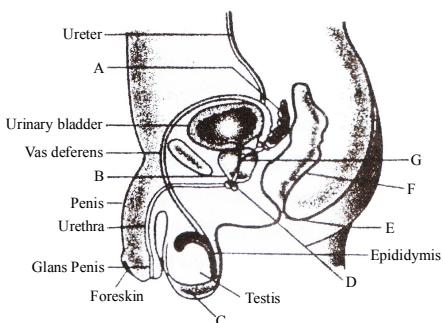
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	1	2	1	3	3	1	3	3	1	4	4	4	4
Que.	16	17	18	19	20	21									
Ans.	4	3	4	2	1	2									

HUMAN REPRODUCTION & REPRODUCTIVE HEALTH

1. Select the option which correctly matches the endocrine gland with its hormone and its function

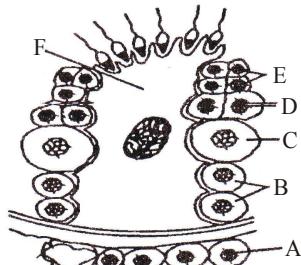
	Endocrine gland	Hormone	Function
(1)	Ovary	FSH	Stimulates follicular development and the secretion of estrogens
(2)	Placenta	estrogen	initiates secretion of the milk
(3)	Corpus luteum	estrogen	essential for maintenance of endometrium
(4)	Leyding cells	androgen	initiates the production of sperms

2. Identify the parts labelled (A to G) in the diagram of male reproductive system from the list I to X given along with.



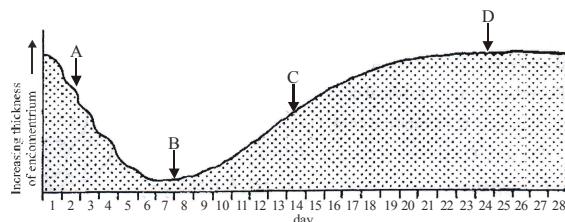
- I. Fundus
 - II. Uriniferous tubules
 - III. Seminiferous tubules
 - IV. Seminal vesicle
 - V. Prostate
 - VI. Ejaculatory duct
 - VII. Rectum
 - VIII. Anus
 - IX. Bulbourethral gland
 - X. Scrotum
- (1) A-IV, B-V, C-I, D-III, E-IX, F-X, G-II
(2) A-V, B-III, C-I, D-II, E-IV, F-VI, G-VIII
(3) A-IV, B-V, C-X, D-IX, E-VIII, F-VII, G-VI
(4) A-X, B-IX, C-VIII, D-IV, E-III, F-II, G-I

3. In the following diagram of a portion of a seminiferous tubule identify the marked alphabets.



- (1) A-Leydig cell, B-Spermatogonium, C-Primary spermatocyte, D-Secondary Spermatocyte, E - Spermatides, F - Sertoli Cells
(2) A-Sertoli cells, B - Spermatogonium, C-Primary Spermatocyte, D - Secondary spermatocyte, E - Spermatids, F - Leydig cell
(3) A - Leydig cell, B - Primary spermatocyte, C - Spermatogonium, D - Secondary spermatocyte, E - Spermatids, F - Sertoli cells.
(4) A - Leydig cell, B - Spermatogonium, C-Primary spermatocyte, D - Secondary spermatocyte, E-Spermatozoa, F-Sertoli cells

4. The accompanying diagram shows the changes that take place in the endometrium during a normal menstrual cycle.

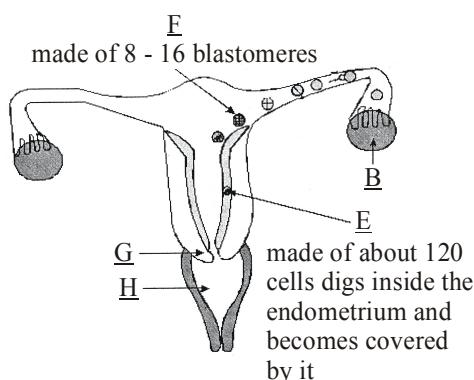


Arrow represents ovulation

Arrow represents menstruation

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

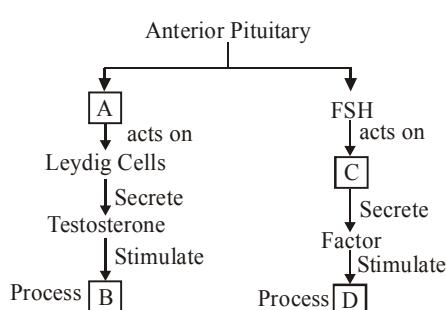
5. Label the following diagram which illustrates fertilisation by cleavage and the early stages of embryonic development.



Identify B, E, F, G and H.

	B	E	F	G	H
(1)	Ovary	morula	blastocyst	Cervix	Vagina
(2)	Ovary	blastocyst	morula	Cervix	Vagina
(3)	Ovary	blastocyst	morula	Vagina	Cervix
(4)	Ovary	blastocyst	Gastrula	Vagina	Cervix

6. Following is the flow chart showing the influence of hormones on testes in males. Choose the option which correctly fills the gaps represented by A, B, C and D.



- (1) A - Androgen; B - Spermatogenesis;
C - Seminiferous tubule;
D - Spermatogensis
- (2) A - Inhibin; B - Spermatogenesis;
C - Spermatogonia; D - Spermatogenesis
- (3) A - ICSH/LH; B - Spermatogenesis;
C - Sertoli cells; D - Spermatogenesis
- (4) A - LH; B - Spermatogenesis;
C - Sustentacular cells;
D - Spermatogenesis

7. What is amniocentesis?

- (I) A pre - natal, foetal determination test.
 - (II) A post - natal foetal determination test.
 - (III) It is based on the chromosomal pattern of the amniotic fluid.
 - (IV) It is based on the Chromosomal pattern of the amniotic fluid and the seminal Fluid
- (1) II, III
(2) I, IV
(3) I, III
(4) I, IV

8. What is true for natural methods of contraception?

- (1) They increase phagocytosis of sperms
- (2) They employ barriers to prevent fertilisation
- (3) They are natural ways of avoiding chances of fertilisation
- (4) They are surgical methods and are terminal methods

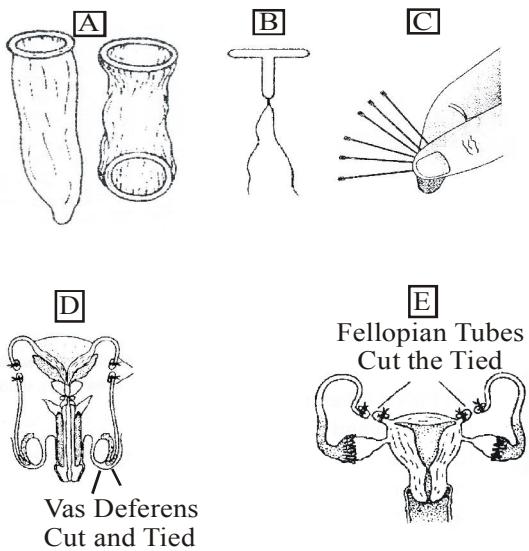
- 9.

	Column - I	Column - II
(A)	Lippes loop	(I) Non-medicated IUDs
(B)	Multiload 375	(II) Hormone releasing IUDs
(C)	CuT	(III) Copper releasing IUDs
(D)	Cu7	
(E)	LNG - 20	
(F)	Progestasert	

The correct match is -

- (1) I - A; II - B, F; III - C, D, E
- (2) I - A; II - E, F; III - B, C, D
- (3) I - B; II - E, F; III - A, C, D
- (4) I - B; II - A, F; III - C, D, E

10. Match the ARTs with their description -
- Collected gametes are made to the embryo in the laboratory
 - Zygote or early embryo with upto 8 blastomeres is transferred into the oviduct
 - More than 8 blastomeres is transferred into the uterus
 - Fusion of gametes within the female
 - Transfer of ovum from a donor to the oviduct of the recipient
 - Sperm is injected into the ovum in - vitro
- | | | |
|---------|--------------------------|--------|
| A. GIFT | B. ZIFT | C. AL |
| D. ICSI | E. IUT | F. IVF |
| G. IUI | H. In-vivo fertilisation | |
- I - G, II - B, III - F, IV - H, V - A, VI - D
 - I - F, II - B, III - A, IV - H, V - E, VI - G
 - I - F, II - B, III - E, IV - H, V - A, VI - D
 - I - G, II - B, III - F, IV - H, V - C, VI - E

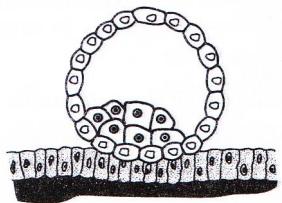


- 11.
- Tubectomy
 - Vasectomy
 - Implants
 - Condoms
 - Copper T
 - Cervical caps
- A - VI, B - V, C - III, D - II, E - I
 - A - III, B - V, C - IV, D - I, E - II
 - A - IV, B - V, C - III, D - II, E - I
 - A - VI, B - V, C - IV, D - I, E - II

12. Using which contraceptive also provides protection from contracting STDs and AIDS?
- Diaphragms
 - Spermicidal foams
 - Condoms
 - lactational amenorrhoea
13. Following statements are given regarding MTP. Choose the correct options given below.
- MTPs are generally advised during first trimester
 - MTPs are used as a contraceptive method
 - MTPs are always surgical
 - i and iii
 - ii and iii
 - only i
 - i and ii

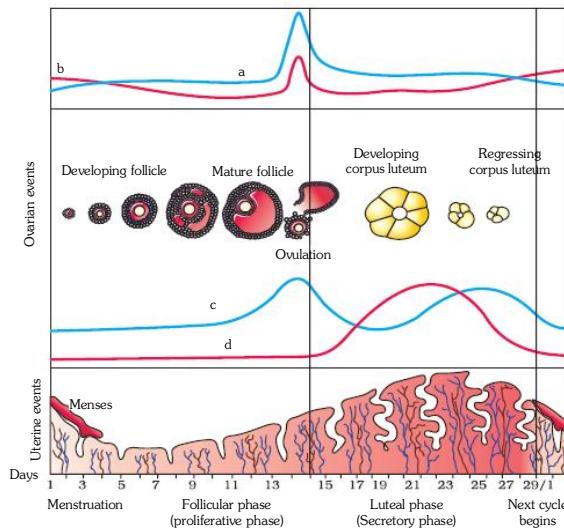
	Column - I		Column - II
(A)	Hepatitis B	(i)	Vitamin E
(B)	Saheli	(ii)	7 th April, 1948
(C)	Normal functioning of reproductive organs	(iii)	CDRI, Lucknow
(D)	World health organisation	(iv)	Detection of Antibody (Antigen)
(E)	ELISA technique	(v)	Hepatitis B Virus

- A - (v) B - (iii), C - (i), D - (ii), E - (iv)
 - A - (v) B - (ii), C - (i), D - (iii), E - (iv)
 - A - (v) B - (iii), C - (iv), D - (ii), E - (i)
 - A - (v) B - (ii), C - (iv), D - (iii), E - (i)
15. The best definition of the process of gastrulation is that it is a process where the
- single layered blastula become two layered
 - archenteron is formed after gastrulation
 - zygote gets converted into larva
 - cells move to occupy their definite position
16. Two offsprings developed in the same uterus from fertilisation of two different ova are
- monozygotic twins
 - dizygotic twins
 - Identical twins
 - Both (1) and (3)

17. Vitelline membrane is a
 (1) primary egg membrane
 (2) secondary egg membrane
 (3) tertiary egg membrane
 (4) None of the above
18. In tracing the path of sperm from testis to outside, you would mention the vasa efferentia before the
 (1) testes (2) epididymides
 (3) urethra (4) uterus
19. Given structure represents
- 
- (1) morula (2) zygote
 (3) blastocyst (4) gastrula
20. Secondary spermatocytes in male testis forms during
 (1) multiplication phase
 (2) spermiogenesis
 (3) growth phase
 (4) maturation phase
21. Which is the correct sequence of egg layers from outside to inside?
 (1) Radiata, proliferous and pellucida
 (2) Radiata and pellucida
 (3) Proliferous, yolk sac and radiata
 (4) None of the above
22. Polar bodies
 (1) have no known function
 (2) protect the egg
 (3) protect the sperm
 (4) ensure fertilisation
23. The villi of human placenta arise from
 (1) chorion (2) allantois
 (3) Both (1) and (2) (4) yolk sac
24. In human sperm entry from
 (1) axis of cleavage
 (2) grey crescent
 (3) dorsal lip of blastopore
 (4) From anywhere
25. The fertilisation cone, which pulls the sperm into the egg, is formed from the
 (1) acrosome of the sperm
 (2) centriole of the sperm
 (3) vitelline layer of the egg
 (4) plasma membrane of the egg
26. How many testicular lobules are present in each testis ?
 (1) About 250 (2) Infinite
 (3) About 100 (4) About 150
27. Select the odd one out from the following structures with reference to the male
 (1) Vasa efferentia (2) Isthmus
 (3) Rete testis (4) Epididymis
28. In spermiation the sperms release from
 (1) epididymis (2) prostate gland
 (3) seminiferous tubules (4) vas deferens
29. Which is the **incorrect** statement about testosterone?
 (1) It affects the development
 (2) Its efficiency increases according to age
 (3) Its quantity decreases according to age
 (4) It works as prohormone in the target organ
30. Which one of the following is not a part of oviduct?
 (1) Womb (2) Infundibulum
 (3) Isthmus (4) Ampulla
31. Bartholin glands are accessory sex glands in females. These are situated
 (1) on the either side of labia minora and open in vestibule
 (2) on the either side of urethral opening but open in vagina
 (3) on the either side of vagina and open in vestibule
 (4) on the either side of urethral opening and open in vestibule

- 32.** Which of the following openings are not present in vaginal vestibule ?
 (1) Opening of Bartholin's ducts
 (2) Opening of Bulbourethral ducts
 (3) Urethral opening
 (4) Vaginal opening
- 33.** Longest unstriated muscles are present in
 (1) wall of intestine
 (2) wall of ovary
 (3) wall of fallopian tube
 (4) wall of uterus of pregnant female
- 34.** Mature, Graffian follicle is generally present in the ovary of a healthy human female around
 (1) 18–23 day of menstrual cycle
 (2) 24–28 day of menstrual cycle
 (3) 5–8 day of menstrual cycle
 (4) 11–17 day of menstrual cycle
- 35.** Which of the following hormones is not secreted by human placenta ?
 (1) Progesterone (2) LH
 (3) hCG (4) Estrogens
- 36.** The cellular cover of the ovum at ovulation is
 (1) Zona pellucida
 (2) Chorion
 (3) Vitelline membrane
 (4) Corona radiata
- 37.** Mammalian sperms acquire capacitation in which part ?
 (1) Epididymis
 (2) Seminal vesicle
 (3) Female reproductive tract
 (4) Both (1) and (3)
- 38.** In females which structure is homologous to penis of male ?
 (1) Uterus (2) Clitoris
 (3) Cervix (4) Vagina
- 39.** Spermatogenesis starts with the increase in the secretion of
 (1) oxytocin (2) relaxin
 (3) GnRH (4) LTH
- 40.** For normal fertility, what percentage of sperms must have normal shape and size ?
 (1) 40% (2) 60%
 (3) 50% (4) 25%
- 41.** A human female has the maximum number of primary oocytes in her ovaries
 (1) at birth
 (2) early in her fertile years
 (3) at menopause
 (4) at puberty
- 42.** Which among the following has 23 chromosomes?
 (1) Secondary oocyte
 (2) Oogonia
 (3) Spermatogonia
 (4) Zygote
- 43.** Division of human egg is
 (1) superficial meroblastic
 (2) discoidal meroblastic
 (3) equal holoblastic
 (4) unequal holoblastic
- 44.** Which hormones are secreted in women only during pregnancy.
 (1) Estrogen (2) Thyroxin
 (3) Progesterone (4) hCG
- 45.** Human placenta is derived from which of the following structure ?
 (1) Ectoderm (2) Trophoblast
 (3) Endoderm (4) Mesoderm
- 46.** Parturition is induced by
 (1) a neuroexocrine mechanism
 (2) a physio-chemical mechanism
 (3) a complex neuroendocrine mechanism
 (4) a simple neuroendocrine mechanism
- 47.** Menstrual flow occurs due to lack of
 (1) progesterone (2) FSH
 (3) oxytocin (4) vasopressin
- 48.** The main function of mammalian corpus luteum is to produce
 (1) estrogen only
 (2) progesterone and estrogen
 (3) human chorionic gonadotropin
 (4) relaxin only

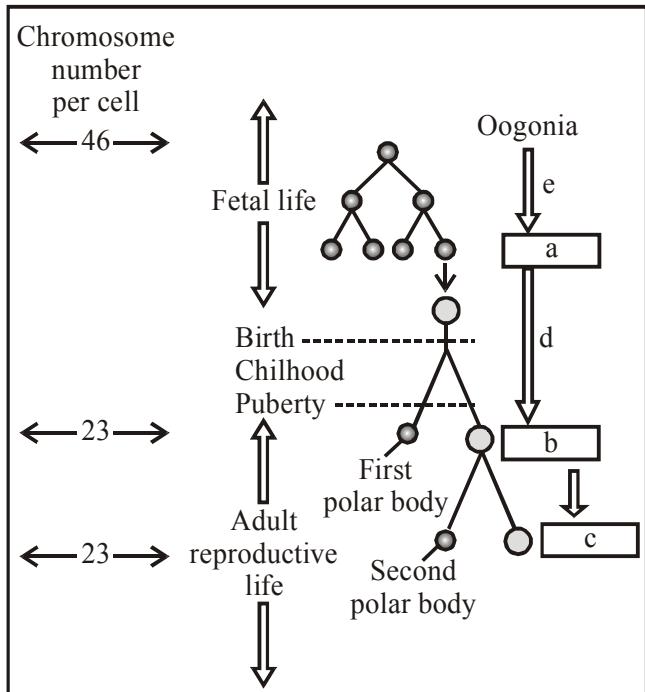
- 49.** The male accessory duct include
 (1) Penis, testis and ureter
 (2) Rete testis, vasa efferentia, epididymis and vas deferens
 (3) Ureter, urinary bladder and urethra
 (4) Ureter, urethra and penis
- 50.** Which duct ascends to abdomen and loops over the urinary bladder?
 (1) Rete testis
 (2) Vasa efferentia
 (3) Epididymis
 (4) Vas deferens
- 51.** Spermatozoa are nourished during their development by
 (1) Sertoli cells
 (2) Connective tissue cells
 (3) Interstitial cells
 (4) None of the above
- 52.** Cryptorchidism is a condition of testes
 (1) Unable to descend in scrotal sacs
 (2) Unable to produce sperms
 (3) Having been surgically removed
 (4) Having remained undeveloped
- 53.** Function of prostate glands is
 (1) Storage of semen
 (2) Provide motility to sperms
 (3) Formation of semen
 (4) Release of hormones
- 54.** The part of the fallopian tube which is closer to the ovary possess finger like projections called
 (1) Infundibulum (2) Isthmus
 (3) Ampulla (4) Fimbriae
- 55.** Mammary glands are modification of
 (1) Sebaceous glands
 (2) Sweat glands
 (3) Meibomian gland
 (4) None of the above
- 56.** During coitus, the human male ejaculates about
 (1) 200 to 400 million sperms
 (2) 100 to 200 million sperms
 (3) 200 to 300 million sperms
 (4) 200 to 300 billion sperms
- 57.** An egg is released and fertilised by sperm at which stage
 (1) Primary oocyte (2) Secondary oocyte
 (3) Oogonium (4) Ovum
- 58.** Which is absent in human sperm?
 (1) Nucleus
 (2) Mitochondria
 (3) Centriole
 (4) Endoplasmic reticulum
- 59.** In a mammalian sperm, spirally arranged mitochondria around an axial filament occurs in
 (1) Middle piece
 (2) Head
 (3) End piece of tail
 (4) Principal piece of tail
- 60.** Recognise the figure and find out the correct matching.



- (1) a-LH, b-FSH, c-estrogen, d-progesterone
 (2) b-LH, b-FSH, c-estrogen, d-progesterone
 (3) c-LH, d-FSH, c-estrogen, d-progesterone
 (4) d-LH, c-FSH, b-estrogen, a-progesterone

- 61.** Number of eggs released in the life time of a women is approximately
 (1) 40 (2) 400
 (3) 4000 (4) 2000
- 62.** Phase of menstrual cycle when ovulation occurs in
 (1) Luteal (2) Menstrual
 (3) Proliferative (4) Secretory
- 63.** Human placenta is formed by
 (1) Chlorionic villi
 (2) Umbilical cord
 (3) Uterine tissue
 (4) Both 1 and 3
- 64.** Which hormones is produced in women during pregnancy?
 (1) Human chorionic gonadotropin (hCG)
 (2) Relaxin
 (3) Human placental lactogen (hPL)
 (4) All the above
- 65.** Thick yellow, high protein fluid produced by mammary glands of a women during first 2-3 days after child birth is
 (1) Meconium (2) Hymen
 (3) *Cumulus oophorus* (4) Colostrum
- 66.** Signals from the fully developed foetus and placenta ultimately lead to parturition which requires the release of
 (1) Estrogen from placenta
 (2) Oxytocin from foetal pituitary
 (3) Oxytocin from maternal pituitary
 (4) Relaxin from placenta
- 67.** LH surge occurs during phase of menstrual cycle
 (1) Menstrual phase
 (2) Beginning of proliferative phase
 (3) Just before end of proliferation phase
 (4) At the middle of the cycle
- 68.** Read the following statements and find out the incorrect statements.
 a. Each testicular lobule contains one to three highly coiled seminiferous tubules in which sperm are produced.
 b. Each seminiferous tubule is lined on its inside by two types of cells called Leyding cells and Sertoli cells.
 c. The region outside the seminiferous tubules called interstitial space, contain small blood vessels and male germ cells (spermatogonia) which lead to sperm formation.
 d. In testis immunologically component cells are also present.
 e. The seminiferous tubules of the testis open into the rete testis through vasa efferentia.
 (1) b and c (2) b and d
 (3) d and e (4) b, c and e
- 69.** Sertoli cells secrete a hormone called
 (1) Gonadotropin
 (2) Testosterone
 (3) Relaxin
 (4) Inhibin
- 70.** The ovaries are located one on each side of the lower abdomen and is connected to the pelvic wall and uterus by
 (1) Ligaments
 (2) Tendons
 (3) Loose connective tissue
 (4) Dense irregular connective tissue
- 71.** From the mammary gland, the milk is sucked out through
 (1) Mammary duct (2) Mammary tubule
 (3) Mammary ampulla (4) Lactiferous duct
- 72.** In spermatogenesis, reductional division of chromosomes occurs during conversion of
 (1) Primary spermatocytes to secondary spermatocytes
 (2) Spermatogonia to primary spermatocytes
 (3) Spermatids to sperms
 (4) Secondary spematocytes to spermatids

73. Recognise the figure and find out the correct matching.



- a-primary oocyte, b-secondary oocyte, c-ovum, d-second meiotic division, e-first meiotic division.
- a-primary oocyte, b-secondary oocyte, c-ovum, d-first meiotic division, e-mitosis differentiation
- a-primary oocyte, b-secondary oocyte, c-polar body, d-second meiotic division, e-first meiotic division.
- a-first polar body, b-second polar body, c-ovum, d-first meiotic division, e-mitosis differentiation.

74. The cavity contained in Graafian follicle is :-
- Antrum
 - Centrocoel
 - Blastocoel
 - Archenteron
75. A cross section at midpoint of the middle piece of human sperm will show
- Centriole, mitochondria, 9+2 arrangement of microtubules
 - Centriole and mitochondria
 - Mitochondria and 9+2 arrangement of microtubules
 - 9+2 arrangement of microtubules only

76. Atretic follicles occur in

(1) Ovary

(2) Thymus

(3) Testis

(4) Liver

77. Menstrual cycle is characteristic of all female.

(1) Human, apes and monkeys

(2) Mammals

(3) Primates

(4) Both 1 and 3

78. Both corpus lutea and macula lutea are

(1) Found in human ovaries

(2) Source of hormones

(3) Characterised by yellow colour

(4) Contributory in maintaining pregnancy

79. Match the column.

	Column-I		Column-II
a	FSH	1	Maintain endometrium
b	LH	2	Develops female secondary sexual characters
c	Progesterone	3	Contraction of uterine wall
d	Estrogen	4	Development of corpus luteum
		5	Maturation of Graafian follicle

(1) a-5, b-4, c-1, d-2

(2) a-4, b-5, c-2, d-1

(3) a-4, b-3, c-2, d-5

(4) a-5, b-1, c-2, d-4

80. At menopause there is rise in urinary excretion of

(1) FSH

(2) STH

(3) MSH

(4) PRL

81. Disintegration of corpus luteum occurs due to inhibition of secretion of hormone.

(1) LTH

(2) FSH

(3) Progesterone

(4) LH

- 82.** Arrange the events in human female menstrual cycle
 (a)-Secretion of FSH, (b)-Growth of corpus luteum, (c)-Growth of follicle and oogenesis, (d)-Ovulation, (e)-Sudden increase in level of LH
 (1) a-c-e-d-b (2) c-a-d-b-e
 (3) a-d-c-e-b (4) b-a-c-d-e
- 83.** Thick/follicular cells surrounding oocyte in Graffian follicle belong to
 (1) Zona pellucida
 (2) Corona radiata
 (3) Zona vesculosa
 (4) Membrana granulosa
- 84.** Fill in the blanks :
 a. Zygote divides to form ...1... which is implanted to uterus
 b. The structure which provides vascular connection between foetus and uterus is called ...2...
 c. Inner cell mass contains certain cells called ...3... which have the potency to give rise to all the tissues and organs.
 d. By the end of ...4..., most of the major organ system are formed, for example, the limbs and external genital organs are well-developed.
 e. Immediately after implantation, the ...5... differentiates into an outer layer called ectoderm and an inner layer called endoderm.
 (1) 1-morula, 2-umbilical cord, 3-trophoblast, 4-second trimester, 5-stem cells
 (2) 1-blastocyst, 2-placenta, 3-stem cells, 4-first trimester, 5-trophoblast
 (3) 1-blastocyst, 2-umbilical cord, 3-stem cells, 4-second trimesters, 5-inner cell mass
 (4) 1-blastocyst, 2-placenta, 3-stem cells, 4-first trimester, 5-inner cell mass.
- 85.** Which is urinary bladder of child in womb?
 (1) Uterus (2) Liver
 (3) Allantois (4) Amnion
- 86.** Umbilical cord contains
 (1) Umbilicus
 (2) Placenta
 (3) Discus proligerus
 (4) Allantic artery and vein
- 87.** The cheap and convenient method of birth control is
 (1) vasectomy (2) IUDs
 (3) condom (4) pills
- 88.** How many statements are correct regarding an ideal contraceptive ?
 I. It should be user-friendly
 II. It should be easily available
 III. It should be ineffective and reversible with least side effects
 IV. It should be effective and reversible with least side effects
 V. It does not interfere with the sexual act of the user
 (1) I, II, IV, V (2) I, III, IV, V
 (3) All (4) I, II, III
- 89.** In this technique, the semen collected either from a husband or a healthy donor is artificially introduced either into the vagina or into the uterus of the female called
 (1) ICSI
 (2) ZIFT
 (3) GIFT
 (4) Intra-Uterine Insemination (I.U.I.)
- 90.** The main purpose of MTP is
 (1) increase population
 (2) decrease population size
 (3) get rid of unwanted female child legally
 (4) get rid of unwanted pregnancies due to failure of contraception or rapes
- 91.** People, especially vulnerable to STDs are in the age group
 (1) 5–15 (2) 40–60
 (3) 15–24 (4) 25–50

- 92.** Select correct matching in the following :

Column I		Column II	
I	Natural methods	A	Coitus Interrupts
II	IUDs	B	LNG-20
III	Barrier methods	C	Diaphragms
IV	Surgical methods	D	Saheli
V	Oral contraceptives	E	Vasectomy

- (1) I-B, II-D, III-C, IV-E, V-A
- (2) I-A, II-D, III-C, IV-E, V-B
- (3) I-E, II-D, III-C, IV-A, V-B
- (4) I-A, II-B, III-C, IV-E, V-D

- 93.** Cu ions released by Cu Ts plays a role in
- (1) supressing fertilizing capacity of sperms
 - (2) suppressing sperm motility
 - (3) increasing phagocytosis of sperms
 - (4) both (1) and (2)
- 94.** Which of the following method of contraception is effective only upto a maximum period of six months following parturition ?
- (1) Periodic abstinence
 - (2) Condoms
 - (3) Coitus interruptus
 - (4) Lactational amenorrhea
- 95.** Which of the following method of contraception is highly effective but has poor reversibility ?
- (1) IUD
 - (2) Barrier methods
 - (3) Sterillization
 - (4) Oral pills
- 96.** In which of the following methods, zygotes or early embryo upto 8 blastomeres could be transferred into the fallopian tube ?
- (1) ZIFT
 - (2) ICSI
 - (3) GIFT
 - (4) IUT

- 97.** A popular brand "Nirodh" is known for

- (1) IUD
- (2) Diaphragm
- (3) Contraceptive pill
- (4) Male Condom

- 98.** Oral contraceptive pills contain

- (1) progestogens only
- (2) progestogen-estrogen combination
- (3) progestogens-testosterone combinations
- (4) both (1) and (2)

- 99.** Select true statements regarding 'Saheli' given below?

- I. Developed at the CDRI, Lucknow
- II. Contains a steroid preparation
- III. "Once-a-week" pill
- IV. Many side effects
- V. High contraceptive value
- VI. Very few side effects
- VII. Low contraceptive value

- (1) I, II, III, IV, V (2) I, III, IV, V
- (3) I, II, III, V, VI (4) I, III, V, VI

- 100.** Which one of the following is the most widely accepted method of contraception in India as at present ?

- (1) IUDs (Intra Uterine Devices)
- (2) Cervical caps
- (3) Tubectomy
- (4) Diaphragms

- 101.** The assisted reproductive technology, IVF involves 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

- 102.** Which of the following is a hormone-releasing Intra Uterine Device (IUD) ?

- (1) Multiload 375 (2) LNG-20
- (3) Cervical cap (4) Vault

- 103.** "Saheli" oral contraceptive for females, was developed by
 (1) AIIMS, Delhi
 (2) IICB, Kolkata
 (3) SGPGI, Lucknow
 (4) CDRI, Lucknow
- 104.** Diaphragms, cervical caps and vaults prevent conception by
 (1) Increasing phagocytosis of sperms within uterus
 (2) Suppressing sperm motility
 (3) Inhibiting ovulation and implantation
 (4) Blocking the entry of sperms through the cervix
- 105.** Cu ions released from the copper releasing IUDs to
 (a) Suppress sperm motility
 (b) Make fallopian tube unsuitable for fertilization
 (c) Suppress fertilising capacity of sperms
 (d) Make cervix hostile to sperms
 (1) 1 and 2
 (2) 2 and d
 (3) 1 and 3
 (4) 1, 3 and 4
- 106.** Oral contraceptive pills have
 (1) Progestogens alone
 (2) Estrogen alone
 (3) Progestogen-estrogen combination
 (4) Either A or C
- 107.** Emergency contraceptives could be used to avoid possible pregnancy due to
 (1) Casual unprotected intercourse
 (2) Rape
 (3) MTP
 (4) Both 1 and 2
- 108.** Progesterone present in contraceptive pill is meant for
 (1) Checking ovulation
 (2) Preventing fertilisation
 (3) Preventing implantation of zygote
 (4) Preventing cleavage
- 109.** Nearly a million MTPs are performed in a year all over the world which accounts to b of the total number of conceived pregnancies in a year.
 (1) a-40 to 50, b=1/4th
 (2) a-40 to 50, b=1/5th
 (3) a-45 to 50, b1/4th
 (4) a-45 to 50, b-1/5th
- 110.** Amniocentesis is employed for determining
 (1) Cardiac ailments of embryo
 (2) Hereditary abnormalities in embryo
 (3) Errors in amino acid metabolism in embryo
 (4) All the above
- 111.** Early symptoms of the most of the STDs are
 (a) Itching in pelvic region
 (b) Fluid discharge in pelvic region
 (c) Slight pain in pelvic region
 (d) Swelling in pelvic region
 (e) Pelvic inflammatory disease (PID)
 (f) Still births
 (1) a, b and c (2) a, b, c and d
 (3) a, b, c and e (4) All of the above
- 112.** Female who cannot produce ovum, but can provide suitable environment for fertilisation and further development, could be assisted by
 (1) ZIFT (2) GIFT
 (3) ICSI (4) IUI

113. In which ART technique, the semen is artificially introduced into the female?

- (1) ET (2) IUI
 (3) IUT (4) GIFT

114. The first nation in the world to initiate various action plans at national level towards attaining a reproductively healthy society is

- (1) India (2) China
 (3) USA (4) Norway

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	3	1	3	2	3	3	3	2	3	3	3	3	1	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	1	3	3	4	2	1	1	4	4	1	2	3	2	1
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	2	4	4	2	4	3	2	3	2	1	1	4	4	2
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	3	1	2	2	4	1	1	2	4	2	3	2	4	1	1
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	2	3	4	4	4	3	4	4	4	1	4	1	2	1	3
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	1	4	3	1	1	4	1	2	4	3	4	3	1	4	4
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	3	4	4	4	3	1	4	4	4	1	2	2	4	4	3
Que.	106	107	108	109	110	111	112	113	114						
Ans.	4	4	1	4	2	2	2	2	1						

PRINCIPLES OF INHERITANCE AND VARIATION

1. Read the following statements and find out the **incorrect** statement.
 - (a) Genetics deals with the inheritance, as well as variation of characters from parents to offspring.
 - (b) Variation is the process by which characters are passed on from parent to progeny.
 - (c) Inheritance is the basis of heredity
 - (d) Inheritance is the degree by which progeny differ from their parents
 - (e) Human knew from as early as 8000-10000 B.C. that one of the causes of variation was hidden in sexual reproduction

(1) b, d and e	(2) a, c and e
(3) b and d only	(4) e only
2. Sahiwal cow in a was developed by b
 - (1) a-Punjab, b-Natural selection and Domestication
 - (2) a-Haryana, b-Natural selection and Artificial selection
 - (3) a-Haryana, b-Artificial selection and domestication
 - (4) a-Punjab, b-Artificial selection and Domestication
3. Phenotype of an organism is the result of
 - (1) Mutations and linkages
 - (2) Genotype and environment interaction
 - (3) Cytoplasmic effects and nutrition
 - (4) Environment changes and sexual dimorphism
4. Which is wrong about Mendel ?
 - (1) He was born in 1822
 - (2) Mendel presented his work in the form of a paper at Heinzendorf in 1856
 - (3) Mendel carried out his experiments for 7 years
 - (4) Mendel died in 1884
5. Select one word for the statement. Dominance, co-dominance, incomplete dominance
 - (a) If F_1 resembled both the parents
 - (b) If F_1 did not resemble either of the two parents and was in between the two
 - (c) If F_1 resembled either of the two parents
 - (1) c-dominance, b-codominance, a-incomplete dominance
 - (2) a-dominance, c-codominance, c-incomplete dominance
 - (3) b-dominance, a-codominance, c-incomplete dominance
 - (4) c-dominance, a-codominance, b-incomplete dominance
6. In the case of *Antirrhinum sp.* the recessive trait is seen in progenies due to the
 - (i) The normal enzyme
 - (ii) Less-efficient enzyme
 - (iii) Non-functional enzyme
 - (iv) No enzyme at all

Select the correct option among (i-iv)

 - (1) ii, iii
 - (2) iii, iv
 - (3) i, iii
 - (4) i, ii
7. tt mates with Tt. What will be characteristic of offspring?
 - (1) 75% recessive
 - (2) 50% recessive
 - (3) 25% recessive
 - (4) All dominant
8. Mendel's principle of segregation is based on separation of alleles during
 - (1) Gamete formation
 - (2) Seed formation
 - (3) Pollination
 - (4) Embryonic development
9. O group mother with O group child sues AB group man for fatherhood of child. What is true?
 - (1) The claim is correct
 - (2) Father is true mother is not
 - (3) Both parent are false
 - (4) Mother is true but father's claim is wrong

- 10.** Children in a family have blood types O, A, AB and B respectively. What are the genotypes of their parents?
- $I^A i$ and $I^B i$
 - $I^A I^B$ and ii
 - $I^B I^B$ and $I^A I^A$
 - $I^A I^A$ and $I^B i$
- 11.** If a pea produces 2560 seeds during a dihybrid cross between round-yellow and wrinkled-green plant. Then how many seed are wrinkled-yellow, round-yellow and wrinkled-green respectively.
- 640, 480, 1280
 - 480, 1440, 160
 - 640, 1280, 320
 - 160, 1440, 480
- 12.** If there is complete linkage in F_2 generation
- Parental types and recombinants appear in equal ratio
 - Recombinants are less than parental types
 - Recombinants are more than parental types
 - There will be only parental types
- 13.** Read the following statements.
- In haplo-diploid sex-determination system, the males do not have father and thus cannot have sons, but have a grandfather and can have grandsons
 - In honey bee, workers are developed by the unfertilized egg by means of parthenogenesis
 - In human skin colour, the effect of each allele is additive
 - In XO type of sex-determination, male have half number of chromosome than the female
- Select the incorrect statement.
- | | |
|------------|-------------|
| (1) i, iii | (2) ii, iii |
| (3) ii, iv | (4) i, iv |
- 14.** Choose the wrong statement.
- In grasshoppers besides autosomes, males have only one X-chromosome whereas females have a pair of X-chromosomes
 - In *Drosophila*, male have one X-and one Y-chromosome whereas females have a pair of X-chromosomes besides autosomes
 - In birds, females have one Z-and one W-chromosome, whereas males have a pair of Z-chromosomes besides autosomes.
 - In insects with XO type of sex determination, all sperms have X-chromosome besides autosomes.
- 15.** Which is incorrect about colour blindness?
- This is due to defect in either red or green cone of eye resulting in failure to discriminate between red and green colour.
 - A daughter will not normally be colour blind, unless her mother is a carrier and her father is colour blind.
 - If female has $X^C X$ then it is called carrier but when male has then $X^C Y$ then it will be colour blind
 - The son of a woman who carries the gene has 25 per cent chance of being colour blind.
- 16.** Read the following statements and find out the incorrect statement.
- Alpha thalassemia is controlled by two closely linked genes HBA_1 and HBA_2 on chromosome 16 of each parent and it is observed due to matution deletion of one or more of the four genes.
 - Beta thalassemia is controlled by a single gene HBB on chromosome 11 of each parent and occurs due to mutation of one or both the genes.
 - Beta thalassemia is also called Cooley's anamia or thalassemia major
 - None of the above

17. A woman with two genes, one for haemophilia and one for colour blindness on one of its X-chromosomes, marries a normal man. The progeny will be :-

- All sons are haemophilic and colour blind
- 50% sons are haemophilic and colour blind and 50% normal
- All daughters are haemophilic and colour blind
- 50% daughters are haemophilic and 50% colour blind daughters

18. A male human is heterozygous for autosomal genes A and B. He is also hemizygous for haemophilic gene h. What proportion of sperms will carry abh?

- 1/8
- 1/32
- 1/4
- 1/16

19. Pick out the correct statements.

- Haemophilia is a sex-linked recessive character
- Down's syndrome is due to aneuploidy
- Phenylketonuria is an autosomal dominant gene disorder
- Phenylketonuria is an autosomal recessive gene disorder
- Sickle cell anaemia is an X-linked recessive gene disorder
- a, b, d correct
- a, c, e correct
- a, c correct
- b, e correct

20. Select the **incorrect** statement from the following.
- Baldness is a sex limited trait
 - Linkage is an exception to the principle of independent assortment
 - Galactosemia is an inborn error of metabolism
 - Small population size results in random genetic drift in a population

21. Which of the following statements is not true of two genes that show 50% recombination frequency?

- The genes show independent assortment
- If the genes are present on the same chromosome, they undergo more than one crossovers in every meiosis
- The genes may be on different chromosomes
- The genes are tightly linked

22. The Punnet square shown below represents the pattern of inheritance in dihybrid cross when yellow (Y) is dominant over green (y) and round (R) is dominant over wrinkled (r) seed.

	YR	Yr	yR	yr
YR	F	J	N	R
Yr	G	K	O	S
rR	H	L	P	T
yr	I	M	Q	U

A plant of type 'H' will produce seeds with the genotype identical to seeds produced by the plants of

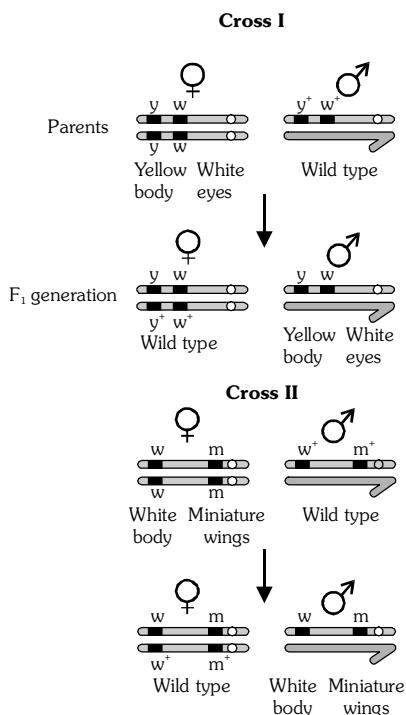
- Type M
- Type J
- Type G
- Type N

	Column-A		Column-B
I	Autopolyploidy	A	2n+1
II	Aneuploidy	B	AAAA
III	Allopolyploidy	C	AABB
IV	Nullisomy	D	2n-2

The correct match is

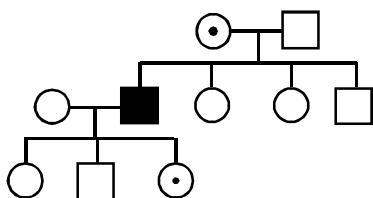
- I-B, II-A, III-C, IV-D
- I-B, II-A, III-D, IV-C
- I-B, II-D, III-C, IV-A
- I-D, II-A, III-B, IV-C

24. The experiment shown in the figure below has been carried out by Morgan to show the phenomenon of linkage and recombination. If in Cross I, genes are tightly linked and in Cross II, genes are loosely linked then what will be the percentage of recombinants products in Cross I and Cross II, respectively.



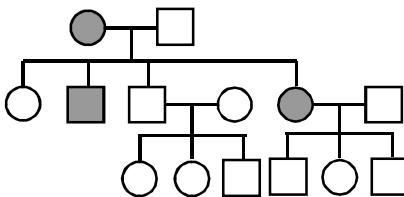
- (1) 28.7% and 62.8%
- (2) 1.3% and 37.2%
- (3) 37.2 and 1.3%
- (4) 62.8% and 98.7%

25. Predict from the following chart.



- (1) Character is dominant and carried by X chromosomes
- (2) Character is carried by Y chromosomes
- (3) Character is sex-linked recessive
- (4) Character is recessive codominant

26. Study the pedigree chart of a certain family given below. It is related to myotonic dystrophy.



The trait traced in the above pedigree chart is

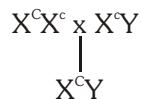
- (1) Dominant X-linked
- (2) Recessive X-linked
- (3) Autosomal dominant
- (4) Recessive Y-linked

27. Haemophilia is a condition in which blood fails to clot or clots only very slowly. The studies of this human sex-linked trait show that
- (a) every Y chromosome carries the dominant allele
 - (b) a X chromosome carries the recessive allele
 - (c) both X and Y chromosomes can bear the recessive allele
 - (d) neither X nor Y chromosomes can bear the recessive allele

Which of the following offspring could be produced by a normal homozygous female and a hemophiliac male?

- (1) Normal males and normal females
- (2) Haemophiliac males and normal females
- (3) Normal males and carrier females
- (4) Haemophiliac males and carrier females

28. Red-green colour-blindness is a sex-linked trait in humans X^C =normal allele and X^c =colourblind allele in the following cross.



Which of the groups shown below consists of Patient grandparents?

	Maternal Grandmother	Maternal Grandfather	Paternal Grandmother	Paternal Grandfather
(1)	$X^C X^c$	$X^c Y$	$X^C X^c$	$X^c Y$
(2)	$X^C X^c$	$X^c Y$	$X^C X^c$	$X^c Y$
(3)	$X^C X^c$	$X^c Y$	$X^C X^c$	$X^c Y$
(4)	$X^C X^c$	$X^c Y$	$X^C X^c$	$X^c Y$

- 29.** Which of the following is suitable for experiments on linkage? (Coupling)
 (1) $AABB \times aabb$ (2) $AaBb \times AaBb$
 (3) $AABB \times aaBB$ (4) $AAbb \times AaBB$
- 30.** Go through following statements and choose the correct option
 (A) Sutton united the knowledge of chromosomal segregation with Mendelian principles and called it the chromosomal theory of inheritance
 (B) Genes are the units of inheritance
 (C) There are 5 different alleles which determine ABO blood types
 (D) The phenotypic ratio of Mendelian monohybrid cross is 3 : 1
 (1) All are correct
 (2) All are incorrect
 (3) A, B, D are correct
 (4) A, B and C are correct
- 31.** A true-breeding purple-flowered pea plant is crossed with a white-flowered plant. They produce two F_1 progeny that are then mated with each other to yield 10 F_2 plants. The F_2 contains 5 purple-flowered plants and 5 white-flowered plants. Which of the following is the best explanation for the F_2 results?
 (1) They are exactly what is expected from Mendel's laws
 (2) They are similar to, but not exactly, what Mendel's laws predict
 (3) They are rather different from predictions, probably due to small sample size
 (4) The F_2 plants must have suffered a mutation before mating
- 32.** Go through following statements
 (I) Enborn error of metabolism
 (II) Homozygous recessive autosomal alleles on chromosome 12 cause the absence of the specific enzyme
 (III) A specific amino acid does not change into tyrosine
 (IV) Accumulation of phenylpyruvic acid and other derivatives lead to mental retardation
 The above facts refer to
 (1) Phenylketonuria
 (2) Haemophilia
 (3) Turner's syndrome
 (4) Down's syndrome
- 33.** Find the incorrect statement with respect to chromosomal mapping.
 (1) Crossing over is important in locating genes on the chromosome
 (2) Recombination frequency depends upon the distance between the genes
 (3) Recombination frequency is inversely proportional to distance between the genes
 (4) The sequences and the relative distance between various genes is graphically represented in terms of recombination frequencies
- 34.** Consider the following four statements A, B, C and D and then select the right option for incorrect statements.
 (A) Mendelian experiments has a large sampling size, which gave greater credibility to the data that he collected
 (B) Recessive allele influences the appearance of the phenotype, even in the presence of an alternative allele
 (C) Multiple alleles can be found only when individual studies are made
 (D) In F_2 generation of a Mendelian monohybrid cross, the tall and dwarf traits were identical to their parentl types and show blending
- The incorrect statements are
 (1) A and C (2) C and D
 (3) B, C, D (4) B and D
- 35.** In rabbit black skin (B) is dominant over brown skin(b) and short (S) is dominant over long hair(s) if homozygous black-short haired male is crossed with homozygous brown long haired female. All F_1 offspring are heterozygous black short haired F_1 male crossed with F_1 female. If F_2 generation what is the percentage of homozygous black short haired offspring?
 (1) 50% (2) 12.5%
 (3) 6.25% (4) 28%

- 36.** Why did not Mendel find linkage?
- Some genes were linked but they were too close together to cross over
 - All seven genes were on separate chromosomes
 - Mendel did not detect linkage. He discovered this genetic phenomenon
 - Some genes were linked but they were too far apart for crossing over to be distinguished from independent assortment or linked genes were never tested for at the same time in the same cross
- 37.** Read the following statements and find out the incorrect statements.
- Though the genotypic ratios can be calculated using mathematical probability, by simply looking at the phenotype of recessive trait, it is not possible to know the genotypic composition.
 - The $1/4 : 1/2 : 1/4$ ratio of TT : Tt : tt is mathematically condensable to form of the binomial expression $(ax + by)^2$, that has the gametes bearing genes T and t in equal frequency of 1/2.
 - Based on his observation on dihybrid crosses Mendel proposed two rules that are called Principles or Laws of Inheritance : the First Law or Law of Dominance and the Second Law or Law of Segregation.
 - If in test cross, all the progenies shows dominant trait then the unknown parent is heterozygous dominant.
 - ABO blood groups are controlled by three alleles I^A , I^B and i . I^A and I^B produce a slightly different type of the sugar while allele i doesn't produce any sugar.
- (1) a, c and d (2) b, d and e
 (3) a and c only (4) c and d only
- 38.** Read the following statements and find out the correct statements.
- The sex determination in honey bee is based on the number of sets of chromosomes an individual receives.
 - An offspring formed from the union of a sperm and an egg develops as a male (drone) by means of parthenogenesis.
- c. The females are diploid having 32 chromodomes and males are haploid, i.e., having 16 chromosomes.
- d. This is called as haplo-diploid sex-determination system and has special characteristic features such as the males produce sperms by mitosis they do not have father and thus cannot have sons, but have a grandfather and can have grandsons.
- (1) a and b (2) b, c and d
 (3) a, c and d (4) a, b, c and d
- 39.** Sickle cell anaemia is an example of
- Mendelian disorder
 - Genetic disorder
 - Chromosomal disorder
 - Inborn error of metabolism
 - Point mutation
 - Frame - Shift mutation
 - Sex-linked disease
 - Recessive disorder
 - Qualitative disorder
 - Quantitative disorder
 - Autosomal disorder
- (1) i, ii, iv, v, viii, x, xi (2) i, v, viii, ix, xi
 (3) i, ii, v, viii, ix, xi (4) ii, iii, v, vii, ix
- 40.** Which is incorrect about thalassemia ?
- This blood disease is transmitted from parents to the offspring when both the partners are unaffected carrier for the gene (or heterozygous).
 - The defect is due to either mutation or deletion which ultimately results in reduced rate of synthesis of one of the globin chains that make up haemoglobin.
 - This causes the formation of abnormal haemoglobin molecule resulting into anaemia which is characteristic of the disease.
 - Thalassemia differs from sickle cell anaemia in that the former is a qualitative problem of synthesising an incorrectly functioning globin while the latter is a quantitative problem of synthesising too few globin molecules.

- 41.** Select the autosomal dominant, autosomal recessive, X-sex linked recessive and Y-linked disorders respectively.
- Myotonic dystrophy, SCA, Haemophilia and hypertrichosis
 - Huntington's chorea, PKU (phenylketonuria), colour-blindness and webbed toes.
 - Polydactyly, Thalassemia G-6-P dehydrogenase deficiency and long hairs on pinna
 - All of the above
- 42.** Albinism is due to non-synthesis of melanin on account of absence of
- Melanase
 - Luciferase
 - Tyrosinase
 - Lysine
- 43.** For the MN-blood group system, the frequencies of M and N alleles are 0.7 and 0.3, respectively. The expected frequency of MN-blood group bearing organisms is likely to be
- 42%
 - 49%
 - 9%
 - 58%
- 44.** A cow with red coat is crossed with a bull having white coat. Their offspring produced in F_1 generation showed roan coat. This effect is produced due to juxtaposition of small patches of red and white colour. What can be assumed about the gene controlling coat colour in cattle?
- The alleles of gene controlling coat show a perfect dominant recessive relationship.
 - The alleles of gene controlling coat colour are incompletely dominant
 - The alleles of gene controlling coat colour are co-dominant
 - None of these
- 45.** True-breeding red-eyed *Drosophila* flies with plain thoraxes were crossed with pink-eyed flies with striped throaxes.
Red eye plain throax \times Pink eye striped throax
The F_1 flies were then test crossed against the double recessive.
The following F_2 generation resulted from the cross:

80	16	12	92
Red eye	Red eye	Pink eye	Pink eye
Plain thorax	striped thorax	Plain thorax	striped thorax

What percentage of recombinants resulted from the test cross?

- 12
- 14
- 16
- 28

- 46.** Depending upon the distance between any two genes which is inversely proportional to the strength of linkage, cross overs will vary from:-
- 50-100%
 - 0-50%
 - 75-100%
 - 100-150%

- 47.** If map distance between genes P and Q is 4 units between P and R is 11 units, and between Q and R is 7 units, the order of genes on the linkage map can be tracted as follows.

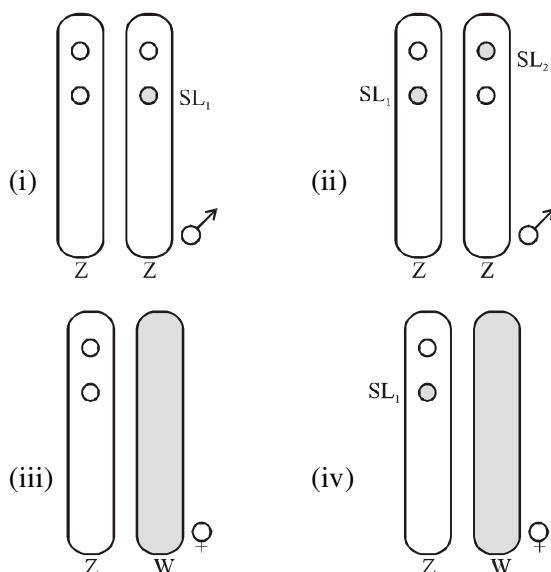
- Q P R
- P Q R
- P Q R
- P Q P R Q R

- 48.** More than two alternate forms of a gene present on the same locus are called (i). They are produced due to repeated (ii) of the same gene but in different directions. Their well known example is (iii).

Which of the following correctly fills the above statement?

	(i)	(ii)	(iii)
(1)	Epistatic genes	crossing over	polydactyly
(2)	Multiple alleles	mutations	human blood groups
(3)	Supplementary genes	mutations	hypertrichosis
(4)	Linked genes	crossing over	alkaptonuria

49. Males of silkworm *Bombyx mori* are known to produce more silk per unit quantity of leaf consumed. Hence, they are preferably bred in sericulture industry. Which of the following genotypes should be crossed in order to get maximum fraction of male insects :-

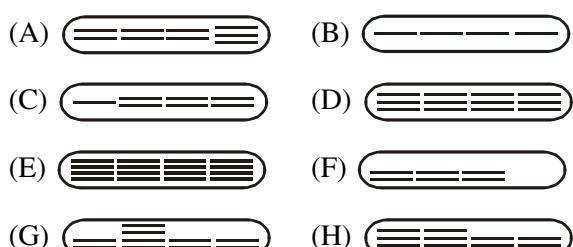


Note: SL₁ and SL₂ are sex-linked recessive lethal mutations.

- (1) (i) and (iv) (2) (i) and (iii)
 (3) (ii) and (iii) (4) (ii) and (iv)

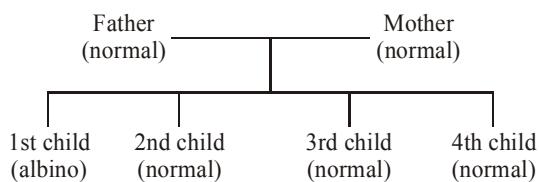
50. Assign the correct names from the following list to the figures below.

- (i) trisomic (ii) tetrasomic (iii) tetraploid (iv) double trisomic (v) triploid (vi) haploid (vii) nullisomic (viii) monosomic



- (1) I - A, II - G, III - E, IV - H, V - D, VI - B, VII - F, VIII - C
 (2) I - A, II - G, III - C, IV - B, V - D, VI - H, VII - F, VIII - E
 (3) I - A, II - B, III - C, IV - H, V - D, VI - G, VII - F, VIII - E
 (4) I - A, II - G, III - E, IV - D, V - H, VI - B, VII - C, VIII - F

51. Refer to the following family tree.



If A = normal allele and a = albino allele, the genotypes of these parents are

	Father	Mother
(1)	Aa	Aa
(2)	AA	AA
(3)	AA	Aa
(4)	Aa	AA

52. If fruit flies, long wing is dominant to vestigial wing. When heterozygous long - winged flies were crossed with vestigial-If an exact mendelian ratio had been obtained, then the number of each phenotype would have been

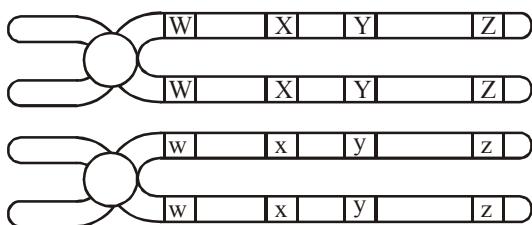
	Long - Winged	Vestigial - Winged
(1)	64	128
(2)	96	96
(3)	128	64
(4)	192	0

53. In snapdragon plants, broad leaf is completely dominant to narrow leaf whereas red flower colour is incompletely dominant to ivory. (The genes for leaf width and flower colour are not linked).

If plant which is heterozygous for both genes is crossed with a true - breeding broad - leaved red - flowered plant, then the expected proportion of broad - leaved plants with pink flowers amongst the offspring would be

- (1) 1 in 4 (2) 2 in 4
 (3) 3 in 4 (4) 4 in 4

54. The diagram opposite shows a pair of homologous chromosomes during meiosis.



Maximum crossing over will occur between genes

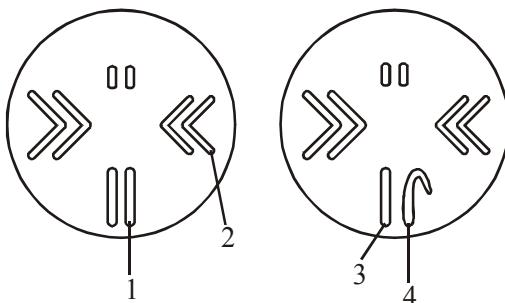
- (1) W and X (2) X and Y
 (3) Y and Z (4) W and Z

55. The following table shows the genotypes for ABO blood grouping and their phenotypes. In which one of the four options the components of reaction labelled as W, X, Y and Z are identified correctly?

S. NO.	Genotype	Blood Group
1	I ^A I ^A	A
2	W	A
3	I ^B I ^B	B
4	X	B
5	I ^A I ^B	Y
6	Z	O

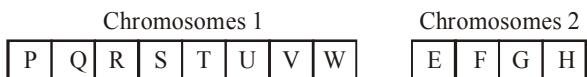
- W X Y Z
 (1) I^Ai I^Bi AB ii
 (2) I^Bi I^Ai B ii
 (3) I^Bi I^Bi A ii
 (4) I^Ai I^Ai O ii

56. The diagram refer to the chromosome complement of each sex of fruit fly shown in the diagram -



By which number is a Y chromosome labelled?
 (1) 1 (2) 2 (3) 3 (4) 4

57. The following diagram shows two chromosomes. The lateral represent of genes.



Which of the following would result if a translocation occurred between chromosomes 1 and 2?

- (1)

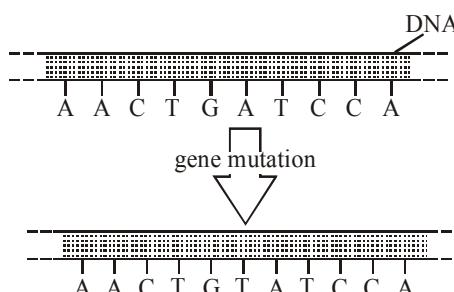
P	Q	R	S	W	V	U	T
E	F	H	G				
- (2)

P	Q	R	S				
T	U	V	W	E	F	G	H
- (3)

P	Q	S	T	U	V	W	
E	F	H					
- (4)

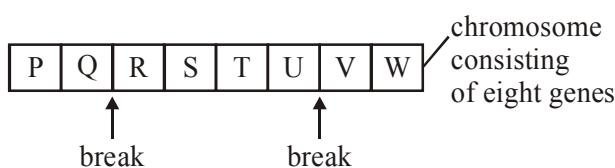
P	Q	R	T	U	V	W	V	W
E	F	G	H	G	H			

58. What name is given to the type of gene mutation illustrated in the following diagram?



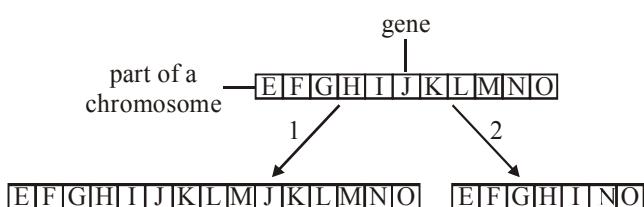
- (1) inversion
 (2) Deletion
 (3) insertion
 (4) Substitution

- 59.** The chromosome shown in the diagram below became broken at the points indicated by arrows and the genes between these points become inverted.



The resulting order of the genes was

- (1) PQUITSRVW
 - (2) WVUTSRQP
 - (3) PQTURSVW
 - (4) VWUTRSRPQ
- 60.** The following diagram shows two types of chromosomes mutation.



These are called

- | 1 | 2 |
|-----------------|--------------|
| (1) duplication | deletion |
| (2) duplication | substitution |
| (3) inversion | deletion |
| (4) inversion | substitution |
- 61.** Mendel's law of segregation states that :-
- (1) the two factors for the same trait separate in the production of gametes
 - (2) the two different traits will be inherited independently of each other
 - (3) the gametes are produced by meiosis
 - (4) All of the above

- 62.** Kernal colour in corn is a trait determined by two alleles. The dominant allele (P) produces a purple colour, and the recessive allele (p) produces a yellow colour. The diagram below shows an ear of corn produced by crossing two corn plants. The shaded kernels are purple, and the unshaded ones are yellow.



The yellow kernels can be best described as

- (1) homozygous dominant
 - (2) hybrid
 - (3) heterozygous
 - (4) homozygous recessive
- 63.** If Mendel had studied 8 traits using pea plant with 14 chromosomes, he would
- (1) Not have proposed that chromosomes are carriers of hereditary factor
 - (2) Not have discovered the law of independent assortment
 - (3) have not discovered sex linkage
 - (4) have discovered polygenic inheritance
- 64.** If enough crosses are made between male flies of genotype Aa and the female flies of genotype aa to produce about 1000 offsprings, which one of the following is the most likely distribution of genotypes in the offsprings?

- (1) 750 Aa : 250 aa
- (2) 481 Aa : 519 aa
- (3) 249 aa; 751 aa
- (4) 243 AA:517 aa:240 aa

- 65.** In an example of incomplete dominance, pure red flowers are crossed with pure white flowers and the F_1 individuals have pink flowers, which one of the following is **not correct**?
- Half of the offspring of the pink flowers will be homozygous if the pink flowers are self - pollinated
 - The gene of the hybrid pink flowers will segregate if self - pollinated
 - Pink flowers will produce only pink flowers
 - Pink flowers will produce three kinds of flowers if self - pollinated
- 66.** Normal maize has starch seeds which remain smooth when dry. A mutant form has sugary seeds, which gowrinckled dry. When a mutant was crossed with a normal plant, an F_1 was produced which has smooth seeds. What would be the relative ratios of the different seed types, if the F_1 was allowed to self?
- 1 smooth : 3 sugary
 - 3 smooth : 1 sugary
 - 1 smooth : 1 sugary
 - All sugary
- 67.** A black hybrid mouse is crossed with a pure brown mouse to produce a total of 24 young ones. Which of the following result is most likely to be **correct**?
- 13 black males and 11 black females
 - 11 brown males and 13 brown females
 - 8 black males, 10 black females, 3 brown males, 3 brown females
 - 5 black males, 6 brown males, 7 black females, 6 brown females
- 68.** Mendel found that the reciprocal crosses yielded identical results. From that
- there is no dominance of any trait
 - sex has no influence on the traits
 - there is independent assortment of traits
 - sex plays a role in the deciding the dominance of a trait

- 69.** Match the definitions in column II with the **correct** term in column I.

	Column - I		Column - II
(A)	Codominance	(1)	True - breeding variety
(B)	Homozygous	(2)	Cross between two hybrids
(C)	Heterozygous	(3)	Cross that involves two different gene pairs
(D)	Phenotype	(4)	An allele that is not expressed in the phenotype
(E)	Polygenic (quantitative)	(5)	The physical characteristics of an individual
(F)	Pleiotropy	(6)	Genotype with two different alleles
(G)	Epistasis	(7)	Genotype with multiple alleles for same locus
(H)	Test cross	(8)	One gene influences the expression of other gene
(I)	Dihybrid cross	(9)	Both alleles are fully expressed in heterozygous
(J)	Incomplete dominance	(10)	Single gene with multiple phenotypic effects
		(11)	Heterozygote is intermediate between homozygous phenotypes
		(12)	Two or more genes with additive effect on phenotype
		(13)	Cross with homozygous recessive to determine genotype of unknown

- A-9, B-1, C-6, D-5, E-12, F-10, G-8, H-13, I-3, J-11
- A-10, B-6, C-2, D-4, E-14, F-13, G-12, H-9, I-7, J-5
- A-5, B-12, C-10, D-11, E-13, F-8, G-7, H-13, I-2, J-1
- A-1, B-2, C-4, D-7, E-6, F-10, G-8, H-11, I-12, J-13

70. Match the following columns :-

	Column - I	Column - II
(A)	An organism that has two identical alleles for a given characteristic	(1) Law of segregation
(B)	An organism that has one copy of each allele for a given characteristic	(2) Rule of multiplication
(C)	Principle that describes the probability of a given outcome when that outcome can happen in two or more ways	(3) Rule of addition
(D)	Principle that describes the probability of any two or more events happening together	(4) Heterozygous
(E)	The observation that genetic elements separate when gametes are formed	(5) Homozygous

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

71. In Drosophila, the following crossing over percentages were found

Gene	Gene	Crossing over %
bi	ec	1.4
bi	fa	3.9
wi	ec	4.0
wi	fa	1.5

What is the order of these genes?

- (1) bi-ec-fa-wi (2) bi-ec-wi-fa
- (3) ec-bi-fa-wi (4) ec-bi-wi-fa

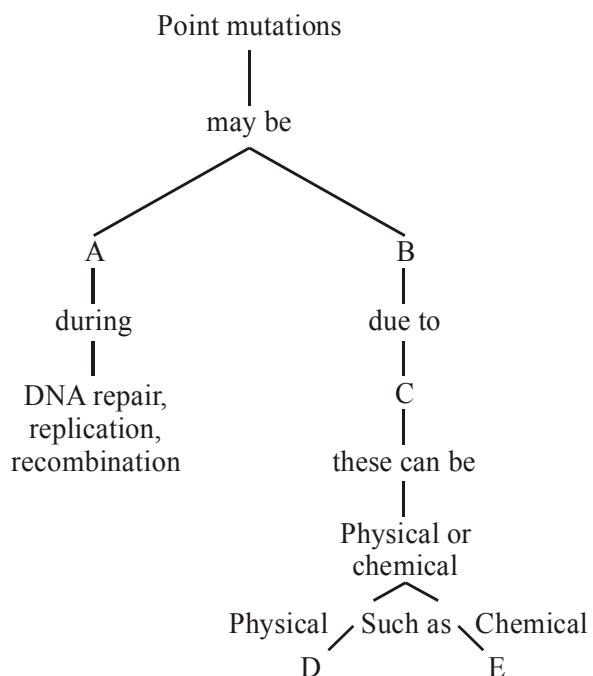
72. One of the reason why haploids are considered more suitable than diploids for the study of mutation is that the haploids :-

- (1) Have shorter generation time
- (2) Have small number of chromosomes
- (3) Allow expression of recessive mutations immediately (or in first generation)
- (4) can be obtained in large number to give correct estimate of mutation theory

73. Dominant mutations are easier to detect than recessive mutations because they

- (1) are always lethal and so their appearance is unmistakable
- (2) are expressed in both homozygotes and heterozygotes
- (3) occur at a higher frequency
- (4) are always neutral in their effect

74. What are shown by A, B, C, D and E in the given figure?



- (1) A - Artificial, B - Spontaneous, C - Radiation like X-rays, D - Mutagens, E - Base analogues, HNO_3
- (2) A - Individual, B - Artificial, C - Mutagens, D - HNO_2 , E - Radiation like X-rays
- (3) A - Spontaneous, B - Artificial, C - Mutagens, D - X - Rays, E - Base analogues, HNO_2
- (4) A - Artificial, B - Spontaneous, C - Mutagens, D - Radiation like X - rays, E - Base analogues, HNO_2

75. The linkage map of X - chromosomes of fruitfly has 66 units, with yellow body gen (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be
 (1) $\leq 50\%$ (2) 100%
 (3) 66% (4) $> 50\%$

76. Match the following columns :-

	Column - I		Column - II
(A)	A heritable disorder linked to genes on the non - sex chromosomes.	(1)	Linkage
(B)	Traits close enough together on a chromosome disorder to segregate together	(2)	Autosomal
(C)	The exchange occurring between homologous areas of the chromosome during meiosis	(3)	Pedigree
(D)	An individual whose genome has one functional allele and one non - functional allele.	(4)	Heterozygous
(E)	A heritable disease caused by the presence of one defective allele	(5)	Carrier
(F)	A defective allele on the non - sex chromosomes that causes a disease	(6)	Recombination
(G)	A chart of members of a single family showing the occurrence pattern of a disease	(7)	Dominant disorder

- (1) A-2, B-1, C-6, D-4, E-7, F-5, G-3
 (2) A-1, B-2, C-6, D-4, E-7, F-5, G-3
 (3) A-6, B-2, C-1, D-4, E-7, F-5, G-3
 (4) A-1, B-2, C-6, D-7, E-4, F-6, G-3

77. Match the following columns.

	Column - I		Column - II
(A)	A chromosome fragment lost during meiotic recombination	(1)	Inversion
(B)	A 'picture' of a set of chromosome	(2)	Karyotype
(C)	A piece of the chromosome that gets flipped during recombination	(3)	Deletion
(D)	Movement of a piece of one chromosome to another	(4)	Duplication
(E)	Repeated DNA sequences produced by unequal crossing over	(5)	Translocation
(F)	Non - disjunction	(6)	A segment of the sequence is turned over and reinserted
(G)	Translocation	(7)	Exchange of material between non - homologous
(H)	Inversion	(8)	A portion of the message is completely lost
(I)	Duplication	(9)	Certain sequence are copied more often than others
(J)	Deletion	(10)	Chromosomes fail to sort properly during meiosis

- (1) A-3, B-2, C-1, D-5, E-4, F-10, G-7, H-6, I-9, J-8
 (2) A-2, B-3, C-1, D-5, E-4, F-10, G-7, H-6, I-9, J-8
 (3) A-1, B-2, C-3, D-5, E-4, F-10, H-6, I-9, J-10
 (4) A-10, B-2, C-1, D-5, E-4, F-3, G-7, H-6, I-9, J-8

- 78.** In human, red - green colour blindness is a sex - linked recessive while albinism is Autosomal recessive. A marriage between two homozygous parents, a normal visioned albino woman and a colourblind and normally pigmented man will produce children
- who are all phenotypically normal visioned and have normal pigmentation
 - half of whom are colourblind and other half having normal vision and all of them having normal pigmentation
 - all of whom have normal vision, but half of whom are albino and the other half with normal pigmentation
 - of four categories normal visioned pigmented; normal visioned albino; colourblind pigmented; colourblind, albino; all are in equal proportions
- 79.** Sita and Ram have their first child. Sita know her blood type is A, but Ram does not know his blood type. However, Ram knows that both his mother and father have type B blood, the first child is a boy named kush. Kush has type O blood. Sita and Ram do not understand how this happened. Which of the following is the best explanation?
- Sita's genotype is AA and Ram's genotype is OO; thus, skip expression the O phenotype
 - Sita's Genotype is AO and Ram's genotype is OO; thus, skip expresses the O phenotype
 - Because Ram's parents are both type B, Ram is not Khush's father
 - Kush's blood type will need to be checked after his first month of life, if Sita and Ram want to know his blood type, as it takes about a month for the blood type of develop in a new `born child
- 80.** Usually, the recessive character is expressed only when present in a double recessive condition. However, single recessive gene can express itself in human beings when the gene is present on
- the X - chromosome of the female
 - the X - chromosome of the male
 - any autosome
 - either an autosome or X - chromosome

- 81.** Study the two cases carefully. The **correct** interpretation of the two cases is

Cases	Mother	Father	Children
Case I	With Disease	Normal	Sons always with disease
Case II	With disease	Normal	Sons and daughters could show disease

- Case I - X - linked recessive disease
Case II - autosomal recessive disease
- Case II - autosomal recessive disease
Case II - X - linked recessive disease
- Case I - Y - linked recessive disease
- Case I - X - linked dominant disease
Case II - autosomal dominant disease

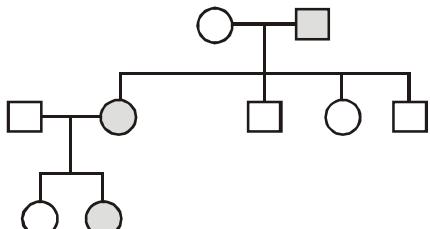
- 82.** What will the phenotype sex of the following organism on the basis of the sex chromosomal constitution indicated against each organism?

	Organism Constitution	Sex Chromosomes
(I)	Human Being	2A + XO
(II)	Drosophila	2A + XO
(III)	Human Being	2A + XXY
(IV)	Drosophila	2A + XXY

Select the **correct** answer using the codes given below

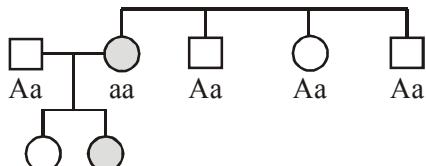
	Male	Female
(1)	I and III	II and IV
(2)	III and IV	I and II
(3)	II and IV	I and III
(4)	II and III	I and IV

83. In a family, father had a particular trait but mother did not show it. Their two sons are normal but their daughter had that trait. The daughter was married to a normal person and her daughter has the trait.

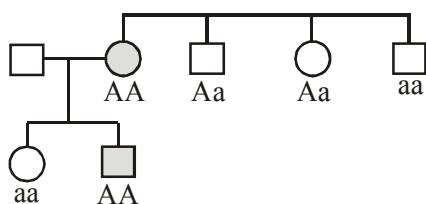


It can be explained as

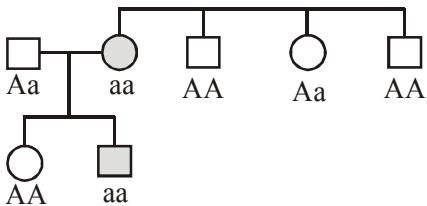
$$(1) \text{ } \bigcirc \text{Aa} \times \text{aa} \square$$



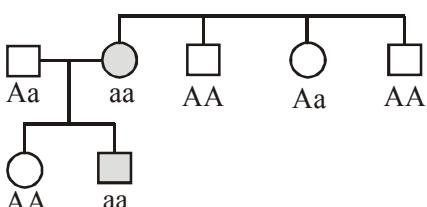
$$(2) \text{ } \bigcirc \text{AA} \times \text{aa} \square$$



$$(3) \text{ } \bigcirc \text{aa} \times \square \text{AA}$$



$$(4) \text{ } \bigcirc \text{aa} \times \square \text{Aa}$$



ANSWER KEY

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

MOLECULAR BASIS OF INHERITANCE

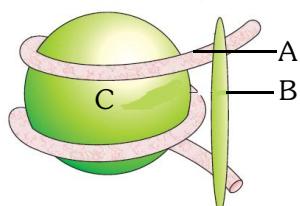
- 1.** Read (i) to (v) and find the correct option.
 - (i) Nitrogen base is linked to pentose sugar through N-glycosidic linkage.
 - (ii) Phosphate group is linked to 5'-OH of a nucleoside through phosphoester linkage
 - (iii) Two nucleoside are linked through 3'-5' N-glycosidic linkage.
 - (iv) Negatively charged DNA is wrapped around positively charged histone octamer to form nucleosome
 - (v) Chromatin that is more densely packed and stains dark is called euchromatin

(1) i and ii are wrong (2) iv alone is wrong
 (3) iii and v are wrong (4) i alone is wrong
- 2.** The promoter site and the terminator site for transcription are located at
 - (1) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit
 - (2) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit
 - (3) The 5' (upstream) end
 - (4) The 3' (downstream) end
- 3.** Consider the statements.
 - (i) rRNA provides template for synthesis of proteins
 - (ii) tRNA brings amino amino acids and reads genetic code
 - (iii) RNA polymerase binds to promotor and initiates transcription
 - (iv) A segment of DNA coding for polypeptide is called intron

(1) i and iii are correct
 (2) i, ii and iii are correct
 (3) i and ii are correct
 (4) ii and iii are correct
- 4.** A segment of DNA, AGCTTCGAA, has lost first base. Assuming that translation starts from the next base the effect would be
 - (1) No change in polypeptide form
 - (2) Only first amino acid will be different
 - (3) A complete change in type and sequence of amino acids
 - (4) Last amino acid of polypeptide will be different
- 5.** Read the statement regarding the lac operon and choose the correct option.
 - (i) An inducer regulates the switching on and off of lac operon
 - (ii) Repressor protein dissociates from operator region and prevents RNA polymerase from transcribing the operon.
 - (iii) In the presence of lactose, the repressor is activated by interaction with lactose
 - (iv) RNA polymerase has access to the promoter and transcription proceeds only when the repressor is inactivated.

(1) i and ii alone are correct
 (2) ii alone is correct
 (3) iii and iv alone are correct
 (4) i and iv alone are correct
- 6.** Wild type *Escherichia coli* growing on medium having glucose is transferred to lactose containing medium. Which one of the following change will occur?
 - (1) The bacterium stops dividing
 - (2) Lac operon is off
 - (3) Lac operon is suppressed
 - (4) Lac operon is induced

7. Which of the following is true, if in a DNA adenine is represented by 1, guanine by 2, cytosine by 3 and thymine by 4?
- $1 + 2 = 3 + 4$
 - $1 + 4 = 2 + 4$
 - $1 + 3 = 3 + 4$
 - $1 + 3 = 2 + 3$
8. Antiparallel relationship of the two strands of DNA refers to the
- strands being the parallel and they are twisted
 - strands providing alternate branching
 - one strand runs in $5' \rightarrow 3'$ and other in $3' \rightarrow 5'$ direction
 - both strands run in $5' \rightarrow 3'$ direction
9. Go through following statements and select correct option.
- Taylor et. al. used radioactive adenine in root tip of *Vicia Faba* (Broad Bean) and proved that Chromosome replicates semiconservatively
 - In eukaryotes, replication of DNA takes place in G_1 -phase of the cell cycle
 - A failure in cell division after RNA replication results into polyploidy
 - Crick pointed out that DNA replicates semiconservatively but first proof for it came from the experiment of Beadle and Tatum who used $^{15}\text{NH}_4\text{Cl}$ in *E.coli*
- All are correct
 - All are incorrect
 - Only D is correct
 - 1 and 4 are correct
10. Go through the following diagram of nucleosome (structural unit of chromatin). Identify componental parts indicated by A, B and C.



	A	B	C
(1)	RNA	Non-histone	Histone
(2)	DNA	H1 histone	Histone octamer
(3)	RNA	Histone octamer	H1 histone
(4)	DNA	Linker	Octamer

11. Listed below are the stages in the cellular synthesis of a protein.
- Movement of mRNA from nucleus to cytoplasm
 - linking of adjacent amino acid molecules
 - transcription of mRNA from a DNA template
 - formation of the polypeptide chain
 - attachment of the mRNA strand to a ribosome
 - polypeptide chain exit from esite of ribosome
- In which order do these stages take place?
- 1 3 2 5 4 6
 - 1 5 3 4 2 6
 - 3 1 5 2 4 6
 - 3 4 2 2 5 6
12. You take *E.coli* that has grown in a medium containing only heavy nitrogen (^{15}N) and transfer a sample to a medium containing light nitrogen (^{14}N). After allowing time for two generations, you centrifuge the sample in cesium chloride density gradient. Which band location would support the semiconservative DNA replication after two generations?
- Only one DNA ($\text{N}^{15} \text{N}^{15}$) form
 - Only one DNA ($\text{N}^{15} \text{N}^{14}$) form
 - Two DNAs ($\text{N}^{14} \text{N}^{15}, \text{N}^{14} \text{N}^{15}$) form
 - Three DNAs ($\text{N}^{14} \text{N}^{14}, \text{N}^{14} \text{N}^{15}, \text{N}^{15} \text{N}^{15}$) form
13. Why are mice killed by smooth (S) stains of *Streptococcus*, but not rough (R) strains?
- Rough strains are virulent, and smooth strains are not
 - Rough strains have a polysaccharide capsule that makes the mouse immune system recognize and destroy them
 - Smooth strains have a polysaccharide capsule, which hides them from the mouse immune system
 - Smooth strains release toxins more faster than rough strains

- 14.** Before the discovery of DNA, why was the hereditary material thought to be made of proteins and not nucleic acids?
- Nucleic acids are made up of 20 different bases, while proteins are made up of only five amino acids
 - Protein subunits can combine to form larger proteins
 - Proteins molecules much more diverse, chemically
 - Proteins can be enzymes
- 15.** In Griffith's experiments, what happened when heat-killed S strains *pneumococci* were injected into a mouse along with live R strains *pneumococci*?
- DNA from the live R was taken up by the heat-killed S converting it to R and killing the mouse
 - DNA from the heat-killed S was taken up by the live R converting it to S and killing the mouse
 - Proteins released from the heat-killed S killed the mouse
 - RNA from the heat-killed S was translated into proteins that killed the mouse
- 16.** Semiconservative replication of DNA in the cell are
- each of the original strands acting as a template for a new strand
 - only one of the original strands acting as a template for a new strand
 - the complete separation of the original strands, the synthesis of new strands and the reassembly of double molecules
 - the use of the original double-stranded molecules as a template, without unwinding
- 17.** Why were fragments like those now called Okazaki fragments expected before they were discovered?
- DNA replication in the 5' to 3' direction
 - The replication fork moves forward along a double-stranded DNA molecule.
- (3) DNA replication in the 3' to 5' direction on the lagging strand
- (4) RNA primase places short RNA primer sequences along the DNA molecule
- 18.** The Hershey-Chase experiment convinced most scientists that
- bacteria can be transformed
 - DNA is indeed the carrier of hereditary information
 - DNA replication is semiconservative
 - the transforming principle requires host factors
- 19.** The enzyme that restores the phosphodiester linkage between adjacent fragments in the lagging strand during DNA replication is
- DNA ligase
 - primase
 - reverse transcriptase
 - helicase
- 20.** Thirty per cent of the bases in a sample of DNA extracted from eukaryotic cells is adenine. What percentage of cytosine is present in this DNA?
- 10%
 - 20%
 - 30%
 - 40%
- 21.** Which of the following statements about DNA replication is false?
- Okazaki fragments are the initiators of continuous DNA synthesis along the leading strand
 - Replication forks represent areas of active DNA synthesis on the chromosomes
 - Error rates for DNA replication are often less than one in every billion base pairings
 - Ligases and polymerases function in the vicinity of replication forks
- 22.** Which of the following statements about the Hershey-Chase experiment is false?
- Sulphur is present in protein but not in DNA while phosphorus is present in DNA, but not in protein
 - The ^{32}P will end up in the supernatant after centrifugation
 - The purpose of the blender is to detach viruses from the bacteria
 - Progeny generations of T_2 bacteriophage contained ^{32}P but no ^{35}S

- 23.** Which of the following statements about the structure of DNA is false?
- The width of the DNA molecule is variable since it can accommodate nucleotides containing varying numbers of nitrogen based "rings"
 - Hydrogen bonds determine which nitrogenous bases can pair together
 - A total of 10 pairs of nucleotides are included in each complete "turn" of the double helix
 - Minor and major grooves alternate along the length of the molecule
- 24.** What do telomeres do ?
- They protect the chromosomes from degradation by nucleases
 - They prevent the ends of chromosomes from fusing with one another
 - They are required for complete chromosomal replication
 - All of these are correct
- 25.** Read the following statemens and find out the incorrect statements.
- The length of DNA is usually defined as number of nucleotides or base pairs present in it.
 - In DNA, every nucleotide residue has an additional -OH group present at 2'-position in the deoxyribose.
 - Nuclein was discovered and named by Friedrich Meisher in 1969.
 - Adenine pair with Thymine and Guanine with Cytosine through H-bonds. This makes one strand complementary to the other.
 - The proposition of double helical model of DNA was also based on the observation of Erwin Chargaff.
- | | |
|------------------|------------------|
| (1) b, c and e | (2) b, c and d |
| (3) c and e only | (4) b and c only |
- 26.** Read the statements (i) to (v) and find the appropriate option.
- Nitrogen base is linked to pentose sugar through N-glycosidic linkage.
 - Phosphate group is linked to 5'-OH of a nucleoside through phosphoester linkage.
 - Two nucleosides are linked through 3'-5' N-glycosidic linkage.
 - Negatively charged DNA is wrapped around positively charged histone octamer to form nucleosome.
 - Chromatin that is more densely packed and stains dark is called euchromatin.
- i and ii are wrong
 - iv alone is wrong
 - iii and v are wrong
 - i alone is wrong
- 27.** Select correct statement about protein synthesis.
- Translation begins when mRNA attaches to small subunit of ribosome.
 - Peptidase catalyses formation of peptide bond.
 - UTRs are present between start and stop codons.
 - At the end of translation, release factor binds to intiation codon.
- 28.** *Escherichia coli* with mutated z gene of lac operon cannot grow in medium containing only lactose as the source of energy because.
- Lac operon is constitutively active in these cells.
 - They cannot synthesise functional beta-galactosidase
 - In the presence of glucose, *Escherichia coli* cannot utilise lactose
 - The bacterium cannot transport lactose from the medium into the cell.

29. Match the columns I and II, and choose the correct combination from the options given.

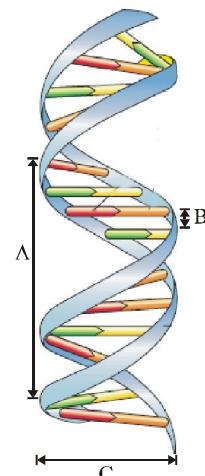
	Column-I	Column-II
a	Hershey and Chase experiment	1 1928
b	Taylor's experiment	2 1952
c	Meselson and Stahl experiment	3 1958
d	Transforming Principle	4 1990
e	Human Genome Project launching	5 1953

- (1) a-1, b-2, c-3, d-5, e-5
 (2) a-2, b-3, c-5, d-1, e-4
 (3) a-2, b-3, c-4, d-1, e-5
 (4) a-2, b-3, c-3, d-1, e-4
30. Select the correct sequence of steps in DNA finger printing involving Southern blot hybridisation using radiolabelled VNTR as probe.
- I. Hybridisation using labelled VNTR probe.
 - II. Isolation of DNA.
 - III. Transferring (blotting) of separated DNA fragments to synthetic membranes, such as nitrocellulose or nylon.
 - IV. Detection of hybridisation DNA fragments by autoradiography.
 - V. Separation of DNA fragments by electrophoresis.
 - VI. Digestion of DNA by restriction endonucleases.
- (1) I, V, VI, II, III and IV
 (2) II, VI, V, III, I and IV
 (3) V, I, VI, III, IV and II
 (4) II, I, V, VI, IV and III
31. Purines are nitrogen atoms at _____ positions.
- (1) 1', 3', 7', 9'
 (2) 1' 5', 7', 9'
 (3) 1', 3'
 (4) 1', 9'

32. What will be the molecular formula of a polypeptide consisting of 10 glycine molecules when the formula of glycine is $\text{C}_2\text{H}_5\text{O}_2\text{N}$?

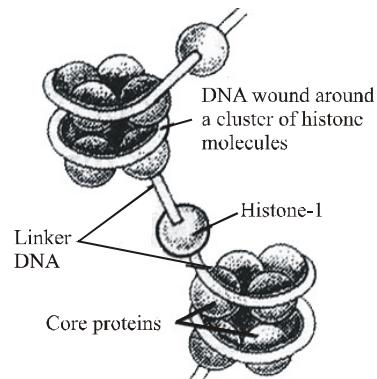
- (1) $\text{C}_6\text{H}_{12}\text{ON}_5$
 (2) $\text{C}_{20}\text{H}_{32}\text{O}_{11}\text{N}_{10}$
 (3) $\text{C}_{30}\text{H}_{16}\text{O}_6\text{N}_{10}$
 (4) $\text{C}_{25}\text{H}_{16}\text{O}_6\text{N}_5$

33. Given figure represents the DNA double helix model as proposed by Watson and Crick (1953). Select the option that shows correct measurements of A, B and C:-



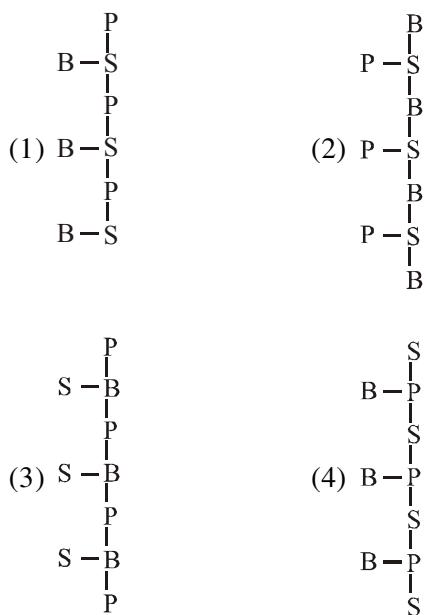
- (1) A-3.4 nm, B-0.34 nm, C-2nm
 (2) A-34 nm, B-3.4, C-20 nm
 (3) A-3.4 Å, B-0.34 Å, C-20 Å
 (4) A -34 Å, B-3.4 Å, C-2 Å

34. What does the given diagram represent?



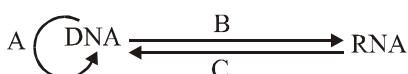
- (1) Nucleosome
 (2) Spliceosome
 (3) Histone complex
 (4) Both (1) and (2)

35. Which of the following shows the correct positions of the phosphate (P), sugar (S) and base (B) molecules in the line diagrams representing structure of DNA?



36. In one polynucleotide strand of a DNA molecule the ratio of A+T/G+C is 0.3. What is the A+G/T+C ratio of the entire DNA molecule
- 0.3
 - 0.6
 - 1.2
 - 1

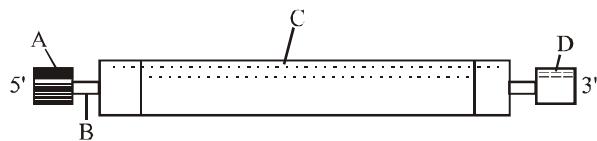
37. The given flowchart shows central dogma reverse.



Enzymes used in processes A, B and C are respectively

	A	B	C
(1)	DNA dependent DNA polymerase	RNA dependent DNA polymerase	DNA dependent RNA polymerase
(2)	DNA dependent DNA polymerase	DNA dependent RNA polymerase	DNA dependent DNA polymerase
(3)	DNA dependent RNA polymerase	DNA dependent DNA polymerase	DNA dependent DNA polymerase
(4)	RNA dependent DNA polymerase	DNA dependent RNA polymerase	DNA dependent RNA polymerase

38. Identify A, B, C and D in the given diagram of mRNA.



	A	B	C	D
(1)	Methylated cap	Initiation codon	Termination codon	Poly A tail
(2)	Poly A tail	Termination codon	Initiation codon	Methylated cap
(3)	Methylated cap	Non-coding region	Coding region	Poly A tail
(4)	Methylated cap	Coding region	Non-coding region	Poly A tail

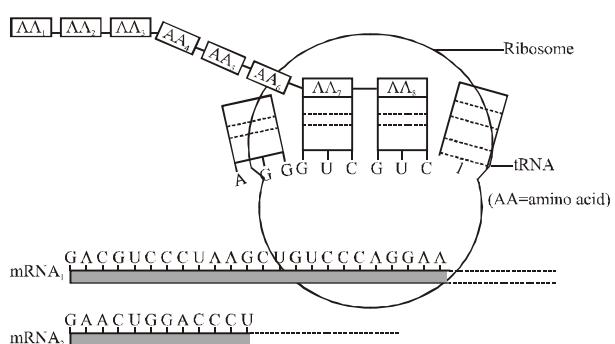
39. Refer the given mRNA segment



It can be translated completely into a polypeptide. Which of the following codons may correspond with A and B?

- A-AUG, GUG; B-UAG or UGA
- A-UAA, UGA; B-AUG or UAG
- A-AUG, UGA; B-GUG or UGA
- A-AUG, GAG; B-UAA or UGA

40. Refer to the diagram which shows the synthesis of path of a protein molecule:-



Which of the following is the first part of the protein molecule that would be translated from mRNA₂?

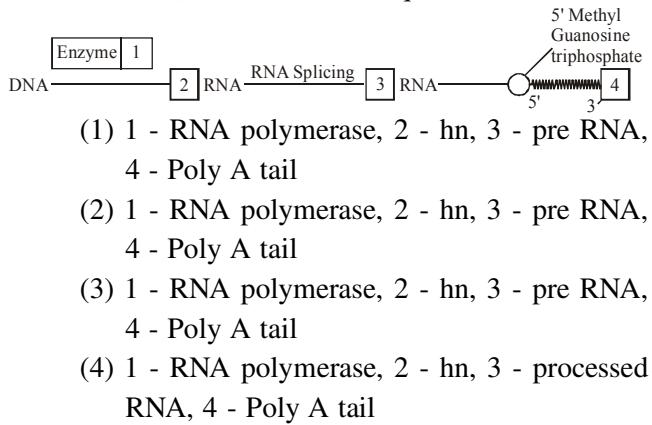
- AA₄-AA₂-AA₇-AA₆
- AA₆-AA₇-AA₂-AA₄
- AA₃-AA₁-AA₆-AA₈
- AA₈-AA₅-AA₁-AA₃

41. While analysing the DNA of an organism a total number of 5386 nucleotides were found out of which the proportion of different bases were: Adenine = 29%, Guanine=17%, Cytosine = 32%, Thymine = 17%. Considering the Chargaff's rule it can be concluded that:-
- it is a double stranded circular DNA
 - it is single stranded DNA
 - It is a double stranded linear DNA
 - No conclusion can be drawn

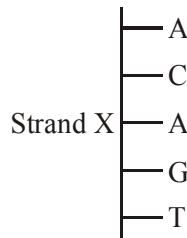
42. Which of the following is true, if in a DNA adenine is represented by a guanine by b, cytosine by c and thymine by d?
- $a = b, c = b$
 - $a = c, b = d$
 - $a + b = c + d$
 - $a + d = b + d$

43. (A) Taylor used radioactive thymidine in root tip of vicia faba (Broad Bean) and proved that chromosome replicates semiconservatively.
(B) In eukaryotes replication of DNA takes place in S - phase of the cell cycle.
(C) Crick pointed out that DNA replicates semiconservatively but first proof for it came from the experiment of Meselson and Stahl who used $^{15}\text{NH}_4\text{Cl}$ in E.coli.
(D) All are correct
(E) All are incorrect
(F) Only D is correct
(G) A and D are correct

44. Given below is a sequence of steps of transcription in eukaryotic cell. Fill up the blanks (1,2,3,4) in the sequence.



45. Strand X in the diagram shows a small part of a nucleic acid molecule.

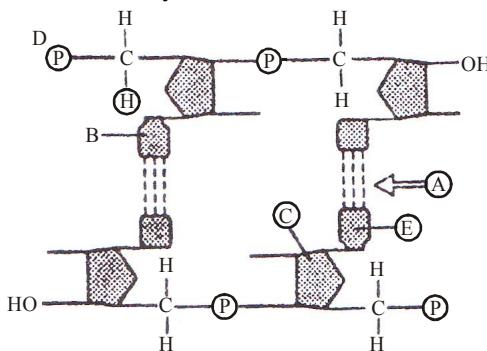


Which pair of the following strands are complementary of strand X?

I	II	III	IV
A	T	A	U
C	G	C	G
A	T	A	U
G	C	G	C
T	A	U	A

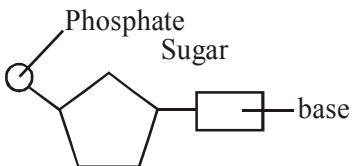
- I and III
- II and IV
- I and II
- III and IV

46. The following diagram is the polynucleotide chain. Identify A, B, C, D and E.

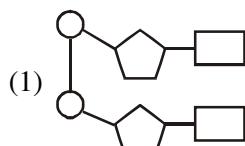
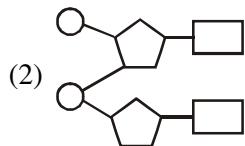
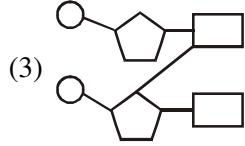
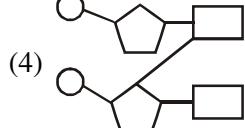


	A	B	C	D	E
(1)	Hydrogen bonds	Pyrimidine	Hexose (deoxyribose) sugar	5' end	Purine base
(2)	Hydrogen bonds	Purine base	Hexose (deoxyribose) sugar	5' end	Pyrimidine
(3)	Hydrogen bonds	Pyrimidine	Pentose (deoxyribose) sugar	5' end	Purine base
(4)	Hydrogen bonds	Purine base	Pentose (deoxyribose) sugar	5' end	Purine

47. The structure of one nucleotide is shown below.



Which of the following diagrams show two nucleotides correctly joined together?

- (1) 
- (2) 
- (3) 
- (4) 

48. Refer to the following table for your possible answer.

Cell types analysed	Average mass of DNA/cell ($\times 10^{-11}$ g)
X	0.00
Y	3.35
Kidney	6.70
Lung	6.70

What is the correct identify of cell type X and Y?

- (1) X - sperm cell, Y - liver cell
 (2) X - liver cell, Y - smooth muscle cell
 (3) X - smooth muscle cell, Y - mature red blood cell
 (4) X - mature red blood cell, Y - sperm cell

49. Avery, Macleod and Mc Carty used the S (virulent) and R (Avirulent) strains of *D. pneumoniae*. They isolated and purified proteins, DNA, RNA, carbohydrates and lipids from the S strain. They treated the living avirulent R strain with each of these chemicals and identify the transforming principle (DNA).

R-type+Protein S-type → A - type

R-type+Carbohydrate S-type → B - type.....

R-type+RNA of S-type → C - type

R-type+DNA of S-type → D - type

Identify the type of bacteria (A to D) -

	A - type	B - type	C - type	D - type
(1)	R + S	R + S	R + S	S
(2)	R + S	S	R + S	R
(3)	S	S	S	R
(4)	R	R	R	S + R

50. Given below are two statements (A and B) each with two blanks. Select the option which correctly fill up the blanks in two statements - Statements :-

(A) Use of the radioactive thymidine to detect distribution of newly synthesised DNA in the chromosomes was performed on Vicia faba (faba beans) by 1 and colleagues in 1958. The experiments proved that the DNA in chromosomes also replicate 2.

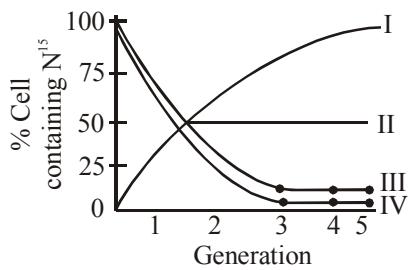
(B) The chemical method developed by Har Gobind khurana was instrumental in synthesising RNA molecules with defined combination of bases (homopolymers and copolymers). 1 cell-free system for protein synthesis finally helped the code to be deciphered. Severo Ochoa enzyme (polynucleotide phosphorlase) was also helpful in polymerising RNA with defined sequences in a 2 independent manner (enzymatic synthesis of RNA)

Options :-

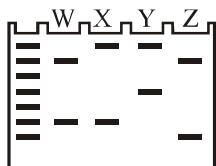
- (1) A - 1. Taylor, 2. Conservatively;
 B - 1. Marshall Nirenberg's, 2-Replica
 (2) A-1.Watson, 2.Semiconservatively;
 B-1.Crick's, 2.Template
 (3) A-1.Messelson,2-Semiconservatively;
 B-1.Marshall Nirenberg's, 2. Template
 (4) A-1.Taylor, 2-Semiconservatively;
 B-Marshall Nirenberg's, 2. Template

51. Dr. Venkataram Ramakrishnan is one of three recipients of the 2009 Nobel Prize for Chemistry. He worked towards the elucidation of the three - dimensional structure of ribosomes. Ribosomes are involved in the biosynthesis of proteins and
- None of their RNA components is the catalyst
 - One of their RNA components is the catalyst
 - they bind to DNA for the purpose of protein synthesis
 - they bind either to tRNA or to mRNA at any given time

52. Bacteria were culture in a medium containing heavy nitrogen (^{15}N) until all the DNA was labelled. These bacteria were then grown in a medium containing only normal nitrogen (^{14}N) for five generation. The percentage of cells containing ^{15}N in each generation was estimated. Which curve provides evidence that DNA replication is semi - conservative?



53. The DNA fingerprinting analysis of four family members is shown below :-



Study the band pattern obtained and assign each family member to W, X, Y and Z. Choose the correct option.

- | | |
|------------------|------------------|
| (1) W-father | X-mother |
| Y-child | Z-paternal uncle |
| (2) W-child | X-father |
| Y-child | Z-maternal uncle |
| (3) W-father | X-child |
| Y-mother | Z-paternal uncle |
| (4) W-child | X-father |
| Y-maternal uncle | Z-mother |

54. You have created a fusion between trp operon and lac operon which encodes the enzymes for tryptophan biosynthesis, under the regulatory control of the lac operator. Under which of the following conditions will tryptophan synthase be induced in the strain that carrier the chimeric operator fused operon?
- Only when both lactose and glucose are absent
 - Only when both lactose and glucose are present
 - Only when lactose is absent and glucose is present
 - Only when lactose is present and glucose is absent

55. A DNA sequence undergoes three subsequent point mutations which result in subsequent changes in transcription of mRNA as shown below:

Original mRNA: AUG CAU CUC ACG GAU UAG

Point mutation 1 : AUG CAU CUU ACG GUA UAG

Point mutation 2: AUG CAU GCU UAC GGU AUA

Point mutation 3: AUG CAU GCU UAA GGU AUA

Select the correct sequence of point mutations that occurred in the DNA.

- Missense mutation → Frameshift mutation → Nonsense mutation
- Silent mutation → Nonsense mutation → Frameshift
- Silent mutation → Frameshift mutation → Nonsense mutation
- Missense mutation → Frameshift mutation → Silent mutation

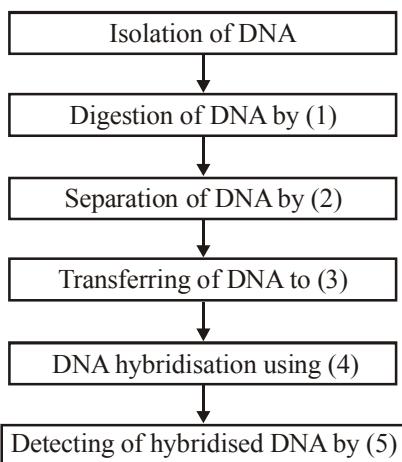
56. The end product of a metabolic pathway may bind a repressor to make the latter active enough to bind to the operator, in which case the end - product is called

- (1) Inducer
- (2) Accelerator
- (3) Corepressor
- (4) Aporepressor

57. The external supply of tryptophan in *Escherichia coli* brings about

- (1) Switching on of lac operon
- (2) Switching off of lac operon
- (3) Switching on of tryptophan operon
- (4) Switching off of tryptophan operon

58. Complete the accompanying flow chart of DNA fingerprinting.

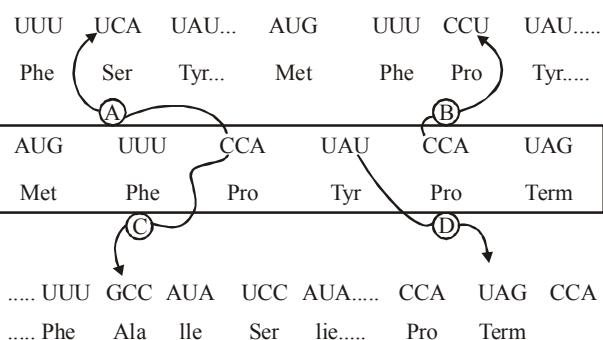


- (1) 1-Restriction endonuclease; 2-Electrophoresis; 3-Nitrocellulose or nylon; 4-Labelled VNTR probe; 5-Autoradiography
- (2) 1-Electrophoresis; 2-Restriction endonuclease; 3-Nitrocellulose or nylon; 4-Labelled VNTR probe; 5-Autoradiography
- (3) 1-Restriction endonuclease; 2-Electrophoresis; 3-Labelled VNTR probe; 4-Nitrocecellulose or nylon; 5-Autodiography
- (4) 1-Restriction endonuclease; 2-Electrophoresis; 3-Nitrocellulose or nylon; 4-Autoradiography; 5-Labelled VNTR probe

59. Which of the following shows silent mutations if mRNA strand has AUG UAU CCA UAU CCA UAC codons?

- (1) AUG UAU GCC AUA UCC AUA
- (2) AUG UAU UGA UAU CCA UAG
- (3) AUG UAU CCU UAU CCA UAC
- (4) AUG UAU UCA UAC CCA UAG

60. A mRNA with 6 codons (for chain initiation, termination and amino acid) is included in the rectangle shown in the given figure. The different types of mutations, indicated as A, B, C and D are respectively



- (1) silent, mis-sense, non-sense and frameshift
- (2) silent, mis-sense, frameshift and non-sense
- (3) mis-sense, silent, non-sense and frameshift
- (4) mis-sense, silent, frameshift and non-sense

61. A segment of DNA has the triplet base sequence AAC, GAC, AGC, CGC, ACA and AAA. Due to mutation, the first base only got deleted. Then the likely effect of this on the coding of DNA segment is that

- (1) there will be complete change in the types and sequence of amino acids
- (2) polypeptide will have one amino acid less
- (3) there will be no change in polypeptide chain formed
- (4) the first amino acid will be different

62. During protein synthesis, the correct amino acid is brought to the ribosome and inserted in correct sequence in the growing polypeptide chain by

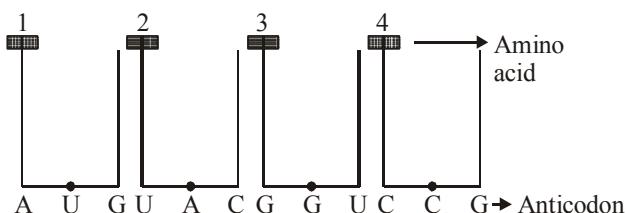
- (1) base pairing between DNA and mRNA
- (2) base pairing between mRNA codons and anticodon in tRNA
- (3) interaction between anticodon of mRNA and codon in tRNA .
- (4) interaction between two triplet codons

63. Practice using the dictionary of the genetic code determine the amino acid sequence for a polypeptide chain coded by the following mRNA transcript (written 5' → 3')

AUGCCUGACUUUAAGUAG

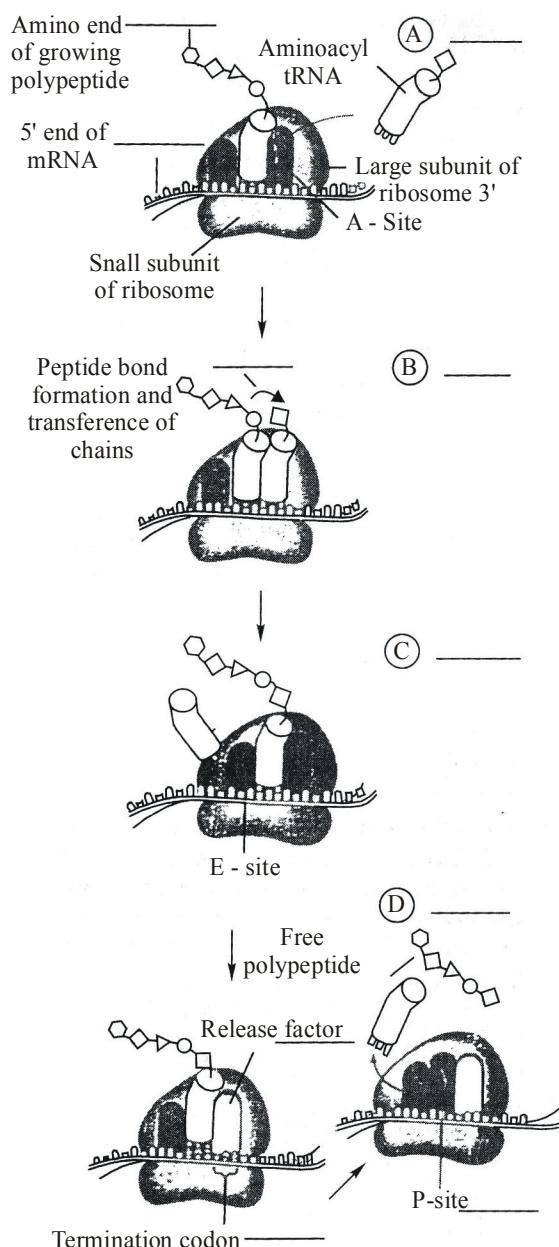
- (1) Met Pro Lys Asp Phe Stop
- (2) Met Pro Asp Phe Lys Stop
- (3) Pro Lys Met Phe Asp Stop
- (4) Pro Met Lys Asp Phe Stop

64. Find the sequence of binding of the following aminoacyl tRNA complexes during translation to a mRNA transcribed by a DNA segment having the base sequence 3' TACATGGGTCCG 5'. Choose the answer showing the **correct** order of alphabets.



- (1) 1, 2, 3, 4
- (2) 2, 1, 3, 4
- (3) 1, 2, 4, 3
- (4) 2, 1, 4, 3

65. In the following diagrams of protein synthesis, name the stages (A - D) -



- (1) A - Codon recognition,
B - Peptide bond formation,
C - Translocation,
D - Termination
- (2) A - Peptide bond formation,
B - Translocation,
C - Peptide Chain Elongation,
D - Transmination
- (3) A - Codon recognition,
B - Translocation,
C - Peptide bond formation,
D - Termination
- (4) A - Peptide bond formation,
B - Peptide chain Termination,
C - Translocation,
D - Termination

- 66.** Viruses grown in the presence of radioactive phosphorus contained radioactive DNA but not radioactive protein because
- DNA contains phosphorus, but protein does not
 - DNA contains deoxyribose sugar, but protein does not
 - protein contains radioactive sulphur, but DNA does not
 - protein contains radioactive carbon, but DNA does not

- 67.** Choose the **Correct** statement in the process of protein synthesis.
- After uncoiling of DNA molecule, one strand acts as a template for the formation of mRNA
 - In the presence of RNA polymerase enzyme, the mRNA is formed based on the triplet codes
 - The mRNA that leaves nucleus reaches cytoplasm and gets attached with 30S ribosomal subunit.
 - The amino acids are transferred from the intracellular amino acids pool to the active ribosomes by the m-RNA

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	4	3	4	4	1	3	2	2	3	3	3	3	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	2	2	1	2	1	2	1	4	4	3	1	2	4	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	3	2	1	1	1	4	2	3	1	4	2	3	1	4	2
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	4	2	4	4	4	2	3	3	4	3	3	4	1	3	4
Que.	61	62	63	64	65	66	67								
Ans.	1	2	2	2	1	1	1								

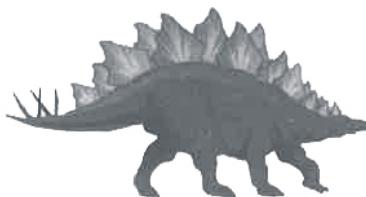
EVOLUTION

- 1.** In evolution the studies can be made at molecular level. For example, the proteins present in the blood of man and ape are similar. The base sequence in nucleic acids and amino acids sequence in proteins of related organism is alike. These are the examples which are specifically referred to in:-
 (1) convergent evolution
 (2) molecular analogy
 (3) molecular homology
 (4) homoplastic appearance
- 2.** Evolutionary convergence is characterized by:-
 (1) development of dissimilar characteristics in closely related groups
 (2) development of a common set of characteristics in groups of different ancestry
 (3) development of characteristics by random mating
 (4) replacement of common characteristics in different groups
- 3.** Refer the given figure. What does it represent?
-
- (1) Convergent evolution
 (2) Adaptive radiation
 (3) Divergent evolution
 (4) Both (2) and (3)
- 4.** An Australian mole is actually a marsupial rather than a placental mammal like the North American mole. These two animals are similar in appearance because :-
 (1) there are practically no placental mammals in Australia
 (2) the evolutionary pressure on both were similar
 (3) they have undergone a long period of coevolution
 (4) marsupials and placental mammals are closely related
- 5.** "Human population grows in geometric ratio while food materials increase in arithmetic proportion." It is a statement of :
 (1) Darwin (2) Bateson
 (3) Hugo de Vries (4) Malthus
- 6.** Each of us is a part of the ongoing evolution of the species. Which of the following occurrences would have the greatest impact on the future biological evolution of the human population?
 (1) A mutation occurs in ones sperm or egg cells.
 (2) You do exercise every day so that you stay physically fit and healthy
 (3) You move to Kerala, the state of highest medical facilities and literacy
 (4) You encourage your children to develop their intellectual abilities.
- 7.** An inter-breeding population of finches became separated geographically, forming two isolated groups. Each group then became under different selective pressures. One group was then introduced into the habitat of the other. Which one of the following would determine whether they now formed two distinct species?
 (1) They had been separated for more than three million years.
 (2) They failed to produce fertile F_1 hybrids.
 (3) They showed marked differences in the shape of their beaks
 (4) Their plumage had become markedly different
- 8.** The extinct human who lived 1,00,000 to 40,000 years ago, in Europe and Asia, with short stature, heavy eye brows, retreating foreheads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was
 (1) *Homo habilis*
 (2) Neanderthal man
 (3) Cro-magnon man
 (4) *Ramapithecus*

- 9.** Which of the following statement is correct regarding evolution of mankind?
 (1) *Homo erectus* is preceded by *Homo habilis*.
 (2) Neanderthal man and Cro-magnon man were living at the same time.
 (3) *Australopithecus* was living in Australia
 (4) None of these
- 10.** If the Neanderthals are not the direct ancestors of humans, is it still possible for humans and Neanderthals to be related?
 (1) Yes, because we share a common ancestor
 (2) Yes, but only if humans and Neanderthals could have interbred.
 (3) No, because the human evolutionary tree is strictly linear and without branches
 (4) No, because this means that Neanderthals evolved from an entirely different branch of organisms than humans did.
- 11.** Match the scientists listed under Column 'A' with ideas listed under Column 'B'
- | | Column A | | Column B |
|---|----------|-------|--------------------------------|
| a | Darwin | (i) | abiogenesis |
| b | Oparin | (ii) | use and disuse of organs |
| c | Lamarck | (iii) | continental drift theory |
| d | Wagner | (iv) | evolution by natural selection |
- (1) a-iv, b-i, c-iii, d-ii
 (2) a-iv, b-i, c-ii, d-iii
 (3) a-iii, b-i, c-ii, d-iv
 (4) a-iv, b-iii, c-i, d-ii
- 12.** In Africa, there is a species of bird called the yellow - throated longclaw. It looks almost exactly like the meadowlark found in North America, but they are not closely related. This is an example of
 (1) uniform distribution
 (2) artificial selection
 (3) gradualism
 (4) convergent evolution
- 13.** Is the layering of fossils in the earth used to support evolution?
 (1) Yes, fossils are laid down in chronological order and we can observe changes in these species over time
 (2) No, the fossils evidence is too recent to provide support
 (3) No, because Darwin did not use it, the modern synthesis also ignores it
 (4) Yes, the fossil evidence is the only support for Darwin's idea of acquired characteristics
- 14.** Which one of the following terms would most correctly describes the relationship between the flight organs of animals like locust, bat, sparrow and flying fish?
 (1) Atavism
 (2) Analogous
 (3) Homologous
 (4) Vestigial
- 15.** Evolution of horse from *Hyracotherium* involved
 (1) lengthening of limbs and increases in size
 (2) progressive loss of digits and lengthening of retained digits.
 (3) increased complexity of molars and molarisation of premolars
 (4) All of the above
- 16.** In the developmental history of mammalian chambered heart, it is observed that it passes through a two chambered fish - like heart, three - chambered frog - like heart and finally four chambered stage. To which hypothesis this above cited statement can be approximated?
 (1) Biogenetic law
 (2) Hardy - Weinberg law
 (3) Lamarck's principle
 (4) Mendelian principle

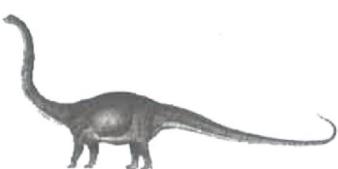
- 17.** In a famous experiment, Weismann cut off tails of newborn mice generation after generation. At the end of experiment, tails of mice neither disappeared nor shortened. This experiment
- Supported Darwin's theory of natural selection
 - proved that the tail is an essential organ of vertebrates
 - disproved de Vries mutation theory
 - Showed that Lamarck was wrong in his theory of inheritance of acquired characters
- 18.** Which of the following statement is **correct**?
- Accumulation of useful mutations through ages has led to the creation of new species of living beings
 - Genetic variability provides raw material for the operation of natural selection and reproductive isolation
 - Genetic variability is produced by gene mutation
 - All of the above
- 19.** Given, 1 = natural selection, 2 = variations and their inheritance, 3 = survival of the fittest, 4 = struggle for existence. According to Darwinism, which of the following represents the correct sequence of events in the origin of a new species?
- 1, 2, 3, 4
 - 2, 3, 1, 4
 - 3, 4, 1, 2
 - 4, 2, 3, 1
- 20.** Today, again the faith in Lamarck's theory has been revived by some people due to the fact that
- if the environment influences the genes of the organism, the acquired change will be transmitted to the next generation
 - genetic refuted the Darwinism
 - mutation theory supports the Lamarckism
 - germplasm theory supports the lamarckism
- 21.** Which one of the following sequences was proposed by Darwin and Wallace for organic evolution?
- Overproduction, variations, constancy of population size, natural selection
 - Variations, constancy of population size, over production, natural selection
 - Overproduction, constancy of population size, varations, natural selection
 - Variation, natural selection, overproduction, constancy of population size
- 22.** 'Every cell of the body contributes gemmulate to the germ cells and so shares in the transmission of inherited characters'. This theory is known as
- theory of inheritance of acquired characteristics
 - theory of germplasm
 - theory of pangenesis
 - theory of mutations
- 23.** In a random mating population in an equilibrium, which one of the following brings about a change in gene frequency in a non - directional manner?
- Controlled breeding
 - Random drift
 - Selection
 - Migration
- 24.** Two species of garter snakes occur in the same geographic areas, but one lives mainly in water and the other mainly on land. Consequently, they do not encounter one another and so, do not inter-breed. This is an example of pre - zygotic isolation caused by :
- ecological isolation
 - temporal isolation
 - behavioural isolation
 - mechanical isolation
- 25.** Different species of dragonflies do not mate with each other because the male of each species have appendages that can clasp and hold, for copulation, only females of their own species. This is an example of
- ecological isolation
 - temporal isolation
 - behavioural isolation
 - mechanical isolation

- 26.** A horse has a karyotype of 64 chromosome, and a donkey has a karyotype of 62 chromosome. The hybrid offspring of horse - donkey cross is a mule, Which has 63 chromosomes. A mule is sterile because it cannot successfully :
- court other mules
 - copulate with mules, donkeys or horses
 - form gametes
 - complete development of the zygote
- 27.** At particular locus, frequency of 'A' allele is 0.6 and that of 'a' is 0.4. What would be the frequency of heterozygous in a random mating population at equilibrium?
- 0.16
 - 0.48
 - 0.35
 - 0.24
- 28.** The next stage in the evolution of man after *Australopithecus* was :
- Homo habilis*
 - Homo sapiens*
 - Homo erectus*
 - Homo pekinensis*
- 29.** The Peking man was named as :
- Pithecanthropus chinensis*
 - Homo Pekinensis*
 - Sinanthropus erectus*
 - Pithecanthropus erectus*
- 30.** During evolution of man, many changes have taken place in his ancestral characters. Which one of the following is an insignificant change?
- Change of diet from hard tough fruits and roots into soft food
 - Qualitative improvement in the structure of hands skills for making tools
 - Disappearance of tail
 - Improvement in speech for the communication and social behaviour
- 31.** Which one proposed that the first form of life came from pre-existing non-living organic molecules ?
- Oparin and Haldane
 - Stanely Miller and Herald Urey
 - Lamarck and Darwin
 - Hugo de Vries and Dobzhansky
- 32.** Pasteur succeeded in disproving the theory of spontaneous generation because
- the laboratory was clean
 - he pulled out the neck of flask into a tube
 - he was lucky
 - yeast used in flask were dead
- 33.** Time gap in between formation of earth and origin of life is
- 0.5 billion years
 - 1 billion years
 - 4.5 billion years
 - 4.0 billion years
- 34.** If a particular animal has shelled eggs, hair and teats on the body and has cloaca, it may be a connecting link between
- Reptiles and birds
 - Birds and mammals
 - Reptiles and mammals
 - None of these
- 35.** In some animals of different group different structures developed along same direction due to adaptation to same needs. This is known as
- Divergent evolution
 - Convergent evolution
 - Parallel evolution
 - Natural selection
- 36.** Presence of coelacanth fish was observed in
- South America
 - South Africa
 - North America
 - North Africa
- 37.** Identify the below diagram.



- Brachiosaurus*
- Stegosaurus*
- Tasmanian wolf
- Banded anteater

38. Identify the below diagram



- (1) *Brachiosaurus* (2) *Stegosaurus*
 (3) *Tyrannosaurus* (4) *Triceratops*

39. There would be no evolution if :-

- (1) The inheritance of acquired characters did not take place
 (2) Somatic variations were not inheritable
 (3) Genetic variations were not found among members of the population
 (4) Somatic variations would not transform into germinal variations

40. Which of the following facts develop in Lamarckism?

- (1) Human females are not born with bored ear pinna, although they have been bored for thousands of years
 (2) Giraffe has long neck to eat leaves of tall trees
 (3) A stag can run fast to protect against the enemies
 (4) None of these

41. One of the revolutionary concepts in biology was Charles Darwin's 'Origin of Species'. It deals with

- (1) Gene mutation
 (2) Use and disuse of organs
 (3) Germplasm
 (4) Natural selection leading to the survival of the fittest

42. Which of the following is responsible for evolution according to Neo-Darwinism ?

- (1) Mutation
 (2) Natural selection
 (3) Mutation and natural selection
 (4) Either (2) or (3)

43. Which is a correct match ?

- (1) Darwin—DNA replication
 (2) Mendel—mutation
 (3) Morgan—Father of genetics
 (4) De Vries—*Oenothera lamarckiana*

44. Gene pool is

- (1) Genotype of an individual of a population
 (2) Sum of total genes of all individuals of a species found in an area
 (3) Pool of artificially synthesised genes
 (4) Genes of a genus

45. Which of the following evidences does not favour the Lamarckian concept ?

- (1) Absence of limbs in snakes
 (2) Presence of webbed toes in aquatic birds
 (3) Melanization in peppered moth in industrial area
 (4) Lack of pigment in cave dwelling animals

46. Select the incorrect statements.

- (1) Natural selection is a heritable variation and by reproduction leave greater number of progenies.
 (2) During stabilization of natural selection more individuals acquire value other than mean character value
 (3) By the time of 500 million years ago invertebrates were formed and were active
 (4) Reptiles lay thick shelled eggs which do not dry up in sun unlike those of amphibians

47. Which of the following statement is correct ?

- (1) Proconsul was ancestor of man and ape
 (2) Proconsul was ancestor of man and not of ape
 (3) Sauropsids were ancestor of man anatomically
 (4) None of these

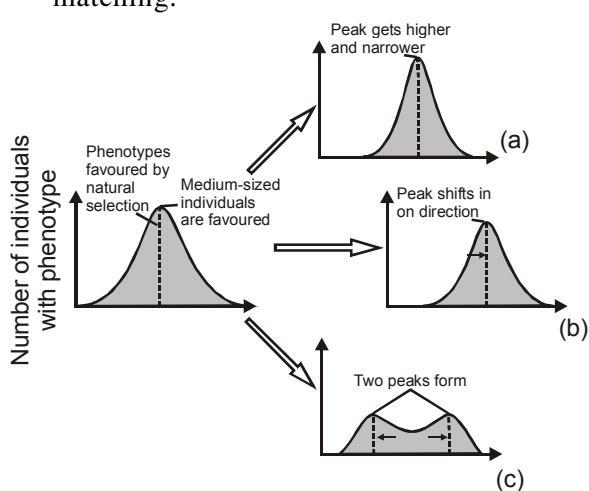
48. Most recent man found as fossil was

- (1) Java man
 (2) Peking man
 (3) Cromagnon man
 (4) Heidelberg man

- 49.** One of the important consequences of the geographic isolation is
 (1) Random creation of new species
 (2) No change in the isolated fauna
 (3) Preventing speciation
 (4) Speciation through reproduction isolation
- 50.** The extinct human who lived 1,00,000 to 40,000 years ago in Europe, Asia and part of Africa with short stature, heavy eye brows, retreating fore heads, large jaws with heavy teeth, stocky bodies, lumbering gait and stooped posture was ?
 (1) Cro-magnon man
 (2) *Ramapithecus*
 (3) *Homo habilis*
 (4) *Neanderthal man*
- 51.** The process by which organisms with different evolutionary history evolve similar phenotypic adaptations in response to a common environmental challenge is called
 (1) Natural selection
 (2) Convergent evolution
 (3) Non-random
 (4) Adaptive radiation
- 52.** The eye of octopus and eyes of cat show different patterns of structure, yet they perform similar function. This is an example of
 (1) homologous organs that have evolved due to convergent evolution
 (2) Homologous organs that have evolved due to divergent evolution
 (3) Analogous organs that have evolved due to convergent evolution
 (4) Analogous organs that have evolved due to divergent evolution
- 53.** Presence of NaCl in body fluid indicates that life originated in :-
 (1) Primitive ocean
 (2) Rain water lakes
 (3) Rocks
 (4) All the above

- 54.** Similarities between organisms of different genotypes is due to
 (1) Convergent evolution
 (2) Divergent evolution
 (3) Microevolution
 (4) Macroevolution
- 55.** Fill in the blanks according to the convergent evolution
- | Placental mammals | Australian mammals |
|-------------------|---------------------|
| Anteater |a.... |
|b.... | Spotted cuscus |
| Flying squirrel |c.... |
|d.... | Tasmanian tiger cat |
- (1) c-flying phalanger, b-lemur, d-bobcat, a-Numbat
 (2) b-flying phalanger, a-lemur, c-bobcat, d-Numbat
 (3) c-flying phalanger, a-lemur, d-bobcat, b-Numbat
 (4) d-flying phalanger, b-lemur, c-bobcat, a-Numbat
- 56.** Recognise the figure and find out the correct matching.
-
- (1) c-wombat, b-koala, a-sugar glider, d-banded anteater
 (2) a-wombat, c-koala, d-sugar glider, b-banded anteater
 (3) b-wombat, d-koala, c-sugar glider, a-banded anteater
 (4) d-wombat, a-koala, b-sugar glider, c-banded anteater
- 57.** In a population of 1000 individuals, 360 belong to genotype AA, 480 to Aa and remaining 160 to aa. Based on this data, the frequency of allele A in the population is
 (1) 0.5 (2) 0.6 (3) 0.7 (4) 0.4

58. Recognise the figure and find out the correct matching.



- (1) b-directional, a-disruption, c-stabilisation
 (2) b-directional, c-disruption, a-stabilisation
 (3) c-directional, b-disruption, a-stabilisation
 (4) a-directional, c-disruption, b-stabilisation
59. In ...a..., a fish caught in ...b..., happened to be a ...c... which was thought to be extinct. These animals are called ...d... evolved into the first ...e...
 (1) a-1891, b-South America, c-Ichthyosaurs, d-labyrinthines, e-amphibians
 (2) a-1938, b-South America, c-Ictyophis, d-coelocanth, e-reptiles
 (3) a-1891, b-North America, c-coelocanth, d-labyrinthines, e-amphibians
 (4) a-1938, b-South Africa, c-coelocanth, d-labyrinthines, e-amphibians

60. Correct order is

- (1) Palaeozoic → Archaeozoic → Coenozoic
- (2) Archaeozoic → Palaeozoic → Proterozoic
- (3) Palaeozoic → Mesozoic → Coenozoic
- (4) Mesozoic → Archaeozoic → Proterozoic

61. Which one is connected with human evolution?

- (1) Binocular vision
- (2) Flatnails
- (3) Loss of tail
- (4) Shortening of jaws

62. Concept of mutations was put forth by

- (1) Charles Darwin who found a wide variety of organisms during sea voyage
- (2) Hugo de Vries who worked on Evening Primrose
- (3) Gregor Mendel who worked on *Pisum sativum*
- (4) Hardy Weinberg who worked on allele frequencies in population

63. Primary source of allelic variation is

- (1) independent assortment
- (2) recombination
- (3) mutation
- (4) polyploidy

64. Light coloured Peppered Moth/*Biston Betularia* gets changed to its darker *carbonaria* variety due to

- (1) Translocation of block of genes in response to heavy carbons
- (2) Deletion of gene segment due to industrial pollution
- (3) Mutation of single Mendelian gene for survival in smoke laden industrial environment
- (4) Industrial carbon deposited on wings

ANSWER KEY

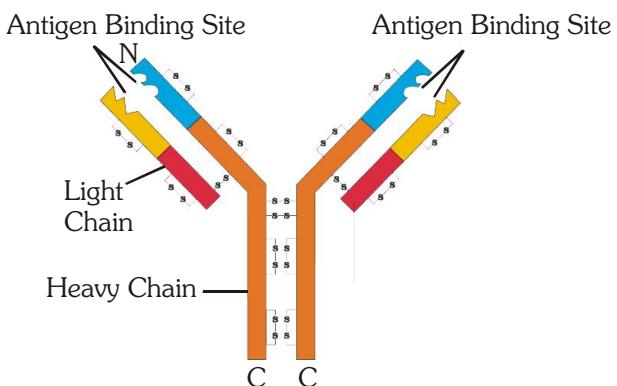
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	4	2	4	1	2	2	1	1	2	4	1	2	4
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Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	1	3	4	4	2	3	1	1	1	1	2	2	4	3
Que.	61	62	63	64											
Ans.	4	2	3	3											

HUMAN HEALTH & DISEASE

- 1.** Mark correct about a healthy person.
- More efficient
 - High productivity
 - Longevity of people
 - Brings economic prosperity
 - Both (i) and (ii)
 - Only (iv)
 - Both (iii) and (iv)
 - All are correct
- 2.** Mark the correct statement
- Yoga has been practised to achieve physical and mental health
 - Infectious diseases are very common and everyone of us suffers from these at sometime or the other
 - AIDS is an infectious disease
 - Cancer is non-infectious disease
 - Healthy persons bring economic prosperity
 - (i), (ii) and (iii)
 - (ii), (iii), (iv) and (v)
 - (iii) and (iv)
 - (i), (ii), (iii), (iv) and (v)
- 3.** Most disease can be diagnosed by observing the symptoms in the patient. Which group of symptoms are indicative of amoebiasis ?
- Nasal congestion and discharge, cough, sore throat and headache
 - High fever, stomach ache, loss of appetite and constipation
 - Difficulty in respiration, fever, chills, cough and headache
 - Constipation, abdominal pain, cramps, blood clots and mucous in stools
- 4.** The presence of typhoid fever in a person can be confirmed by
- Wayson-Stain Test
 - Schick's Test
 - ELISA Test
 - Widal Test
- 5.** The protection provided by the mucous membrane against pathogenic invasion is not enough. The mere ingestion of *tubercle bacilli* or picorna viruses in sufficient numbers will lead to penetration of GIT mucosa. A similar penetration of respiratory tract by _____ can occur following a heavy exposure to these pathogens
- Pneumococci
 - Rhinoviruses
 - Salmonella
 - Both (1) and (2)
- 6.** Identify the correct match from the Columns I, II and III
- | Column-I | Column-II | Column-III |
|-----------------|--------------------------------|---|
| 1 Bacteria | I <i>Plasmodium</i> | i Infection of lungs |
| 2 Virus | II <i>Wuchereria bancrofti</i> | ii Fever with chill |
| 3 Protozoa | III <i>Haemophilus</i> | iii Inflammation of lower limbs |
| 4 Helminth | IV Rhino virus | iv Infection of upper respiratory tract |
- 4-II-(iii), 3-I-(ii), 1-III-(i), 2-IV-(iv)
 - 4-II-(iii), 3-I-(i), 1-III-(ii), 2-IV-(iv)
 - 2-III-(i), 1-IV-(iv), 3-IV-(ii), 4-II-(iii)
 - 3-I-(ii), 4-II-(iii), 2-III-(iv), 1-IV-(i)
- 7.** Which of the following statement is not correct about typhoid ?
- Sustained high fever (39° to 40°F)
 - Weakness
 - Constipation
 - Headache and loss of appetite
 - Coughing
- (a), (c), (d)
 - (c), (d), (e)
 - (a) and (e) only
 - All are correct
- 8.** The letter T in T-lymphocyte refers to
- thymus
 - thyroid
 - thalamus
 - tonsil

9. Lysozyme kills by destroying
 (1) lipid bilayers
 (2) the machinery for DNA replication
 (3) cell walls
 (4) mitochondrial enzymes
10. Artificial immunity can be acquired from a
 (1) repeated exposure to the same microbe
 (2) treatment with penicillin
 (3) serious illness
 (4) vaccination
11. Messenger molecules, released by virus-infected cells, that bind to the surfaces of healthy cells and stimulate them to synthesize proteins that prevent viral replication are called
 (1) cytotoxins (2) lymphokines
 (3) interferons (4) antibiotics
12. Read the statement 1 – 4. How many statements are true for passive immunity :
 1. Anti-tetanus serum administered after an injury
 2. An injection of anti-venom after snake bite
 3. A newborn vaccinated against Hapatitis-B
 4. Life time immunity attained by suffering from chicken pox.
 (1) Three (2) Four (3) One (4) Two
13. For successful grafting or organ transplantation, it is essential to match the tissues of the recipient and donor. Most successful match will be if the graft is taken from
 (1) identical twin (2) fraternal twin
 (3) parent (4) sibling
14. The four polypeptide chains of the antibody molecule are held together by
 (1) ionic bonds
 (2) vander waal's interactions
 (3) peptide bonds
 (4) disulphide bonds
15. Which one of the following vaccine is prepared by recombinant RNA technology ?
 (1) Hepatitis-B (2) BCG
 (3) OPV (4) None of these

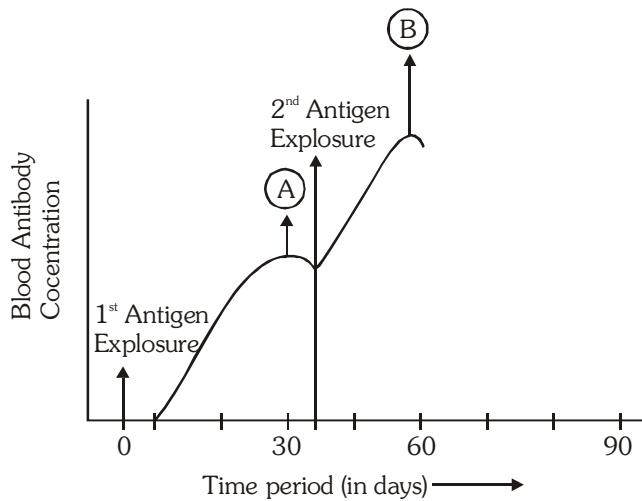
16. Which of the following statement is false for the structure given here?



- (1) These are secreted by T-cells
 (2) They have four polypeptide chains
 (3) They are represented by H_2L_2
 (4) These are found in blood so the response is termed as humoral immune response

17. Which type of antibody is present in ABO blood group ?
 (1) IgM (2) IgD
 (3) IgA (4) IgE

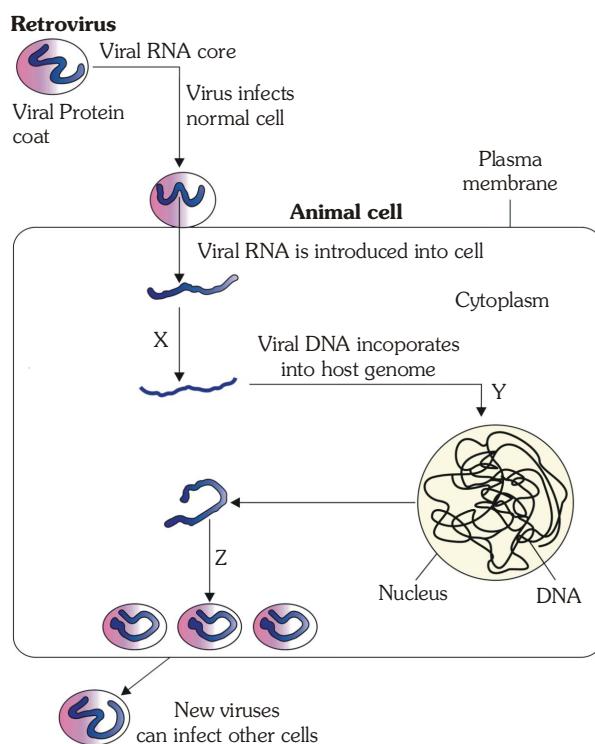
18. How many of the following are correct about the given diagram ?



- (a) (A) is anamnestic response
 (b) Memory cells are responsible for (A)
 (c) Memory cells are responsible for (B)
 (d) IgM is responsible for (A)
 (1) One (2) Two
 (3) Three (4) Four

19. How many of the below is/are correct matching?
- Congenital infection = IgM
 - Surface antibody = IgA
 - Rh-antibody = IgG
 - Rheumatoid factor = IgM
- One
 - Two
 - Three
 - Four
20. How many of the following is/are correct matching?
- | Antibody | Number of Paratope |
|-----------------|---------------------------|
| (A) IgA | 2 |
| (B) IgG | 2 |
| (C) IgM | 10 |
| (D) IgE | 2 |
| (E) IgA | 4 |
| (F) IgD | 10 |
| (1) Four | (2) Five |
| (3) Two | (4) Three |
21. If a pregnant woman is suffering from syphilis infection, then after delivery which type of antibodies may be present in her new born ?
- IgM and IgG
 - IgA and IgG
 - IgM only
 - IgG only
22. Which of the following is not immunodeficiency disorder ?
- SCID
 - AIDS
 - Both (1) and (2)
 - Multiple sclerosis
23. AIDS Virus has
- single strand RNA
 - double strand RNA
 - single strand DNA
 - double strand DNA
24. AIDS is caused by HIV that principally infects
- T-4 lymphocytes
 - cytotoxic T cells
 - all lymphocytes
 - activator B cells

25. Mark the correctly matched XYZ option in given diagram



	X	Y	Z
(1)	Alkaline phosphatase	Integrase	Protease
(2)	Reverse transcriptase	Protease	Integrase
(3)	Reverse transcriptase	Integrase	Protease
(4)	DNA polymerase	Integrase	Protease

26. Cancer cells are more easily damaged by radiation than normal cells because they are
- non-dividing
 - starved of mutation
 - undergoing rapid division
 - different in structure
27. In drunk person, the part of brain to be affected first is
- medulla oblongata
 - cerebrum
 - cerebellum
 - pons varolii

28. Caffeine, amphetamine and cocaine are
 (1) hallucinogens (2) stimulants
 (3) sedatives (4) tranquilizers

29. Opiates narcotics are
 (1) Codein, heroin and cocaine
 (2) Cocaine, caffeine and codein
 (3) Morphine, codein and heroin
 (4) Morphine, barbiturates and caffeine

30. Cocaine interferes with the transport of which of the following neurotransmitter ?
 (1) Dopamine (2) Acetylcholine
 (3) Prostaglandin (4) Serotonin

31. Identify the leaf of plant



- (1) Opium
 (2) *Atropa Belladonna*
 (3) *Cannabis Sativa*
 (4) *Datura*

32. Sexual stage of *Plasmodium* are formed in?
 (1) Salivary glands of mosquito
 (2) Human RBC
 (3) Intestine of mosquito
 (4) Human liver

33. A wide range of organisms belonging to bacteria, viruses, fungi, protozoans, helminths, etc, could cause diseases in men. Such disease causing organisms are called
 (1) Allergens
 (2) Carcinogens
 (3) Parasites
 (4) Pathogens

34. Which of the following human parasites require mosquito to complete their life cycle?

- (1) *Ascaris lumbricoides* and *Wuchereria bancrofti*
 (2) *Ascaris lumbricoides* and *Leishmania donovani*
 (3) *Leishmania donovani* and *Plasmodium ovale*
 (4) *Plasmodium ovale* and *Wuchereria bancrofti*

35. Match the columns I and II and choose the correct combination from the options given

	Column-I		Column-II
a	African sleeping sickness	I	<i>Plasmodium</i>
b	Dum dum fever	II	<i>Haemophilus influenzae</i>
c	Pneumonia	III	<i>Leishmania donovani</i>
d	Malaria	IV	<i>Trypanosoma gambiense</i>
		V	<i>Leishmania tropica</i>

- (1) a-IV, b-III, c-II, d-I (2) a-III, b-IV, c-II, d-I
 (3) a-III, b-I, c-II, d-IV (4) a-IV, b-III, c-I, d-V

36. Internal bleeding, muscular pain, blockage of the intestinal passage and anaemia are some of the symptoms caused due to infection by
 (1) *Wuchereria*
 (2) *Trichophyton*
 (3) *Ascaris*
 (4) *Plasmodium*

37. Which of the following is a bacterial disease?
 (1) Small pox (2) Influenza
 (3) T.B. (4) Rabies

38. Identify the wrongly matched pair
 (1) Typhoid - Widal test
 (2) Plague - Viral disease
 (3) Malignant malaria - *Plasmodium falciparum*
 (4) Common cold - Rhinovirus

39. Match the column-I and II, and choose the correct combination from the options given.

	Column-I		Column-II
I	Typhoid	a	<i>Haemophilus influenzae</i>
II	Pneumonia	b	<i>Trichophyton</i>
III	Filariasis	c	<i>Plasmodium</i>
IV	Ringworm	d	<i>Salmonella typhi</i>
V	Malaria	e	<i>Wuchereria malayi</i>

- (1) I-d, II-a, III-e, IV-b, V-c
- (2) I-a, II-c, III-b, IV-e, V-d
- (3) I-b, II-d, III-e, IV-c, V-a
- (4) I-b, II-c, III-e, IV-d, V-a

40. Antibodies are

- (1) Gamma Globulins
- (2) Vitamins
- (3) Albumins
- (4) Sugars

41. Interferons act against viral infection by

- (1) Protecting other cells against virus
- (2) Functioning as macrophages
- (3) Providing antibodies
- (4) Directly destroying genetic material of virus

42. An example of innate immunity is

- (1) PMNL-neutrophils
- (2) B-lymphocytes
- (3) T-lymphocytes
- (4) TH cells

43. Damage to thymus in a child would lead to

- (1) Loss of cell mediated immunity
- (2) Loss of antibody mediated immunity
- (3) A reduction in stem cell production
- (4) Reduction in haemoglobin content of blood

44. Macrophages are derived from

- (1) Neutrophils (2) Lymphocytes
- (3) Monocytes (4) Basophils

45. Which one acts as physiological barrier to entry of microorganisms in human body?

- (1) Monocytes
- (2) Skin
- (3) Epithelium of urinogenital tract
- (4) Tears

46. Sometime due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called

- (1) Allergy (2) Auto-immunity
- (3) Immunisation (4) Contact inhibition

47. The human immune system consist of

- (1) Lymphoid organs and soluble molecules
- (2) Lymphoid tissues
- (3) Lymphoid cells and antibodies
- (4) All of the above

48. The immune system plays an important role in

- (a) Recognition of foreign antigens
- (b) Responds to antigens and remembers them
- (c) Allergic reactions
- (d) Auto immune disease
- (e) Organ transplantation
- (1) b, c and e
- (2) a and b only
- (3) a, b, c and d
- (4) a, b, c, d and e

49. Full form of MALT is

- (1) Macrophages associated lymphoid tissue
- (2) Macrophages associated lymphoid tumor
- (3) Mucosa associated lymphoid tumor
- (4) Mucosa associated lymphoid tissue

50. Antitoxin is a preparation containing

- (1) Antigens to the toxin
- (2) Antibodies to the toxin
- (3) Mixture of antigen and antibodies given in tetanus
- (4) Memory B and T cells

51. The principle of immunisation or vaccination is based on which property of immune system

- (1) To produce antibodies
- (2) To retain memory
- (3) To differentiate self and non-self
- (4) All of the above

- 52.** Jenner prepared vaccine for small pox virus by employing
 (1) Attenuated small pox virus
 (2) Small doses of small pox virus
 (3) Cow pox virus
 (4) Large doses of small pox virus
- 53.** NACO stands for
 (1) National AIDS Control Organisation
 (2) National AIDS and Cancer Organisation
 (3) Non-government AIDS Xontrol Organisation
 (4) Nation Associated Combined Organisation
- 54.** Choose the wrong statement :-
 (1) Time lag between infection and appearance of AIDS is a few hours to a week
 (2) HIV has RNA as genetic material
 (3) HIV replicates in T₄ lymphocytes
 (4) ARV drugs are only partially effective in AIDS treatment
- 55.** AZT is used in treatment of
 (1) Malaria (2) AIDS
 (3) T.B. (4) Kala-azar
- 56.** Most cancers are treated by
 (1) Surgery
 (2) Radiotherapy
 (3) Chemotherapy
 (4) Combination of 1, 2 and 3
- 57.** Metastasis is
 (1) Rapid division in cancer cells
 (2) Regeneration of cancer cells
 (3) Spread of cancer cells to new sites
 (4) All of the above
- 58.** Cervical cancer is caused by
 (1) *Chlamydia*
 (2) Human Papilloma Virus
 (3) Herpes Simplex Virus
 (4) *Neisseria gonorrhoeae*
- 59.** The side-effects of use of anabolic steroids in males do not include
 (1) Increased aggressiveness
 (2) Mood swings
 (3) Liver dysfunction
 (4) Absence of hair growth on face and body
- 60.** In liver, alcohol is converted into a more toxic substance called
 (1) Acetaldehyde
 (2) Formaldehyde
 (3) Hydrogen cyanide
 (4) Methane
- 61.** Opium is obtained from part of *Papaver somniferum*
 (1) Unripe fruit
 (2) Ripe fruit
 (3) Root
 (4) Inflorescence
- 62.** A person preparing food like Mary Mallon can be a major source of spread of disease.
 (1) Pneumonia (2) Syphilis
 (3) Cancer (4) Typhoid
- 63.** Memory based acquired immunity evolved in
 (1) Higher vertebrates
 (2) Lower vertebrates
 (3) Lower invertebrates
 (4) All of the above
- 64.** Immature lymphocytes differentiates into antigen-sensitive lymphocytes in the
 (1) Primary lymphoid organs
 (2) Secondary lymphoid organs
 (3) Both 1 and 2
 (4) All of the above
- 65.** Fill in the blanks :
 1. The ...a... lymphoid organs provide the sites for interaction of lymphocytes with antigen, which then proliferate to become ...b...
 2. The thymus is a lobed organ located near the heart and beneath thec....
 3. Spleen has a large reservoir of ...d...
 (1) a-primary, b-antigen sensitive cells, c-collar bone, d-lymphocytes
 (2) a-secondary, b-receptor cells, c-breast bone, d-erythrocytes
 (3) a-primary, b-effector cells, c-breast bone, d-lymphocytes
 (4) a-secondary, b-effector cells, c-breast bone, d-erythrocytes

- 66.** Which of the following are the reasons for rheumatoid arthritis?
- Lymphocytes becomes less active
 - Body attacks self cells
 - Less antibodies are produced in the body
 - The ability to differentiate pathogens or foreign molecule from self cells is lost
- (1) ii, iii and iv (2) ii and iv
 (3) i, iii and iv (4) i and iv
- 67.** Medicinal plant harvested from wild for anticancer compound is
- Taxus baccata*
 - Datura stramonium*
 - Rauwolfia serpentina*
 - Ocimum sanctum*
- 68.** Fill in the blanks :
- In ...a..., a piece of the suspected tissue cut into thin section is stained and examined under microscope for (...b...) by a pathologist.
 - In radiography, ...c... are used
 - In CT scan,d... are used
- (1) a-biopsy, b-histopathological studies, c-X rays, d-gamma rays
- (2) a-biopsy, b-histopathological studies, c-X rays, c-gamma rays
- (3) a-biopsy, b-histopathological studies, c-X rays, d-X ray
- (4) b-biopsy, a-histopathological studies, c-X rays, d-gamma rays
- 69.** Tumor cells have been shown to avoid detection and destruction by immune system. Therefore the patient are given certain substances called biological response modifiers (BRM) which activates their immune system and helps in destroying the tumor. Identify the BRM.
- Alpha interferon
 - Alpha lactalbumin
 - Alpha-1 antitrypsin
 - Gamma globulin
- 70.** Match the columns I and II, and choose the correct combination from the options given
- | | Column-I | | Column-II |
|---|---------------|---|------------------------------|
| a | Neoplasm | 1 | Hematopoietic cell tumour |
| b | Benign tumour | 2 | Bone cartilage tissue cancer |
| c | Carcinomas | 3 | Malignant tumour |
| d | Sarcoma | 4 | Cancer of epithelial tissues |
| e | Lymphomas | 5 | Noncancerous tumour |
| | | 6 | Initiation of new tumours |
- (1) a-3, b-5, c-4, d-2, e-1
 (2) a-6, b-4, c-3, d-2, e-1
 (3) a-3, b-5, c-4, d-1, e-2
 (4) a-2, b-5, c-4, d-3, e-6
- 71.** Burkitt's lymphoma is caused by
- (1) HBV (2) Reo Virus
 (3) E-B Virus (4) HV-8
- 72.** Which is common between AIDS and Hepatitis-B?
- Both are viral diseases
 - Both are transmitted by infected needles and syringes.
 - Both are infectious diseases
 - Both are chronic diseases
- (1) ii, iii, and iv
 (2) i, ii and iii
 (3) i, ii, iii and iv
 (4) ii and iii
- 73.** Side-effects of use of anabolic steroids in female include
- Masculinisation
 - Premature baldness
 - Breast enlargement
 - Deepening of voice
 - Abnormal menstrual cycle
 - Depression
- (1) i, ii, iv, v and vi
 (2) i, ii, v and vi
 (3) i, iv, v and vi
 (4) i, iii, iv, v and vi

- 74.** A disease transferred from mother to child through placenta is
 (1) Hepatitis-B
 (2) Syphilis
 (3) HIV infection
 (4) All of the above
- 75.** Hepatitis B is also known as
 (1) Epidemic jaundice
 (2) Catarrhal jaundice
 (3) Serum jaundice
 (4) Infectious jaundice
- 76.** Coffee and Tea are
 (1) Fermented beverages
 (2) Alcoholic beverages
 (3) Distilled beverages
 (4) Nonalcoholic beverages
- 77.** Best HLA match for transplants in order of preference is
 (1) Parent > Sibling > Twin > Unrelated donor
 (2) Sibling > Twin > Parent > Unrelated donor
 (3) Twin > Sibling > Parent > Unrelated donor
 (4) Twin > Unrelated donor > Parent > Sibling

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	4	4	4	4	1	3	1	3	4	3	4	1	4	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	1	2	3	1	1	4	1	1	3	3	2	2	3	1
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	3	2	4	4	1	3	3	2	1	1	1	1	1	3	4
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	4	4	4	2	2	3	1	1	2	4	3	2	4	1
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	1	4	1	1	4	2	1	3	1	1	3	3	3	4	3
Que.	76	77													
Ans.	4	3													

ANIMAL HUSBANDRY

- 1.** 'Murrah', mileh a draught breed of cattle occurs in
 (1) A.P. (2) M.P.
 (3) Haryana (4) Gujarat
- 2.** 'Hisardale' is a breed of sheep developed by crossing of :-
 (1) Bikaneri ewes and marino rams
 (2) Marino ewes and bikaneri rams
 (3) Deccani ewes and bikaneri rams
 (4) Marino ewes and apennine rams
- 3.** In which method of animal breeding, males and females of different species are mated?
 (1) Cross breeding
 (2) Outbreeding
 (3) Out crossing
 (4) Interspecific hybridisation
- 4.** *Hisardale* has been developed by
 (1) Out crossing
 (2) Interspecific hybridisation
 (3) Cross breeding
 (4) Intraspecific hybridisation
- 5.** Fill in the blanks :
 1. Multiple of ovulation embryo transfer technology is fora.... improvement.
 2. In MOET, cow is administered hormone withb.... like activity to induce follicular maturation and super ovulation.
 3. Instead of one egg per cyclec.... eggs are produced through it.
 4. The fertilized eggs atd.... cell stages are recovered non-surgically and transferred to surrogate mother.
 (1) a-breed, b-LH, c-6 to 8, d-8 to 16
 (2) a-herd, b-FSH, c-8 to 16, d-16 to 32
 (3) a-herd, b-FSH, c-6 to 8, d-8 to 16
 (4) a-herd, b-FSH, c-6 to 8, d-8 to 32
- 6.** A group of animals which are related by descent and share many similarities are referred to as
 (1) Species (2) Variety
 (3) Breed (4) Race
- 7.** Which technique is used to increase herd size in short time ?
 (1) MOET
 (2) Artificial insemination
 (3) Interspecific hybridisation
 (4) Controlled breeding experiments
- 8.** Read the following statements :
 i. Mule is developed by interspecific hybridisation
 ii. Beekeeping is not labour intensive
 iii. For the herd-improvement cross-breeding is employed
 iv. Bees are the pollinator of apple, *Brassica*, pear and sunflower.
 v. In MOET, fertilised egg at 6-8 celled stage is recovered non-surgically
 (1) i, ii, iii and iv are true
 (2) iii, iv and v are false
 (3) i, ii and iv are true
 (4) i, ii, iii and v are true
- 9.** Fish introduced in India by foreigners is
 (1) *Labeo rohita*
 (2) *Mystus seenghala*
 (3) *Pomfret*
 (4) *Clarias batrachus*
- 10.** Which is the best breeding method for animals that are below average in production?
 (1) Interspecific hybridization
 (2) Cross breeding
 (3) Out breeding
 (4) Out crossing
- 11.** Mating between two related species is known as :
 (1) Intraspecific hybridisation
 (2) Intervarietal hybridisation
 (3) Interspecific hybridisation
 (4) Intergeneric hybridisation

- 12.** "Gill rot" disease of fish is due to
 (1) *Aeromonas species*
 (2) *Branchiomyces sanguinis*
 (3) *Bacillus polymyxa*
 (4) *Bacillus subtilis*
- 13.** To increase lactation/milk yield, cow is given
 (1) Sorbitol (2) Stilbestrol
 (3) Progesterone (4) Gonadotropin
- 14.** 'Birdflu' disease of poultry is caused by
 (1) *Bacterium* (2) *Virus*
 (3) *Fungus* (4) *Helminth*

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Ans.	3	1	4	3	4	3	1	3	3	4	3	2	2	2	

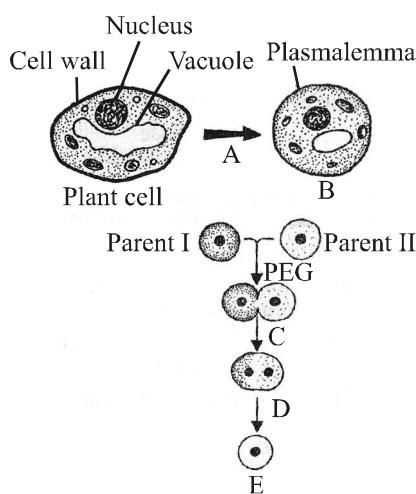
STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

- 1.** Read the following statements.
- About 840 million people in the world suffer from hidden hunger.
 - About 3 billion people suffer from micronutrient, protein and vitamin deficiencies.
 - About 25% population suffering from hunger and malnutrition.
 - SCP is the one of the alternate source of proteins for animal and human nutrition.
- Select the correct statements :
- i, ii, and iii
 - i, iii, and iv
 - i, ii, and iv
 - ii, iii, and iv
- 2.** In *Himgiri*, *Karan Rai*, *Pusa Gaurav*, *Pusa Sem-2*, *Pusa Snowball k-1*, *Pusa A-4* and *Pusa Komal*, how many crops are disease resistance and pest resistance respectively?
- 3, 4
 - 4, 3
 - 2, 5
 - 6, 1
- 3.** Match the columns and choose the correct option.
- | Column-I | Column-II |
|---------------------|---|
| 1 Totipotency | a Breeding crops with higher levels of nutrients |
| 2 Micro-propagation | b Plant grown from hybrid protoplast |
| 3 Somaclone | c Producing large number of plants through tissue culture |
| 4 Somatic hybrid | d Capacity to generate a whole plant from an explant |
| 5 Biofortification | e Plant genetically identical to original plant |
- (1) 1-d, 2-c, 3-e, 4-b, 5-a
 (2) 1-a, 2-e, 3-b, 4-d, 5-c
 (3) 1-c, 2-b, 3-e, 4-d, 5-c
 (4) 1-d, 2-e, 3-a, 4-d, 5-c
- 4.** Tissue culture technique can produce indefinite number of new plants from a small parental tissue. The economic importance of the technique is in raising.
- Variants through picking up somaclonal variations
 - Genetically uniform population of an elite species
 - Homozygous diploid plants
 - Development of new species
- 5.** Axenic culture is
- Pure culture without any contamination
 - Pure culture without any nutrient
 - Culture of a tissue
 - Culture of gene
- 6.** Slaughter house is known as
- Abattoir
 - Apiary
 - Aviary
 - Heterosis
- 7.** Black rot of crucifer is caused by
- Bacteria
 - Fungi
 - Virus
 - Protozoa
- 8.** Resistance to jassids in cotton and cereal leaf beetles in wheat is due to which of the following characteristic?
- Solid stem
 - Hairy leaves
 - Nectarless nature
 - Both 1 and 2
- 9.** Root of any plant breeding programme is
- Genetic variability
 - Selection
 - Mutation
 - Hybridisation

- 10.** Pollen grains of a plant ($2n = 28$) are cultured. What would be the number of chromosomes in the cells of callus?
- 56
 - 28
 - 21
 - 14
- 11.** Plant medium used widely in preparation of culture medium is got from
- Cycas revoluta*
 - Cocos nucifera*
 - Pinus roxburghii*
 - Borassus flabellifera*
- 12.** Match Column-I with Column-II and select the correct answer.
- | | Column-I | | Column-II |
|---|----------------|-------|-----------------------------|
| A | Wax | (i) | Interspecific hybridization |
| B | Pollinator | (ii) | Microporopagation |
| C | Mule | (iii) | Bee |
| D | Tissue culture | (iv) | Apiculture |
- (1) A-(iii), B-(i), C-(ii), D-(iv)
 (2) A-(iv), B-(iii), C-(i), D-(ii)
 (3) A-(ii), B-(i), C-(iii), D-(iv)
 (4) A-(iv), B-(i), C-(iii), D-(ii)
- 13.** Several South Indian states raise 2-3 crops of rice annually. The agronomic feature that makes this possible is because of:-
- shorter rice plant
 - better irrigation facilities
 - early yielding rice variety
 - disease resistant rice variety
- 14.** Which one of the following combination would a sugarcafe frame look for in the sugarcane crop?
- Thick stem, long internodes, high sugar content and disease resistant.
 - Thick stem, high sugar content and profuse flowering.
 - Thick stem, short internodes, high sugar content, disease resistance.
 - Thick stem, low sugar content, disease resistant.

- 15.** Fungicides and antibiotics are chemicals that:-
- enhance yield and disease resistance
 - kill pathogenic fungi and bacteria, respectively.
 - kill all pathogenic microbes
 - kill pathogenic bacteria and fungi respectively
- 16.** Given below are a few statements regarding somatic hybridization. Choose the **correct** statements :-
- Protoplasts of different cells of the same plant are fused.
 - Protoplasts from cells of different species can be fused.
 - Treatment of cells with cellulase and pectinase.
 - The hybrid protoplast contains characters of only one parental protoplast.
- (i) and (ii)
 - (i) and (ii)
 - (i) and (iv)
 - (ii) and (iii)
- 17.** Select the correct statement out the following:-
- A suspension culture consists of single cell and small groups of cells suspended in a liquid medium.
 - During sub-culturing, only a part of the culture is transferred into the new media.
 - Sterilization means complete destruction of microorganisms.
 - All of these

18. Given below is the flowchart showing the process of somatic hybridization. Identify A, B, C, D and E.



- (1) A -cell fusion, B-nuclear fusion, C-cellulase and pectinase, D-protoplast, E-somatic hybrid cell
- (2) A-cellulase and pectinase, B-protoplast, C-cell fusion, D-nuclear fusion, E-somatic hybrid cell
- (3) A-protoplast, B-nuclear fusion, C-somatic hybrid cell, D-cellulase and pectinase, E-cell fusion
- (4) A-cellulase and pectinase, B-protoplast, C-nuclear fusion, D-cell fusion, E-somatic hybrid cell

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	2	1	2	1	1	1	2	1	4	2	2	3	1	2
Que.	16	17	18												
Ans.	4	4	2												

BIOTECHNOLOGY - PRINCIPLES AND PROCESSES

- 1.** Restriction enzymes are used in genetic engineering because
- They can cut DNA at specific base sequence
 - They are nucleases that can cut DNA at variable sites
 - They have low pH
 - They are proteolytic enzymes which can degrade harmful proteins
- 2.** Restriction endonucleases
- cleave DNA at highly specific recognition sequences
 - are inserted into bacteria by bacteriophages
 - contain exon and intron
 - add methyl groups to specific DNA sequences
- 3.** X technique is now routinely used to detect HIV in suspected AIDS patients. It is being used to detect mutations in genes in suspected cancer patients too. It is a powerful technique to identify many other genetic disorders Identify X
- X = PCR
 - X = DNA fingerprinting
 - X = Pathogen
 - X = X-ray diffraction
- 4.** For transformation with recombinant DNA, the bacterial cells must first be made 'competent' which means
- should increase their catalytic activity
 - should decrease their metabolic reactions
 - increases efficiency with which DNA enters the bacterium
 - ability to divide fast
- 5.** During isolation of DNA, addition of which of the following causes precipitation of purified DNA ?
- Chilled ethanol
 - RNA primer
 - DNA polymerase
 - Proteases
- 6.** A bioreactor (fermenter) refers to
- a device in which substances are treated to stimulate biochemical transformation by living cells
 - study of mutated species
 - a tank for biochemical reactions
 - organisms reacting to a stimulus
- 7.**
- | Column-I | | Column-II | |
|-----------------|------------|------------------|----------------------------------|
| I | PCR | A | Large scale culture |
| II | Bioreactor | B | To induce alien DNA in host cell |
| III | Genegun | C | Restriction endonuclease |
| IV | EcoR1 | D | Amplification of gene |
- I-D, II-A, III-B, IV-C
 - I-B, II-A, III-D, IV-C
 - I-C, II-B, III-D, IV-A
 - I-A, II-D, III-B, IV-C
- 8.**
- | Column-I | | Column-II | |
|-----------------|----------------|------------------|---|
| I | Band | A | Restriction fragments are attached to this |
| II | Positive pole | B | Where specific restriction fragment collects in gel |
| III | Taq polymerase | C | Piece of DNA cut up by restriction enzymes |
| IV | Recognition | D | Temperature resistant |
- I-D, II-A, III-B, IV-C
 - I-A, II-D, III-B, IV-C
 - I-D, II-A, III-C, IV-B
 - I-B, II-A, III-D, IV-C

9.

Column-I		Column-II	
I	EcoRI	A	<i>Bacillus amyloliquefaciens</i>
II	Bam HI	B	<i>Haemophilus influenza</i>
III	Hind III	C	<i>Escherichia coli</i>
IV	pBR322	D	Artificial plasmid

- (1) I-C, II-A, III-B, IV-D
 (2) I-B, II-A, III-D, IV-C
 (3) I-D, II-A, III-C, IV-B
 (4) I-A, II-D, III-B, IV-C

10. Which one of these statements about the applications of gene cloning is false ?

- (1) Large amounts of recombinant protein can be produced by gene cloning
 (2) DNA fingerprinting is used to detect proteins bound to DNA
 (3) Cloned genes can be used to detect carrier of disease-causing genes
 (4) Gene therapy attempts to correct a disorder by delivering a good copy of a gene to a patient

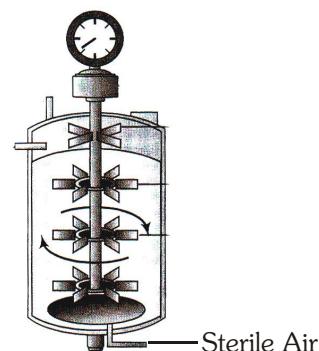
11. In order to identify the person who committed a crime, forensic experts will need to extract DNA from the tissue sample collected at the crime scene and conduct one of the following procedures for DNA finger printing analysis.

- (1) Cut the DNA and hybridize with specific micro-satellite probes
 (2) Cut the DNA and subclone the fragments
 (3) Cut DNA of victim to transfer in other individual
 (4) (2) followed by (3)

12. Select the correct option which shows the most appropriate temperatures of three different steps of PCR mechanism

Denaturation	Primer annealing	Primer extension
(1) 40–60°C	72°C	90°C
(2) 60–60°C	96°C	40–60°C
(3) 94–96°C	40–60°C	72°C
(4) 27°C	45–50°C	85–87°C

13. Identify the correct match for the given apparatus.



Apparatus		Function	
(1)	Genegun	i	Vectorless direct gene transfer
(2)	Paper chromatography	ii	Separation of chlorophyll pigments
(3)	Stirred tank bioreactor	iii	Carry out fermentation process
(4)	Respirometer	iv	Finding out rate of respiration

14. Which of the following statement is true ?

- (1) Hind-II always cuts DNA molecules at a particular point by recognizing a specific sequence of 4 base pairs
 (2) Besides Hind-II, today we know 900 restriction enzymes
 (3) Gametes derive from phage
 (4) Type-II restriction endonuclease is most useful in genetic engineering

15. Antibiotic resistance gene present of Bam HI site of a *E.coli* cloning vector is

- (1) streptomycin resistance
 (2) tetracycline resistance
 (3) chloramphenicol resistance
 (4) kanamycin resistance

- 16.** Direct visual selection method for the selection of recombinant host cells on the basis of their inability to produce colour in the presence of chromogenic substrate can be applied, if the vector used is a
 (1) modified plasmid vector of *E.coli*
 (2) mutated phages
 (3) modified *Agrobacterium tumifaciens* plasmid
 (4) disarmed retroviruse
- 17.** An example of petroleum plant is
 (1) *zea mays*
 (2) *azotobacter*
 (3) *euphorbia lathyris*
 (4) *solanum tuberosum*
- 18.** First fermented acid is
 (1) formaldehyde (2) lactic acid
 (3) fumaric acid (4) all the above
- 19.** The important objective of biotechnology in agricultural section is
 (1) to produce pest resistant varieties of plants
 (2) to increase the nitrogen content
 (3) disease free plant
 (4) to increase the plant weight
- 20.** Interferons are synthesized in response to
 (1) mycoplasma (2) bacteria
 (3) viruses (4) algae
- 21.** Transgenic animal has
 (1) foreign DNA in all its cells
 (2) foreign RNA in all its cells
 (3) foreign DNA in some of the cells
 (4) all of the above
- 22.** The main objective of production/use of herbicide resistant GM crops is to
 (1) eliminate weeds from the field without the use of herbicides
 (2) encourage eco-friendly herbicides
 (3) Both (1) and (2)
 (4) eliminate weeds from the field without the use of manual labour
- 23.** Which one of the following is being tried in India as a biofuel substitute for fossil fuels ?
 (1) Jatropha (2) Maize
 (3) Aegilops (4) Azadirachta
- 24.** A transgenic food crop which may help in solving the problem of night blindness in developing countries is
 (1) Bt cotton
 (2) Bt Soybean
 (3) Golden rice
 (4) Falvr Savr tomatoes
- 25.** There are three basic steps in genetically modify organism. Arrange these steps in correct sequence.
 (a) Introduction of the identified DNA into 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
- 26.** In the year a the two enzymes responsible for b the growth of bacteriophage in *E.coli* were isolated. One of these added c group to DNA, while other d DNA. The later was called e.
 (1) a-1967, b-promoting, c-ethyl, d-join, e-DNA ligase
 (2) a-1963, b-restricting, c-methyl, d-join, e-DNA ligase
 (3) a-1972, b-restricting, c-methyl, d-cut, e-restriction endonuclease
 (4) a-1963, b-restricting, c-methyl, d-cut, e-restriction endonuclease
- 27.** The most important feature in a plasmid to be used as a vector is
 (1) Origin of replication
 (2) Presence of sites for restriction endonuclease
 (3) Presence of selectable marker
 (4) Presence of alternate selectable marker

- 28.** In vector pBR 322, the 'rop' codes for the
 (1) Pvu II
 (2) Pvu I
 (3) Proteins that involved in the replication of the restriction enzyme
 (4) Proteins that involved in the replication of the plasmid
- 29.** Which statement is incorrect?
 (1) Recognition sequence is made up of 6 bases
 (2) Recognition sites are present in cloning vector
 (3) In gene-gun, plant cell are bombarded with high velocity micro-particles of gold or tungsten
 (4) *Agrobacterium tumifaciens* is a pathogen of several dicot plants
- 30.** Restriction enzymes belongs to a large class of the enzyme called
 (1) Cellulase (2) Nuclease
 (3) Chitinase (4) Polymerase
- 31.** In pBR 322, how many recognition sites are present?
 (1) 8 (2) 7 (3) 3 (4) 4
- 32.** Stickiness of the sticky ends of the DNA facilitates the
 (1) Action of DNA ligase and these ends joined together laterally
 (2) Action of DNA ligase and these ends joined together end-to-end
 (3) Action of Taq polymerase
 (4) Action of restriction enzyme
- 33.** In pBR 322, recognition sequences, that are present on the antibiotic resistant gene.
 (1) Pst I, Pvu I
 (2) Bam HI, Sal I
 (3) Both 1 & 2
 (4) None of the above
- 34.** DNA is a ___1___ molecule having ___2___ charge.
 (1) 1-Hydrophobic, 2-negative
 (2) 1-Hydrophilic, 2-positive
 (3) 1-Hydrophilic, 2-negative
 (4) 1-Hydrophobic, 2-positive
- 35.** Source of Taq polymerase used in PCR is a
 (1) Thermophilic fungus
 (2) Mesophilic fungus
 (3) Thermophilic bacterium
 (4) Halophilic bacterium
- 36.** 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, c, d and e (4) a, b, c, d, e and f
- 37.** Significance of the 'heat shock' in bacterial transformation is to facilitate.
 (1) Expression of the antibiotic resistance gene in the vector
 (2) Ligation of DNA to the cell membrane
 (3) Uptake the DNA through membrane
 (4) Binding of DNA to cell wall
- 38.** Select the incorrect statement(s)
 (1) A foreign DNA can be ligated at the BamHI site of ampicillin resistance gene in the vector pBR 322.
 (2) Some plasmids may have only one or 2 copies per cell whereas others may have 15-100 copies per cell.
 (3) In almost all recombinant technologies, the ultimate aim is to produce a desirable protein.
 (4) All of the above

ANSWER KEY

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

BIOTECHNOLOGY AND ITS APPLICATIONS

1. Insect pest resistance Bt Cotton was developed by
 (1) Somaclonal variation
 (2) Micropropagation
 (3) Transgenic technology
 (4) Somatic hybridisation
2. Find the correct match

	Column-I		Column-II
a	Army worm	i	Dipteran
b	Flies	ii	Lepidopterans
c	Beetles	iii	Coelopterans
d	Mosquitoes		
e	Tobacco budworm		

- (1) a-i, b-iii, c-ii, d-i, e-iii
 (2) a-ii, b-i, c-iii, d-i, e-i
 (3) a-iii, b-ii, c-i, d-iii, e-ii
 (4) a-ii, b-i, c-iii, d-i, e-ii
3. From which of the following techniques early detection is not possible.
 (a) Serum analysis (b) PCR
 (c) ELISA (d) Urine analysis
 (e) Recombinant DNA technology
 (1) b, c and e (2) a and d
 (3) a, d and e (4) b and c

4. 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
 (1) a, b and c (2) a and c
 (3) a and b (4) a, b, c and d

5. Read the following statements.
- In 1997, an American company got patent rights on Basmati rice through the International Patent and Trademark office.
 - There are an estimated 50,000 varieties of rice in India alone.
 - First clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase deficiency
 - In 1983, Eli Lilly Company prepared DNA sequences corresponding to A, B and C chains of human insulin.

In these how many are incorrect statements?

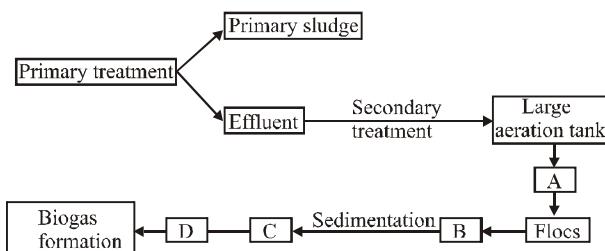
- | | |
|-------|-----------------------|
| (1) 4 | (2) 3 |
| (3) 2 | (4) None of the above |

ANSWER KEY

Que.	1	2	3	4	5	
Ans.	3	4	2	1	3	

MICROBES IN HUMAN WELFARE

1. Given below is the flowchart of sewage treatment. Identify A, B, C and D and select the correct option:-



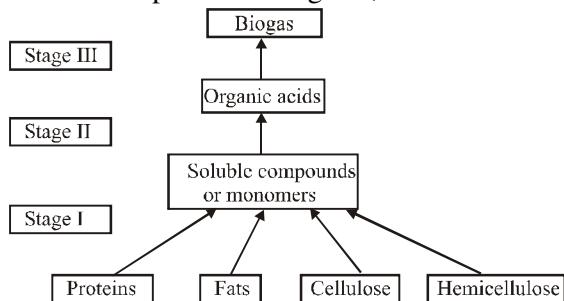
- (1) A-Mechanical agitation; B-Increased BOD
C- Activated sludge; -D-Aerobic sludge digesters
- (2) A-Mechanical agitation; B-Reduced BOD
C-Activated sludge; D-Anaerobic sludge digesters
- (3) A- Microbial digestion; B-Activated sludge
C-Reduced BOD; D-Anaerobic sludge digesters
- (4) A-Microbial digestion; B-Mechanical agitaton C-Reduced BOD; D-Aerobic sludge digesters

2. Match Column-I with Column-II and select the correct answer from the codes given below.

	Column-I		Column-II
A	The stage in which physical treatment of sewage is done	(i)	Anaerobic digestion of activated sludge and production of biogas
B	The stae in which biological treatment of sewage is done	(ii)	Activated sludge
C	Name of the sediment in primary treatment	(iii)	Aeration tanks
D	It is carried to aeration tanks from primary settling	(iv)	Primary effluent
E	Name of thie sediment in secondary treatment	(v)	Primary sludge
F	Site of flocs growth	(vi)	Secondary treatment
G	Function of sludge digester	(vii)	Primary treatment

- (1) A-(vii), B-(vi), C-(v), D-(iv), (E)-(ii), F-(iii), G-(i)
- (2) A-(i), B-(iii), C-(v), D-(vii), (E)-(ii), F-(iv), G-(vi)
- (3) A-(i), B-(ii), C-(iii), D-(iv), (E)-(v), F-(vi), G-(vii)
- (4) A-(vii), B-(vi), C-(i), D-(ii), (E)-(iii), F-(iv), G-(v)

3. Biogas generation is a three stage anaerobic digestion of animal and other organic wastes. Study the following flowchart and select the correct option for stages I, II and III.



- (1) In stage-I facultative anaerobic microorganisms bring about enzymatic breakdown of complex organic compounds into simple soluble compounds or monomers.
- (2) In stage-II, monomers are converted into organic acids by fermentation causing microbes.
- (3) In stage-III, organic acids are acted upon by methanogens bacteria to produce biogas.
- (4) All of these

4. Activated sludge should have the ability to settle quickly so that it can:-

- (1) be rapidly pumped back from sedimentation tank to aeration tank
- (2) Absorb pathogenic bacteria present in waste water while sinking to the bottom of the settling tank
- (3) be discarded and anaerobically digested
- (4) absorb colloidal organic matter

5. What happens when milk is converted into curd or yoghurt?

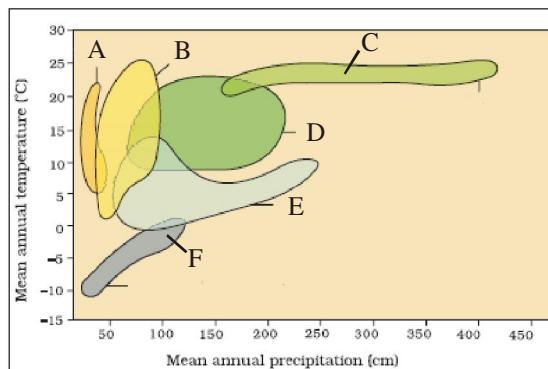
- (1) Bacterial enzymes convert lactose into lactic acid
- (2) Globular milk protein is converted into fibrous protein
- (3) Vit. C is changed into Thiamine
- (4) Both (1) and (2)

ANSWER KEY

Que.	1	2	3	4	5	
Ans.	2	1	4	1	1	

ORGANISMS & POPULATION

1. In the given figure, identify the temperate forest and coniferous forest respectively from the markings A-F and select the correct option :-



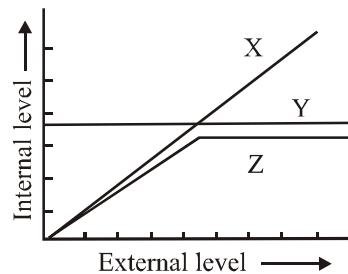
- (1) A and B (2) D and E
 (3) B and D (4) C and F

2. Different biomes are formed over the earth's surface due to annual variations in ?
 (1) Temperature
 (2) Precipitation
 (3) Incident solar radiation
 (4) All of these
3. Match Column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
(A)	Eurythermal	(i)	Able to tolerate narrow range of temperature
(B)	Stenothermal	(ii)	A stage of suspended development
(C)	Conformers	(iii)	Body temperature changes with ambient temperature
(D)	Diapause	(iv)	Able to tolerate wide range of temperature

- (1) A-(iv), B-(i), C-(iii), D-(ii)
 (2) A-(iv), B-(i), C -(ii), D-(iii)
 (3) A-(ii). B-(iv), C-(iii), D-(i)
 (4) A-(i). B- (ii), C-(iii)- D-(iv)

4. The given graph represents how three different living organisms (X, Y and Z) cope with the external environmental conditions. Study the graph and select the **correct** option regarding X, Y and Z :-

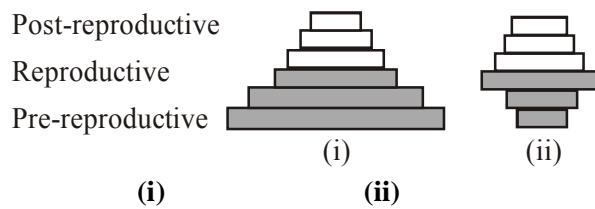


- (1) X could be a mammal.
 (2) Y could be a bird.
 (3) Z could be a plant.
 (4) X could be a bird.

5. When organisms change their location to escape from harsh environment, it is called as:-
 (1) Hibernation (2) Vernalization
 (3) Migration (4) Aestivation
6. _____ rule states that mammals from colder climates generally have shorter ears and limbs, to minimise heat loss :-

- (1) Allen's (2) Bergman's
 (3) Borge's (4) Powell's

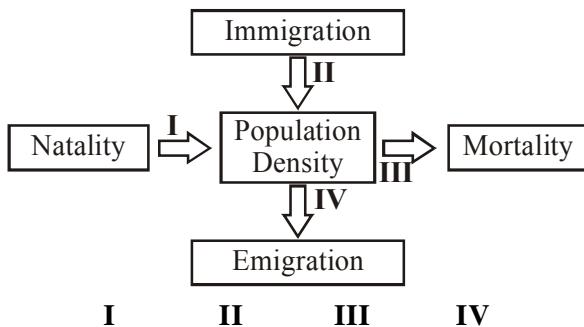
7. What does the shape of the given age pyramids reflects about the growth status of the related population?



- | | |
|---|--|
| (1) Expanding
(2) Stable
(3) Declining
(4) Declining | Stable
Declining
Declining
Stable |
|---|--|

- 8.** Read the following statement (1-4) and select option which correctly indicates the term associated with?
1. Number of births during a given period in the population that are added to initial density.
 2. Number of deaths in the population in a given period.
 3. Number of individuals of the same species that have come into the habitat from elsewhere during a given time period.
 4. Number of individuals who left habitat and gone elsewhere during a given time period.
- (1) 1-Mortality, 2-Natality, 3-Emigration, 4-Immigration
 (2) 1-Mortality, 2-Natality, 4-Emigration, 3-Immigration
 (3) 2-Mortality, 1-Natality, 3-Emigration, 4-Immigration
 (4) 2-Mortality, 1-Natality, 4-Emigration, 3-Immigration
- 9.** 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 |
- (1) a-3, b-1, c-2, d-4
 (2) a-4, b-1, c-4, d-3
 (3) a-3, b-4, c-2, d-1
 (4) a-3 and 4, b-1, c-2, d-1
- 10.** Read the following statements and find out the incorrect statements.
- a. Predation is nature's way of transferring to higher trophic levels the energy fixed by plants
 - b. Prey keep predator population under control
- c. Biological control methods adopted in agricultural pest control are based on the ability of the prey to regulate the predator population.
- d. Predators help in maintaining species diversity in a community by reducing the intensity of competition among competing prey species.
- (1) a and b
 (2) b and c
 (3) b, c and d
 (4) a and d
- 11.** Read the following statements and find out the incorrect statement(s)
- a. Parasitic mode of life ensures free lodging and meals so parasitism has evolved in to many taxonomic groups from plants to higher vertebrates.
 - b. Many parasites have evolved to be host specific, i.e., they can parasitize on any a species of host.
 - c. The life-cycle of parasites are often complex, involving one or two intermediate host or vectors to facilitate parasitisation of its secondary host.
 - d. All of the parasites harm the host.
 - e. Lice on dogs and ticks on humans are familiar examples of ectoparasites.
- (1) a, b and c (2) b, c and d
 (3) b, c, d and e (4) a, b and d
- 12.** Which of the following statements is correct ?
- (1) Sometimes, population density has more impact than the population size, and sometimes vice versa
 - (2) The carrying capacity of a habitat always remains constant
 - (3) Under normal conditions, births and deaths are the most important factors influencing population density, other two factors (immigration and emigration) are important in special conditions
 - (4) Both (1) and (3)

13. Identify I to IV for increase or decrease in population density :-



- (1) Increase Decrease Increase Decrease
- (2) Decrease Increase Decrease Increase
- (3) Increase Increase Decrease Decrease
- (4) Increase Decrease Increase Increase

14. Read the following statements

- (I) In a population growth rate curve, the lag phase represents the period when a population migrates to a new environment
- (II) In a population growth rate curve, the steepest part of growth represents the period when a population is growing exponentially
- (III) In the stationary phase growing exponentially growth rate curve, the population is in dynamic equilibrium
- (IV) Human beings have changed the carrying capacity of the earth

Which of the above statements are correct ?

- (1) All of these (2) I, II, III
- (3) II, III (4) I, IV

15. Which of these is an explanation of why a population can fluctuate once it has reached the carrying "capacity" ?

- (1) The number of organism decrease but never increases as it reaches carrying capacity
- (2) All populations experience exponential growth once they reach the carrying capacity
- (3) A population of organisms always grows exponential over long once it reaches carrying capacity
- (4) Limiting factors can influence the number of organism in a population once it reaches the carrying capacity

16. For the defence against predators, butterflies become highly distasteful due to certain chemical in their bodies. What is the source of the chemical ?

- (1) The butterflies have genes for synthesis of this chemical in its mouth
- (2) The butterflies acquire this chemical during its caterpillar stage by feeding on a poisonous plant
- (3) The chemical accumulates in the cells of butterfly when it feeds the sap of a plant
- (4) The butterfly secretes the chemical from its corpus allatum

17. Which of the following is not entirely a true fact?

- (1) Competition occurs when closely related species compete for the same resources that are limiting
- (2) Totally unrelated species could compete for the same resource
- (3) Resources need not to be limiting for competition to occur in interference competition, the feeding efficiency of one species might be reduced to the interfering and inhibitory presence of the other species, even if resources are plenty
- (4) A complex interplay of interspecific interactions and environmental variability characterizes community structure

18. When a species goes extinct in one area, it is often desirable to reintroduce the species from other populations. A major problem with this approach is that

- (1) genetic diseases can easily be removed when the species is reintroduced
- (2) populations are often adapted to local conditions and may not survive when moved to a different location
- (3) the community will have adapted to the extinct species' absence
- (4) it is difficult to get an adequate sample of individuals to properly reestablish the population

19. In the formula, $\log S = \log C + Z \log A$, ecologist have discovered that the value of Z, lies in the range of
(1) 0.1 to 0.5 (2) 5 to 10
(3) 0.1 to 0.2 (4) 1 to 5

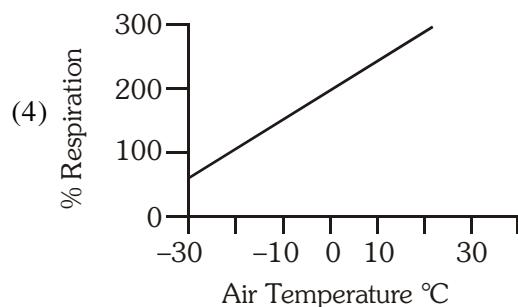
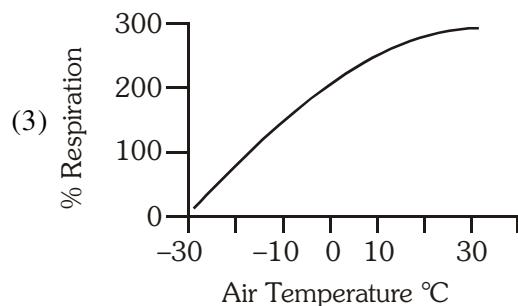
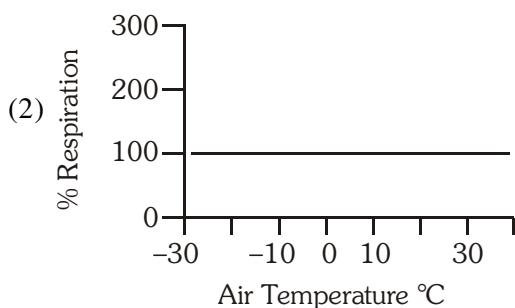
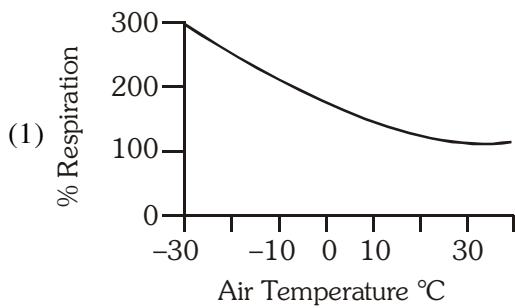
ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	4	1	2	3	1	3	4	4	2	3	4	3	1	4
Que. 16 17 18 19															
Ans.	2	1	2	3											

ECOSYSTEM

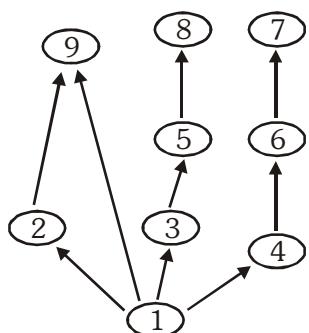
1. Which one of the following is the most productive ecosystem?
 (1) Temperate forest
 (2) Grassland
 (3) Desert
 (4) Tropical rain forest
 2. Which one of the following aspects is not a component of functional unit of ecosystem?
 (1) Productivity
 (2) Decomposition
 (3) Energy flow
 (4) Ecological pyramids.
 3. _____ is the rate of production of organic matter by consumers.
 (1) Primary productivity
 (2) Secondary productivity
 (3) Net primary productivity
 (4) Gross primary productivity
 4. Read the given statements and select the **correct** option.
Statement 1 : Net primary productivity is less than the gross primary productivity.
Statement 2: Net primary productivity is equal to the gross primary productivity minus the respiration losses.
 (1) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
 (2) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
 (3) Statement 1 is correct and statement 2 is incorrect.
 (4) Both statements 1 and 2 are incorrect.
 5. Which of the following is not a characteristic of humus?
 (1) It is rich in organic matter such as lignin and cellulose.
 (2) It is colloidal in nature and serves as a reservoir of nutrients.
 (3) It is highly resistant to microbial action and undergoes slow decomposition.
 (4) It is further degraded by the process of humification.
 6. Percentage of photosynthetically active radiation (PAR) that is captured by plants in synthesis of organic matter is:-
 (1) 50 - 70% (2) 30 - 40%
 (3) 80 -100% (4) 2 - 10%.
 7. In an aquatic ecosystem, the organism present at the level equivalent to cows in grasslands is:-
 (1) phytoplankton
 (2) large fishes
 (3) seagulls
 (4) zooplankton.
 8. The given pyramid best represents:-
- The diagram shows a vertical stack of four horizontal layers. From bottom to top: 1. A layer containing several trees, labeled "Producers". 2. A layer containing various small mammals like mice and birds, labeled "Primary consumers". 3. A layer containing larger mammals like deer and lions, labeled "Secondary consumers". 4. A single large animal at the top, labeled "Tertiary consumers".
- (1) pyramid of energy in forest ecosystem
 (2) pyramid of biomass in forest ecosystem
 (3) pyramid of numbers in grassland ecosystem
 (4) pyramid of numbers in tree-dominated forest ecosystem.
 9. An ecosystem which can be easily damaged but can recover after some time if damaging effect stops will be having
 (1) low stability and high resilience
 (2) high stability and low resilience
 (3) low stability and low resilience
 (4) high stability and high resilience.
 10. Which one of the following is not a gaseous biogeochemical cycle in ecosystem?
 (1) Sulphur cycle (2) Phosphorus cycle
 (3) Nitrogen cycle (4) Carbon cycle

11. Which one of the following is incorrect ?
- Biological control methods adopted in agricultural pest control are based on the ability of the predator to regulate prey population
 - Predators also help in maintaining species diversity in a community by increasing the intensity of competition among competing prey species
 - In the rocky intertidal communities of the American Pacific Coast, the starfish piaster is an important predator
 - In a field experiment, when all the starfish were removed from an enclosed intertidal area, more than 10 species of invertebrates became extinct within a year because of interspecific competition
12. Which one is a physiological adaptation to cold climate ?
- Low weight
 - Accumulating glycerol and antifreezing proteins
 - Accumulating ice nucleating protein
 - Diapause
- Only I
 - I, II, III
 - II, III
 - I, II, III, IV
13. Which of the following graphs correctly depict the rate of respiration to a, non-hibernating mammal living in cold climate ?



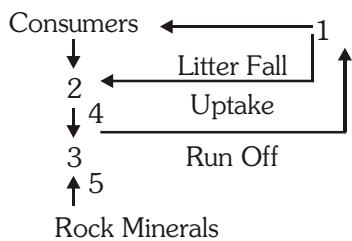
14. The open ocean and tropical rain forest are the two largest contributors to earth's net primary productivity because
- both have light rates of net primary productivity
 - both cover huge surface areas of the earth
 - nurtients cycle is fastest in these two ecosystems
 - The ocean covers a huge surface area and the tropical rain forest has a high rate of productivity
15. In the past 150 years, there has been a major new input to the carbon cycle. What is it ?
- There are more humans releasing large quantities of carbon dioxide through respiration
 - Increased animal farming has resulted in greater carbon dioxide releases
 - Industrialization has resulted in the burning of fossil fuels such as oil and coal, which releases carbon dioxide into the atmosphere
 - Changes in oceans currently have lead to the release of large qunatities of carbon dioxide

16. Examine the following food web. Organism is in 9th position



- (1) Herbivore
- (2) Primary carnivore
- (3) Secondary carnivore
- (4) Omnivore

17. Fill in the blanks in the following simplified model of a nutrient cycle.



	1	2	3	4	5
(1)	Producer	Detritus	Soil solution	Decomposition	Weathering
(2)	Producer	Detritus	Soil solution	Weathering	Decomposition
(3)	Producer	Soil solution	Detritus	Decomposition	
(4)	Producer	Soil solution	Detritus	Weathering	Decomposition

18. Which of the following is true about the amount of sunlight and heat arriving on earth?

- (1) Every place on earth receives the same annual number of hours of sunlight and the same amount of heat
- (2) Every place on earth receives the same annual number of hours of sunlight, but not the same amount of heat

- (3) Every place on earth receives the same annual amount of heat, but not the same number of hours of sunlight
- (4) Both the annual amount of sunlight and the amount of heat received vary over the surface of earth

19. The secondary productivity means

- (1) the rate of formation of biomass in autotrophs
- (2) the rate of formation of biomass in heterotrophs
- (3) the rate at which the organic molecules are formed in an autotroph
- (4) the rate at which organic molecules are used up by an autotroph

20. Food chains differ from food webs in that

- (A) food chains are a single sequence of who eats whom in a community
- (B) food chains better represent the entire community
- (C) food webs represent the complex interaction among food chains
- (D) food chain is the flow of energy in a population

- (1) A, C
- (2) A, D

- (3) A, B, C
- (4) A, B, C, D

21. Which of the following statement(s) is/are correct about biogeochemical cycle?

- (A) Carbon and nitrogen cycle are faster than phosphorus cycle
- (B) All biogeochemical cycles include both organisms and non-living components
- (C) Most elements remain longest in the living portion of their cycle
- (D) The chemical elements used by organisms in large quantities cycle back and forth between the organisms and the environment

- (1) A, C

- (2) A, B, D

- (3) A, B, C

- (4) A, B, C, D

- 22.** The phosphates remain outside the natural cycle for a long time
 (1) when they form compounds with metals.
 (2) when they are incorporated in bone and teeth.
 (3) when the bodies of the organisms excrete and decompose.
 (4) Both (1) and (2)
- 23.** Which of the following include(s) ecosystem services?
 (A) Purification of air and water by forests
 (B) Forests mitigate droughts and flood
 (C) Forests act as store house of carbon
 (D) Forests influence hydrological cycle
 (1) A, C (2) A, D
 (3) A, B, C (4) A, B, C, D
- 24.** Island species have tended to become extinct faster than species living on a mainland. Which is not the reason ?
 (1) Island species have often evolved in the absence of predators
 (2) Human beings have introduced diseases and competitors to islands, which negatively impacts the island population
 (3) Island population is usually smaller than mainland population
 (4) Island population is usually less fit than mainland populations
- 25.** David Tilman performed long term ecosystem experiment using outdoor plots.
 Which is the correct statement ?
 (A) Plots with more species showed less year-to-year variation in total biomass
 (B) Plots with less species showed less year-to-year variation in total biomass
 (C) Increased diversity contributed to higher productivity
 (D) Plots with more species showed more year-to-year variation in total rainfall
 (1) (A) and (C)
 (2) (A) and (D)
 (3) (B) and (D)
 (4) (A), (C) and (D)
- 26.** How much deep in the oceans, the environment is perpetually dark and its inhabitants are not aware of the existence of Sun?
 (1) >3500 m (2) >500 m
 (3) >500 feet (4) >3500 feet
- 27.** Which characteristics determine to a large extent the vegetation in any area?
 (a) Soil composition (b) Grain size
 (c) Irrigation (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
- 28.** Soil rich in Fe and Al due to excessive leaching is
 (1) Alluvial (2) Laterite
 (3) Loam (4) Both 1 and 2
- 29.** River water deposits
 (1) Cooluvial (2) Alluvial soil
 (3) Eolian (4) Sandy soil
- 30.** The greatest biodiversity of Earth is found in
 (1) Tropical Amazonian rain forest in South Africa
 (2) Temperate Amazonian rain forest in North America
 (3) Tropical Amazonian rain forest in South America
 (4) Temperate Amazonian rain forest in South America
- 31.** Which is incorrect about a small pond ecosystem?
 (1) This is fairly a self-sustainable unit.
 (2) All the 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) This ecosystem performs all the functions of any ecosystem except the unidirectional flow of energy.

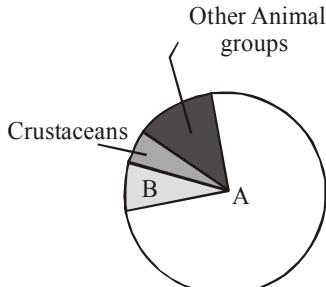
- 32.** What will happen to a well growing herbaceous plant in the forest if it is transplanted outside the forest in a park?
- It will grow normally.
 - it will grow well because it is planted in the same locality.
 - It may not survive because of change in its micro climate.
 - It grows very well because the plant gets more sunlight.
- 33.** Read the following statements regarding ecological pyramids and choose the correct answer.
- Relationship between in terms of organisms at different trophic levels is expressed in terms of number, biomass and energy.
 - Any calculations of energy content, biomass or number has to include only one group of organisms at that trophic level.
 - In most ecosystems, all the pyramids of number, biomass and energy are upright.
 - The pyramid of biomass in sea is generally inverted.
 - Pyramid of energy is always inverted and can never be upright.
- a, c and d are wrong
 - a is wrong
 - b and e are wrong
 - a and e are wrong
- 34.** A healthy forest ecosystem.
- Purify air and water
 - Mitigate droughts and floods
 - Cycle nutrients
 - Generate fertile soils
 - Provide wildlife habitat
 - Maintain biodiversity
- g.** Pollinate crops
h. Provide storage site for carbon
i. Provide aesthetic, cultural and spiritual values
- b, d, e, f, h and i
 - a, b, c, f, g and i
 - a, b, c, d, e, f and g
 - a, b, c, d, e, f, g, h and i
- 35.** Read the following statements and find out the incorrect statement.
- Carbon constitutes 49 per cent of dry weight of organism and is next to water.
 - Of the total quantity of global carbon, 71 per cent carbon is found dissolved in ocean.
 - Atmosphere contains about 10% of total global carbon
 - The oceanic reservoir regulates the amount of carbon dioxide in the atmosphere.
- 36.** Fill in the blanks :
- Plants are called as because they fix carbon dioxide.
 - In an ecosystem dominated by trees, the pyramid numbers is type
 - In aquatic ecosystems, the limiting factor for the productivity is
 - Common detritivores in ecosystem are
 - The major reservoir of carbon on our earth is
- a-consumers, b-upright, c-temperatre, d-earthworm, e-atmosphere
 - a-producer, b-spindle, c-light, d-earthworm, e-atmosphere
 - a-producer, b-inverted, c-carbon dioxide, d-mites, e-ocean
 - a-producer, b-inverted, c-light, d-earthworm, e-ocean.

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	4	2	1	4	4	4	4	1	2	2	3	1	4	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	1	2	2	1	2	4	3	4	1	2	4	3	2	3
Que.	31	32	33	34	35	36									
Ans.	4	3	3	4	3	4									

BIODIVERSITY & ITS CONSERVATION

1. Give pie diagram represents the proportionate number of species of major groups of invertebrates. Identify the groups A and B.



- (1) A = Insects, B = Molluscs
- (2) A = Molluscs, B = Insects
- (3) A = Insects, B = Annelids
- (4) A = Molluscs, B = Annelids

2. 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) Pollution
 - (3) Co-extinctions
 - (4) Alien species invasions
3. When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct. This phenomenon is referred to as
- (1) Fragmentation
 - (2) Alien species invasion
 - (3) Over-exploitation
 - (4) Co-extinction
4. The diversity of organisms sharing the same habitat or community is termed as
- (1) alpha diversity
 - (2) beta diversity
 - (3) gamma diversity
 - (4) delta diversity

5. India is one of the 12 megadiversity centres of the world and is being divided into ____ biogeographical regions.
- (1) 8
 - (2) 10
 - (3) 16
 - (4) 18

6. Which of the following groups does not include the countries which contribute to 12 megadiversity centres of the world?

- (i) Mexico, Columbia, Brazil
- (ii) Peru, Ecuador, Venezuela
- (iii) Madagascar, Indonesia, Malaysia
- (iv) UAE, Germany, Japan
- (v) China, India, Australia

(1) (ii) (2) (v) (3) (iii) (4) (iv)

7. Western ghats have a greater number of amphibian species than the Eastern ghats. What kind of diversity does it represent?

- (1) Species diversity (2) Genetic diversity
- (3) Ecological diversity (4) None of these

8. Keystone species deserve protection because these

- (1) are capable of surviving in harsh environmental conditions
- (2) indicate presence of certain minerals in the soil
- (3) have become rare due to overexploitation
- (4) play an important role in supporting other species

9. Match Column-I with Column-II and select the correct option from the codes given below.

	Column-I		Column-II
A	Rhinoceros	(i)	High endemism
B	In Situ conservation	(ii)	Off site conservation
C	Ex Situ conservation	(iii)	On site conservation
D	Hot spots	(iv)	Kaziranga

- (1) A-(iv), B-(iii), C-(ii), D-(i)
- (2) A-(iv), B-(i), C-(ii), D-(iii)
- (3) A-(iv), B-(ii), C-(iii), D-(i)
- (4) A-(iv), B-(i), C-(iii), D-(ii)

10. 'Broadly utilitarian' argument for the conservation of biodiversity does not include

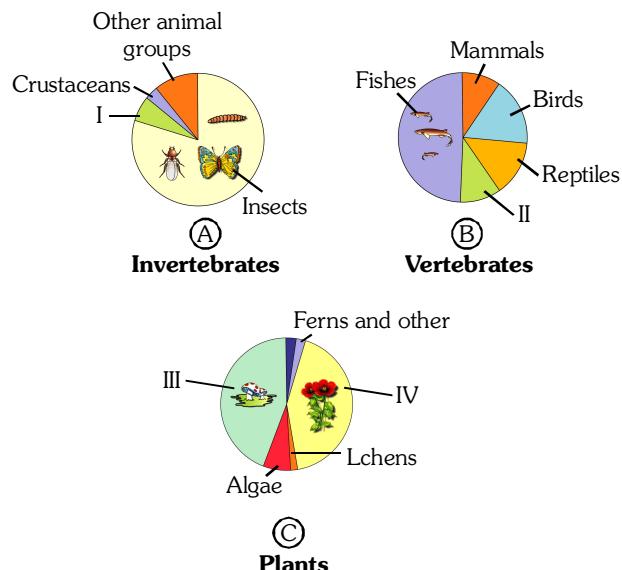
- (1) bioprospecting
- (2) pollination
- (3) aesthetic value
- (4) climatic regulation

11. Which of the following is not an example of **in-situ** conservation?
- Biosphere reserves
 - National parks
 - Wildlife sanctuaries
 - Zoological parks
12. Read the following statement.
"Nature's biological library is burning even before we catalogued the titles of all the books stocked there".
This statement is given in your NCERT book. What would its mean
 (1) The diversity of plants and animals is not uniform
 (2) Rich biodiversity is essential for ecosystem health
 (3) A large fraction of species faces the threat of becoming extinct even before we discover them
 (4) All of the above
13. David Tilman's long-term ecosystem experiments using outdoor plots showed that
 (1) Increased diversity contributed to lower productivity
 (2) Increased diversity contributed to higher productivity
 (3) Increased diversity have no impact on productivity
 (4) Increased diversity have unpredictable impact on productivity
14. *Clarias gariepinus* is
 (1) African ratfish (2) Indian catfish
 (3) African catfish (4) American catfish
15. What is common to the following plants; *Nepenthes*, *Psilotum*, *Rauwolfia* and *Aconitum*?
 (1) All are ornamental plants
 (2) All are phylogenetic link species
 (3) All are prone to over exploitation
 (4) All are exclusively present in the Eastern Himalayas
16. Match the columns I and II, and choose the correct combination from the options given.
(for India)

	Column-I Conservation technique		Column-II Number in India
1	Hotspots	a	34
2	National parks	b	90
3	Wildlife sanctuaries	c	14
4	Biosphere reserves	d	448
		e	3

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

17. Given below are pie diagrams A, B and C related to proportionate number of species of major taxa of invertebrates, vertebrates and plants respectively. Critically study and fill in the blanks I, II, III and IV.



- (1) I-Molluscs, II-Amphibians, III-Fungi, IV-Angiosperms
 (2) I-Molluscs, II-Amphibians, III-Angiosperms, IV-Fungi
 (3) I-Hexapoda, II-Amphibians, III-Fungi, IV-Angiosperms
 (4) I-Turtles, II-Fungi, III-Amphibians, IV-Angiosperms

18. What is the difference between threatened species and an endangered species ?
 (1) A threatened species is already extinct. An endangered species means that the population's numbers have increased greatly over the last 5 years.
 (2) A threatened species are in danger and an endangered species are not in danger.
 (3) A threatened species means that the population is likely to become endangered.
 (4) An endangered species has population numbers so low that it is likely to become extinct.

- 19.** What is sustainable use ?
- The method to help and protect biodiversity
 - Protected strips of land that allow organisms to migrate from one wilderness area to another
 - A law that makes it illegal to harm species that are listed as endangered or extinct
 - The ability to use natural resources in a way that helps people and protects the ecosystem
- 20.** (A) More than 70 percent of all the species recorded are animals
 (B) Out of every 10 animals on this planet, 7 are insects
 (C) The number of fungi species in the world is more than the combined total of the species of fishes, amphibians, reptiles and mammals
 (D) Number of fishes is very less than that of mammals
- Which of the following is correct ?
- (1) A, B (2) A, B, C
 - (3) B, C, D (4) A, B, C, D
- 21.** Select the incorrect statement(s).
- India has more than 50×10^2 genetically different strains of rice
 - India has 10×10^3 varieties of mango
 - The genetic variation in *Rauwolfia vomitoria* can be in terms of cost of reserpine
 - The tropical rain forest initially covered 6% of the land surface of earth, but now they cover 13% of the land area
- (1) A, B (2) A, B, D
 - (3) B, C, D (4) A, B, C, D
- 22.** Given below is the incomplete flow chart depicting *in-situ* and *ex-situ* approaches of conserving biodiversity. Study carefully and fill in the blanks I, II, III and IV.
- ```

 graph TD
 BC[Biodiversity Conservation] --> IS[In-situ conservation]
 BC --> ES[Ex-situ conservation]
 IS --> SG[Sacred grooves and lakes]
 IS --> I
 IS --> II
 ES --> BG[Botanical gardens, Arborata, Zoological garde etc.]
 I --> III
 I --> IV

```
- 23.**
- I–Biosphere reserves; II–National parks and wildlife sanctuaries; III–Home gardens; IV–Seed banks, field gene banks, cryopreservation etc.
  - I–Sacred plants, Home gardens; II–National parks and wildlife sanctuaries; III–Biosphere reserves; IV–Seed banks, field gene banks, cryopreservation etc.
  - I–Biosphere reserves; II–Seed banks, field gene banks, cryopreservation etc.; III–Sacred plants, Home gardens; IV–National parks and wildlife sanctuaries
  - I–Biosphere reserves; II–Sacred plants, Home gardens; III–National parks and wildlife sanctuaries; IV–Seed banks, field gene banks, cryopreservation etc.
- 24.** Which of the following statement is true ?
- Logo of WWF is Red Panda
  - Organization responsible for maintaining Red Data Book/Red List is IUCN
  - Genetic diversity in agricultural crops is threatened by extensive intercropping
  - In India, we find mangoes with different flavours, colours, fibre-content and sugar content
  - The world biodiversity day is celebrated annually on 22nd May
- (1) (A) and (B) (2) (C) and (D)
  - (3) (B), (C), (D), (E) (4) All of these

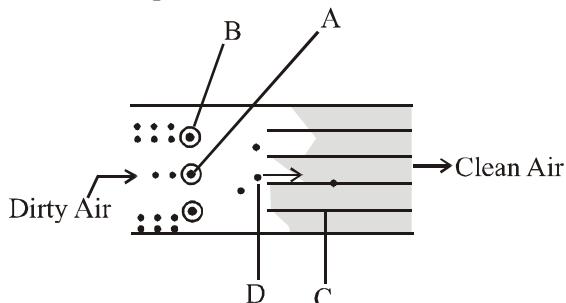
- 25.** Number of fishes, amphibians, reptiles, birds and mammals species found in Amazonian rain forest respectively are
- 427, 378, 1300, 3000 and 339
  - 3000, 1300, 359, 427 and 378
  - 3000, 378, 427, 1300 and 427
  - 3000, 427, 378, 1300 and 427
- 26.** Which one of the following is an endangered plant species of India?
- Rauwolfia serpentina*
  - Santalum album* (Sandal wood)
  - Cycas beddonei*
  - All of the above

**ANSWER KEY**

|             |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Que.</b> | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | 11       | 12       | 13       | 14       | 15       |
| <b>Ans.</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>2</b> | <b>4</b> | <b>1</b> | <b>4</b> | <b>1</b> | <b>1</b> | <b>4</b> | <b>3</b> | <b>2</b> | <b>3</b> | <b>3</b> |
| <b>Que.</b> | 16       | 17       | 18       | 19       | 20       | 21       | 22       | 23       | 24       | 25       | 26       |          |          |          |          |
| <b>Ans.</b> | <b>4</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>4</b> | <b>3</b> | <b>4</b> | <b>4</b> |          |          |          |          |

## ENVIRONMENTAL ISSUES

1. Given below is a diagram of electrostatic precipitator. Identify A, B, C and D and select the correct option.



|   | A                       | B                                 | C                | D                                 |
|---|-------------------------|-----------------------------------|------------------|-----------------------------------|
| 1 | Negatively charged wire | Negatively charged dust particles | Discharge corona | Collection plate                  |
| 2 | Negatively charged wire | Discharge corona                  | Collection plate | Negatively charged dust particles |
| 3 | Positively charged wire | Positively charged dust particles | Discharge corona | Collection plate                  |
| 4 | Positively charged wire | Discharge corona                  | Collection plate | Positively charged dust particles |

2. Catalytic converters, which are fitted into automobiles for reducing the emission of poisonous gases possess which of the following metals as catalyst?
- Platinum-Palladium
  - Rhodium
  - Lead
  - Both (1) and (2)
3. In India, Air (Prevention and Control of pollution) Act came into force in the year 1981, but was amended in the year \_\_\_\_ to include \_\_\_\_ as an air pollutant
- 1990, noise
  - 1984, particulate matter
  - 1987, PAN
  - 1987, noise
4. Acid rains are produced by
- excess  $\text{NO}_2$  and  $\text{SO}_2$  from burning fossil fuels
  - excess production of  $\text{NH}_3$  by industries and power plants
  - excess release of carbon monoxide by incomplete combustion of fossil fuels
  - excess release of  $\text{CO}_2$  by combustion and animal respiration.

5. The amount of biodegradable organic matter in sewage water can be estimated by measuring  
 (1) biochemical oxygen demand  
 (2) the growth of anaerobic bacteria in water  
 (3) biogeological oxygen demand  
 (4) the growth of aerobic bacteria in water
6. Match Column-I with Column-II and select the correct option from the codes given below.

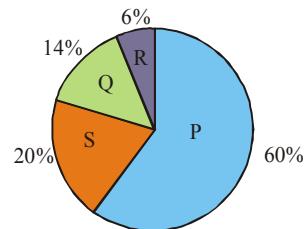
|          | Column-I |       | Column-II                                  |
|----------|----------|-------|--------------------------------------------|
| <b>A</b> | Mercury  | (i)   | Methaemoglobinemia (or Blue baby syndrome) |
| <b>B</b> | Nitrate  | (ii)  | Black foot disease                         |
| <b>C</b> | Arsenic  | (iii) | Itai-itai disease                          |
| <b>D</b> | Cadmium  | (iv)  | Minamata disease                           |

- A-(iv), B-(i), C-(ii), D-(iii)
- A-(iv), B-(i), C-(iii), D-(ii)
- A-(ii), B-(iii), C-(i), D-(iv)
- A-(ii), B-(iv), C-(i), D-(iii)

7. DDT residues are rapidly passed through food chain causing biomagnification because DDT is

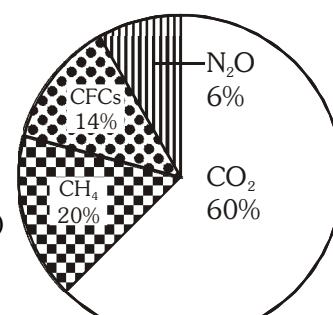
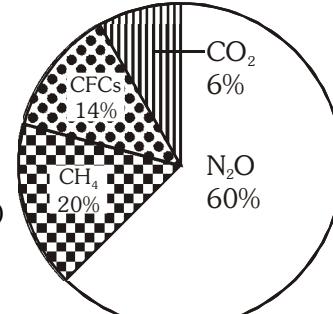
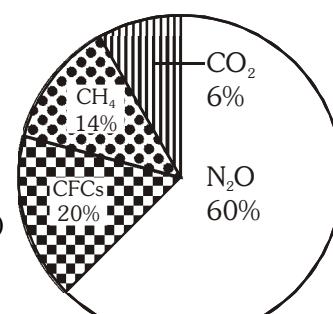
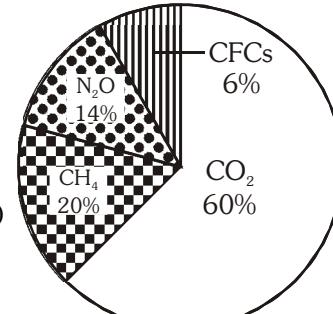
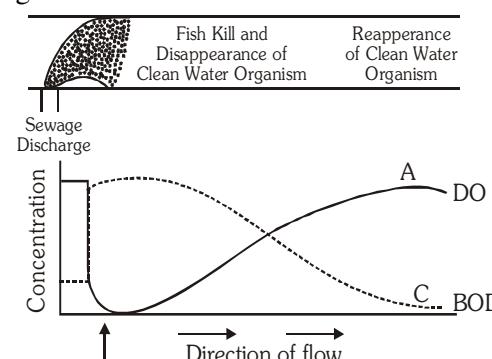
- water soluble
- lipid soluble
- moderately toxic
- non-toxic to aquatic animals

8. Given pie-diagram represents the relative contribution of various greenhouse gases to total global warming. Identify the gases P, Q, R and S.

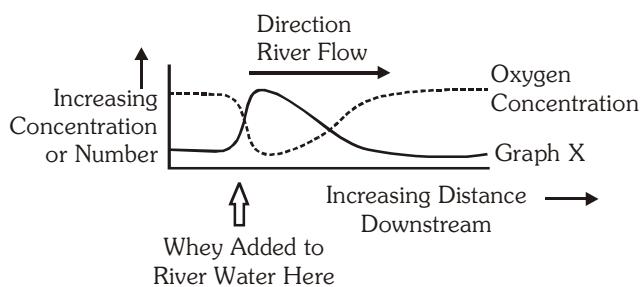


|   | P                    | Q                    | R                    | S             |
|---|----------------------|----------------------|----------------------|---------------|
| 1 | $\text{N}_2\text{O}$ | CFCs                 | $\text{CO}_2$        | Methane       |
| 2 | $\text{N}_2\text{O}$ | Methane              | CFCs                 | $\text{CO}_2$ |
| 3 | $\text{CO}_2$        | $\text{N}_2\text{O}$ | CFCs                 | Methane       |
| 4 | $\text{CO}_2$        | CFCs                 | $\text{N}_2\text{O}$ | Methane       |

- 9.** Montreal Protocol is associated with  
 (1) control of emission of ozone depleting substances  
 (2) control of radioactive wastes  
 (3) control of desertification  
 (4) protection and management of forests.
- 10.** Amrita Devi Bishnoi Wildlife Protection Award is for the individuals or communities from rural areas that have shown extraordinary courage in  
 (1) reducing environmental pollution  
 (2) reducing global warming  
 (3) protecting wildlife  
 (4) reforestation in deforested area.
- 11.** The government of India through a new auto fuel policy has laid out a roadmap to cut down vehicular pollution in Indian cities. More stringent norms for fuels means steadily reducing the  
 a. Sulphur dioxide content in diesel and petrol  
 b. Sulphur content in petrol and diesel  
 c. Aromatic gas in diesel  
 d. Aromatic content in diesel  
 (1) a and b (2) a, c and d  
 (3) b, and d (4) a, b, c and d
- 12.** What are the specifications of the Euro III norms?  
 (1) Sulphur can be controlled at 150 ppm in diesel  
 (2) Sulphur can be controlled at 350 ppm in petrol  
 (3) Aromatic hydrocarbons are to be contained at 42 per cent of the concerned fuel  
 (4) All of the above
- 13.** Sewage from our homes as well as from hospitals are likely to contain many undesirable pathogenic micro-organism, and its disposal into a water body without proper treatment may outbreak of serious diseases, such as  
 a. Dysentery b. Common cold  
 c. Typhoid d. Pneumonia  
 e. Jaundice f. Cholera  
 (1) a, b, c and e (2) b, c, d and f  
 (3) a, c, e and f (4) a, b, c, e and f
- 14.** Fill in the blanks, according to the Greenhouse effect.  
 1. Clouds and gases reflect about ...a... of the incoming solar radiation, and absorb some of it but almost ....b.... of incoming solar radiation falls on Earth's surface heating it, while a small proportion is reflected back.
- 2.** Earth's surface re-emits heat in the form of ...c... but part of this does not escape into space as atmospheric gases absorb a major fraction of it.  
 (1) a-one half, b-one fourth, c-UV radiation  
 (2) a-one fourth, b-one half, c-UV radiation  
 (3) a-one half, b-one fourth, c-infrared radiation  
 (4) a-one fourth, b-one half, c-infrared radiation
- 15.** Of the following, pick out the constituents of a photochemical smog  
 (A) Ozone (B) Nitrogen oxides  
 (C) PAN (D)  $\text{H}_2\text{SO}_4$   
 (E) DDT (F) BHC  
 (G)  $\text{CO}_2$   
 (1) A, B, C (2) A, B, C, G  
 (3) B, C, D, G (4) A, B, C, E, F, G
- 16.** Given below are the four statements each with two blanks. Select the option which correctly fills up the blank in any two statements.  
 (A) Bhopal gas disaster took place on \_\_\_\_ (i) \_\_\_\_ 1984 and this day is now observed as the \_\_\_\_ (ii) \_\_\_\_ day in India to make the anniversary of the Bhopal gas disaster  
 (B) \_\_\_\_ (i) \_\_\_\_ is degradable pollutant while \_\_\_\_ (ii) \_\_\_\_ is non-degradable pollutant  
 (C) When pollutants are released from a single point it is called \_\_\_\_ (i) \_\_\_\_ pollution, but when it is over a large area then it is called \_\_\_\_ (ii) \_\_\_\_ pollution  
 (D) \_\_\_\_ (i) \_\_\_\_ is the world's most problematic aquatic weed introduced in India for their lovely flowers also called \_\_\_\_ (ii) \_\_\_\_ of Bengal  
 (1) (D)-(i) Parthenium (ii) tiger  
 (A)-(i) December 5 (ii) National pollution prevention  
 (2) (A)-(i) December 5 (ii) Bhopal gas day  
 (B)-(i) DDT (ii) sewage  
 (3) (B)-(i) Sewage (ii) DDT  
 (C)-(i) point source (ii) Non-point source  
 (4) (C)-(i) line source (ii) fixed source  
 (D)-(i) Eichhornia (ii) tiger

17. Which of the following is/are correct regarding Montreal Protocol ?  
 (i) hydrocarbon pollutants  
 (ii) Global warming and climate change  
 (iii) To control the emission of ozone depleting substances  
 (iv) Biosafety of genetically modified organisms  
 (1) (ii) and (iii)                                  (2) (iii) only  
 (3) (iii) and (iv)                                  (4) (i) and (iii)
18. Which of the following figures shows correct relative contribution of greenhouse gases to global warming?
- (1) 
- (2) 
- (3) 
- (4) 
19. Which of the following is true about composition and waste water ?  
 (A) Suspended solids e.g., sand, slit and clay—0.1%  
 (B) Colloidal material, e.g., faecal matter, bacteria, cloth and paper fibres—0.1%  
 (C) Dissolved materials e.g., nutrients, (nitrate, ammonia, phosphate, calcium)—0.1%  
 (D) All of the above together constitute 0.1% of the waste water  
 (1) A, B, C, D                                          (2) A, B, C  
 (3) B, C                                                  (4) D
20. Which of the following is correct for the diagram given below ?
- 
- (1) (A) Dissolved oxygen, (B) Point sewage discharge, (C) BOD  
 (2) (A) BOD, (B) Point of treated water discharge, (C) Dissolved oxygen  
 (3) (A) Dissolved oxygen, (B) Point of treated water discharge, (C) Dissolved CO<sub>2</sub>  
 (4) (A) BOD, (B) Point of sewage discharge, (C) Dissolved oxygen
21. Which of the following is not a major positive feedback mechanism in which the activity of humans to increase global climate temperatures leads to an even further increase?  
 (1) Global warming causes increased rainfall, plant growth and photosynthesis upto an extent  
 (2) Global warming causes increased CO<sub>2</sub> release from biomass decomposition  
 (3) Tropical deforestation causes warming and drying so that remaining forests begin to decline  
 (4) Global warming causes snow to melt in polar regions and therefore decreasing global albedo

22. The diagram below shows the effect of polluting a river with untreated whey. What does graph X represent ?



- (1) Bacterial count
  - (2) Number of Zooplanktons
  - (3) Mass of curds
  - (4) Concentration of rennet
23. Which one is correct ?
- (1) The second law of thermodynamics results in the phenomenon of biomagnification, the accumulation to toxic levels in aquatic food chains of persistent biodegradable toxins such as DDT
  - (2) Modern agricultural practices results in water pollution as nitrogenous fertilizer runoff into surround freshwater ecosystems, which can accelerate eutrophication
  - (3) "Blue-baby syndrome" results when nitrogenous fertilizers, which contaminate drinking water and the nitrates combine with haemoglobin within an infant's red blood cells
  - (4) All of the above
24. Which statement(s) is/are false ?
- (A) In marine ecosystems, UV radiation can damage the tiny single-celled plants known as phytoplankton (which form the basis of the food chain)
  - (B) 5th June is World Environment Day
  - (C) Drinking mineral water/aerated drink with low levels ( $-0.02$  ppm) of pesticide for long period would pesticide accumulation in the body
  - (D) NEERI (National Environmental Engineering Research Institute) is at Nagpur
  - (E) Chernobyl nuclear tragedy occurred in April, 1986

(F) Bhopal gas tragedy of 1984 took place because methyl isocyanate reacted with water

(G) Lead concentration of blood is considered alarming at  $10\mu\text{g}/100\text{ ml}$

(H)  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$  and CFCs are called green house gases because they can absorb long infrared radiations

(I) High amount of *Escherichia coli* in water is an indicator of sewage/faecal pollution

(J) Ozone, chlorine and chloramine are passed through swimming pool because it acts as disinfectant

(K) Noise pollution does not have any residue. Noise pollution creates nervous disorders

(L) If there was no  $\text{CO}_2$  in the atmosphere, the earth's temperature would be less than the present

(1) All, except J and K

(2) All, except B, D and H

(3) All, except C, E and G

(4) None of these

25. Which of the following is considered the greatest problem associated with the use of pesticides ?

- (1) The speed with which they kill micro-organisms
- (2) Modern pesticides are more dangerous to use
- (3) Development of genetic resistance in pest organisms
- (4) They increase costs for farmers making it more difficult for them to make a living

26. Fill up the blanks

(A) (I) disposal into water without proper treatment may cause outbreak of serious diseases such as, dysentery, typhoid, jaundice, cholera etc.

(B) High concentration of (I) disturbs (II) metabolism in birds, which causes thinning of eggshell and their premature breaking, eventually causing decline in bird populations

(C) Without greenhouse effect, the average temperature at surface of earth would have been a chilly (I) rather than the present average of  $15^\circ\text{C}$

(D) Presence of large amounts of nutrient in waters also causes excessive growth of free-floating (I) called an (II) bloom, which imparts a distinct colour of the water bodies. (III) causes deterioration of the water quality and fish mortality. Some bloom-forming algae are extremely toxic to human beings and animals

- (1) A-I-Sewage; B-I-DDT, II-Calcium; C-I- $-18^{\circ}\text{C}$ , II; D-I-Phytoplanktons, II-Algae, III-Algal blooms
- (2) A-I-DDT; B-I-Sewage; II-Calcium; C-I- $-18^{\circ}\text{C}$ , II; D-I-Phytoplanktons, II-Algal, III-Algal blooms
- (3) A-I-Sewage; B-I-DDT; I-Fat; C-I- $-18^{\circ}\text{C}$ , II; D-I-Planktons, II-Algal, III-Algal blooms
- (4) A-I-Sewage; B-I-DDT; II-Calcium; C-I- $-18^{\circ}\text{C}$ , II; D-I-Zooplanktons, II-animal, III-Zoo blooms

**27.** Full up the blanks.

(A) (I) were adopted as the substitute for open-burning. In a (II), wastes are dumped in a depression or trench after compacting and covered with dirt everyday  
 (B) Deforestation is the conversion of forested areas to non-forested ones. According to an estimate, almost (I) percent forests have been lost in the tropics compared to only (II) percent in the temperate region. The present scenario of deforestation is particularly grim in India. At the beginning of the twentieth century, forest covered about (III) per cent of the land India. By the end of the century, it shrunk to (IV) percent whereas the National Forest Policy (1988) of India has recommended 33 percent forest cover for the plains and 6 per cent for the hills

- (1) A-I-Sanitary Landfills, II-Sanitary Landfill; B-I-40, II-1, III-30, IV-19.4
- (2) A-I-Sanitary Landfills, II-Sanitary Landfill; B-I-20, II-1, III-15, IV-19.4
- (3) A-I-Sanitary Landfills, II-Sanitary Landfill; B-I-10, II-1, III-5, IV-19.4
- (4) A-I-Sanitary roadfills, II-Sanitary Landfill; B-I-40, II-1, III-30, IV-19.4

**28.** The Kyoto Protocol specifies regulations on the emission of greenhouse gases. It defines a term known as "Carbon-Credits". The following statements pertain to Carbon-Credits.

- (i) The mandatory limit of carbon-credit for each country is directly proportional to its size and population
- (ii) One carbon-credit defines the emission of one ton of carbon dioxide or equivalent gases responsible for greenhouse effect
- (iii) Carbon-credits are exchangeable among countries/industries
- (iv) An industry emitting higher than prescribed limit can do so by purchasing carbon-credits.

Which of the above statements are true ?

- (1) (i) and (ii) only
- (2) (ii) and (iv) only
- (3) (ii), (iii) and (iv) only
- (4) (i), (ii) and (iv) only

**29.** The ideal modern sewage system is the one in which.

- (1) sanitary sewage water is collected, but storm water is treated
- (2) individual home owners operate private septic systems on large plots
- (3) all sanitary sewage water and storm water is collected in a single sewage system and treated in a single treatment plant
- (4) All sanitary sewage water is collected separately from storm water and fully treated to remove all pollutants before the water is released into the natural systems

**30.** One impediment to the use of treated sludge as agricultural fertilizer is

- (1) excess sulphur in sludge could be toxic to plants
- (2) possible disease outbreaks in livestock grazing on treated lands
- (3) in some instances, the sludge may contain high levels of toxic metals
- (4) the potential for groundwater contamination with pathogens

- 31.** SO<sub>2</sub> pollution is indicated by  
 (1) *Deshampsia*  
 (2) *Sphagnum* (mosses)  
 (3) *Usnea* (lichens)  
 (4) *Cucurbita* (climbers)
- 32.** What does the mean of snow blindness?  
 (1) Inflammation of cornea  
 (2) Infection of cornea  
 (3) Blindness due to genetic reason  
 (4) Colour blindness
- 33.** Which is wrong?  
 (1) Most forests have been lost in tropical areas  
 (2) Greenhouse effect is natural phenomenon  
 (3) Ozone in upper part of atmosphere is harmful to animals  
 (4) Eutrophication is natural phenomenon in fresh water bodies

**ANSWER KEY**

| Que. | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ans. | 2  | 4  | 4  | 1  | 1  | 1  | 2  | 4  | 1  | 3  | 3  | 3  | 3  | 4  | 1  |
| Que. | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | 3  | 2  | 1  | 4  | 1  | 3  | 1  | 4  | 4  | 3  | 1  | 1  | 4  | 4  | 3  |
| Que. | 31 | 32 | 33 |    |    |    |    |    |    |    |    |    |    |    |    |
| Ans. | 3  | 1  | 3  |    |    |    |    |    |    |    |    |    |    |    |    |