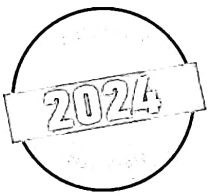
02/05/2024

CODE-A



Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

CST – 18

MM : 720 **Time : 3 Hrs. 20 Mins.**

Complete Syllabus of NEET

Instructions:

(i) There are two sections in each subject, *i.e.* Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
(iii) Use blue/black ballpoint pen only to darken the appropriate circle.
(iv) Mark should be dark and completely fill the circle.
(v) Dark only one circle for each entry.
(vi) Dark the circle in the space provided only.
(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

BOTANY

SECTION-A

1. Read the following statements and choose the **correct** option.

Assertion (A): If an inheritable mutation is observed in a population at high frequency it is referred to as DNA polymorphism.

Reason (R): Allelic sequence variation is described as a DNA polymorphism if more than one variant at a locus occurs in human population with a frequency less than 0.01.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. Which of the following is **not** correct w.r.t goals of human genome project?

(1) Improve tools for data analysis

(2) Determine the sequence of 6 billion chemical base pairs that make up human DNA

(3) Address the ELSI that may arise from the project

(4) Identify all the approximately 20,000 – 25,000 genes in human DNA

3. In prokaryotes

(1) Control of the rate of translational initiation is the predominant site for control of gene expression

(2) Monocistronic genes are commonly found

(3) 23S rRNA serves the catalytic role during translation

(4) Only one type of DNA polymerase is observed

4. **Statement A:** RNA polymerase is only capable of catalysing the process of elongation.
Statement B: James Watson postulated the presence of an adaptor molecule that would bind to specific amino acids.
Select the **correct** option.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

5. Which of the following effect is **not** observed due to water stress in plants?
(1) Closure of stomata
(2) Wilting of leaves
(3) Reduction of the surface area of the leaves
(4) Enhancement in the CO_2 availability

6. Which of the following organelle is not involved in photorespiration?
(1) Chloroplast (2) Mitochondria
(3) Lysosomes (4) Peroxisomes

7. Select the **odd** one out w.r.t. Species-Area relationship curve proposed by Alexander von Humboldt.
(1) On the logarithmic scale, the relationship is a straight line describe by the equation
log S = log C + Z log A
(2) For frugivorous birds and mammals in the tropical forest of different continents the value of slope (Z) is found to be 0.6
(3) Species richness increases with increasing explored area but only up to a limit
(4) Among the very large area like the entire continents, the slope of line become much steeper

8. Which among the following is not an 'Evil Quartet'?
(1) Over exploitation
(2) Alien species invasion
(3) Habitat loss and fragmentation
(4) Co-evolution

9. How many turns of TCA cycles are required for complete oxidation of a sucrose molecule in aerobic respiration?
(1) Two (2) Six
(3) Four (4) Three

10. Read the following Assertion (A) and Reason (R) and choose the **correct** option.
Assertion (A): In a person affected with sickle cell anaemia, shape of RBC changes from biconcave disc to elongated sickle like structure under low oxygen.
Reason (R): In sickle cell anaemia, the mutant haemoglobin molecule undergoes polymerisation under low oxygen tension.
(1) Both (A) and (R) are true and (R) is correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not correct explanation of (A)
(3) Only (A) is true but (R) is false
(4) Both (A) and (R) are false

11. The degree by which progeny differs from their parents is called
(1) Heredity (2) Inheritance
(3) Variation (4) Character

12. According to dihybrid crosses conducted by T.H. Morgan on *Drosophila*, what is the distance between genes *w* (eye colour) and *m* (wing type)?
(1) 37.2 cM (2) 1.3 cM
(3) 62.8 cM (4) 98.3 cM

13. Given below are two statements.
Statement I: White flower colour of pea plant will express only in homozygous condition.
Statement II: The graphical representation to calculate the probability of all possible genotypes of offspring in a genetic cross was developed by German geneticist Reginald C. Punnett.
In the light of above statements, choose the **correct** option among the following.
(1) Only statement I is true
(2) Only statement I is false
(3) Both statement I and II are true
(4) Both statement I and II are false

Space for Rough Work

14. Read the following statements w.r.t. rules of Binomial Nomenclature and mark the **incorrect** one.
    (1) Name of the author is written after the specific epithet in abbreviated form.
    (2) All the three words (generic name, specific epithet and author citation) collectively form binomial epithet.
    (3) Each organism is given only one name consisting of two words.
    (4) For plants, scientific names are based on agreed principles and criteria, which are provided by ICNB.
15. Select an **incorrect** matched pair.
    (1) *Saccharomyces* – Single celled fungus
    (2) Ascomycetes – Endogenous ascospores
    (3) Sac fungi – Exogenous asexual spore
    (4) Zygomycetes – Asexual spore absent
16. Viruses that infect bacteria usually contains
    (1) dsRNA (2) ssRNA
    (3) dsDNA (4) ss DNA
17. Consider the following statements and select the **correct** option.
    a. Region proximal to elongation zone of root give rise to very fine and delicate, thread-like structures which absorbs water and minerals from the soil.
    b. In some plants, like *Monstera*, roots arise from parts of the plant other than the radicle.
    c. In sweet potato and turnip, tap roots get swollen and store food.
    d. The stilt roots of maize and sugarcane comes out of the lower internodes of the stem.
    e. Pneumatophores help some mangrove plants species to get oxygen for respiration.
    (1) b, c and e are correct
    (2) a, b and e are correct
    (3) a, c, d and e are correct
    (4) Only d is incorrect
18. Which of the following plants have fleshy leaves modified to store food?
    (1) Australian acacia
    (2) *Euphorbia*
    (3) Garlic
    (4) *Opuntia*
19. How many of the given plants belong to the family that shows papilionaceous corolla?
    Gloriosa, Moong, *Aloe*, Chilli, *Sesbania*, *Trifolium*, *Asparagus*, Tomato, Sweet pea, Tulip, Sunhemp, *Indigofera*
    (1) Three
    (2) Six
    (3) Two
    (4) Eight
20. Read the following statements carefully and mark the option with **correct** one(s) w.r.t. pteridophytes.
    a. The dominant phase or independent plant body is sporophyte.
    b. They are first terrestrial plants to possess vascular tissues.
    c. *Lycopodium* and *Dryopteris* are homosporous.
    d. The leaves may be small as in ferns and may be large as in *Selaginella*.
    (1) a, c and d
    (2) a, b and c
    (3) d only
    (4) a and b only
21. Laminarin or mannitol is the stored food in
    (1) *Porphyra*
    (2) *Volvox*
    (3) *Polysiphonia*
    (4) *Sargassum*
22. Which of the following organic acid is produced by *Aspergillus niger*?
    (1) Acetic acid
    (2) Butyric acid
    (3) Citric acid
    (4) Lactic acid

Space for Rough Work

23. Match the items in **column I** with those in **column II**.

	Column I		**Column II**
(a)	Mycorrhiza	(i)	Parasitism
(b)	Ticks on dogs	(ii)	Mutualism
(c)	Tiger and deer	(iii)	Predation
(d)	Orchids and mango tree	(iv)	Commensalism

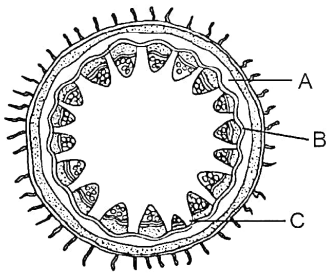
Choose the **correct** answer from the option given below.

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

24. The annual net primary productivity of whole biosphere is approximately _____ (dry weight) of organic matter.
(1) 115 billion tons (2) 170 billion tons
(3) 55 billion tons (4) 160 billion tons

25. Xylem vessels are not found in
(1) *Pinus* (2) Sunflower
(3) Maize (4) Mango

26. Examine the figure given below and select the **correct** option for label A, B and C.



(1) A → Sclerenchyma, B → Medullary rays, C → Pericycle
(2) A → Parenchyma, B → Pith, C → Hypodermis
(3) A → Endodermis, B → Pericycle, C → Pith
(4) A → Parenchyma, B → Pericycle, C → Medullary rays

27. Adenine derivative plant hormone which promotes nutrient mobilisation is
(1) Auxin (2) Ethylene
(3) Cytokinin (4) Abscisic acid

28. Fruit development without fertilisation is
(1) Apomixis (2) Polyembryony
(3) Parthenocarpy (4) Parthenogenesis

29. Select the **correctly** matched pair.

(1)	Anemophily	–	Requiring nectar and pollen grains as floral rewards
(2)	Entomophily	–	Light and non-sticky pollen grains
(3)	Outbreeding devices	–	Encourage self-pollination and discourage cross-pollination
(4)	Monoecious plants, like maize	–	Prevents autogamy but not geitonogamy

30. Read the following statements **assertion (A)** and **reason (R)** and select the **correct** option.
Assertion (A): Golgi apparatus remains in close association with endoplasmic reticulum.
Reason (R): Materials to be packaged in the form of vesicles from the ER fuse with the cis face of the Golgi apparatus and move towards the maturing face.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. Which of the following cell organelle is/are involved in production of cellular energy in the form of ATP?
(1) Ribosomes (2) Lysosomes
(3) Mitochondria (4) Nucleus

Space for Rough Work

32. The Golgi apparatus
(1) Is found only in animals
(2) Is found in prokaryotes
(3) Is a site of protein synthesis
(4) Modifies and packages proteins

33. How many statements are **correct** for cell cycle?
A. In interphase, cell is metabolically inactive.
B. Histone protein synthesis occur in S-phase.
C. Most organelles duplicate in G_1 phase.
D. In G_2 phase protein synthesis occurs.
(1) Four (2) Three
(3) Two (4) One

34. During cell cycle, semi-autonomous organelles duplicate in
(1) G_2 phase (2) G_1 phase
(3) G_0 phase (4) M phase

35. How many meiotic divisions are required for the production of 20 seeds in a bisexual plant?
(1) 5 (2) 19
(3) 25 (4) 21

SECTION-B

36. Which of the following chromosome was sequenced last during HGP?
(1) Chromosome 1 (2) Chromosome 3
(3) Chromosome X (4) Chromosome Y

37. Number of nucleotides found in $\phi \times 174$ is
(1) 48502 (2) 5386
(3) 3.3×10^9 (4) 4.6×10^6

38. Which among the following is **correct** sequence of steps involved in the glycolysis process?
(1) Glucose-6-phosphate → Fructose 1,6-bisphosphate → Fructose 6-phosphate
(2) 3-phosphoglyceric acid → 2-phosphoenolpyruvate → 2 phosphoglycerate → Pyruvic acid
(3) Glyceraldehyde-3-phosphate → 1,3-bisphosphoglyceric acid → 3-phosphoglyceric acid
(4) Dihydroxy acetone phosphate → Glyceraldehyde-3-phosphate → Fructose 1,6-bisphosphate

39. Choose the **incorrect** match among the following.

(1)	Phenylketonuria	–	Inherited as autosomal recessive disorder
(2)	Law of Dominance	–	It is universally applicable law
(3)	Trisomic condition	–	Arise by n × (n + 1) gametic fusion
(4)	Mutation	–	It may arise due to change in a single base pair of DNA

40. How many of the given characters are associated with Archaebacteria?
a. They live in extreme habitats such as hot springs.
b. Cell wall structure differ from other bacteria.
c. Cell membrane is made up of unbranched lipids only.
d. They can be obligate or facultative anaerobes.
e. Methanogens are chemoautotrophs.
(1) 3 (2) 5
(3) 4 (4) 2

41. Which one of the following is an **incorrect** statement?
(1) Ovary is half inferior in the flower of plum
(2) In some seeds such as castor the endosperm formed as a result of double fertilisation, is a food storing tissue
(3) In cymose type of inflorescence, the main axis terminates in a flower, hence is limited in the growth
(4) Tetradynamous condition of stamens is found in the members of family Malvaceae

42. Which of the following statements is **incorrect** w.r.t. angiosperms?
(1) These are flowering plants, where ovules are enclosed in the ovary
(2) Each embryo sac has a three-celled egg apparatus, one egg cell and two synergids
(3) Polar nuclei fuse to produce diploid secondary nucleus
(4) A typical embryo sac is 8-celled and 7-nucleate

Space for Rough Work

43. Enzyme used in detergent formulations are helpful in removing oily stains from laundry is
(1) Lipase
(2) Amylase
(3) Streptokinase
(4) Pectinase

44. *Penicillium* secretes penicillin, that inhibits the growth of large number of bacteria, it exemplifies
(1) Parasitism
(2) Competition
(3) Amensalism
(4) Commensalism

45. Ecological succession that occur on rock is called
(1) Lithosere
(2) Halosere
(3) Hydrosere
(4) Hydrarch

46. Read the following statements and select the **incorrect** ones.
a. Companion cells are specialised sclerenchymatous cells, closely associated with sieve tube elements.
b. All tissues except epidermis and vascular bundles constitute ground tissue.
c. A tissue is a group of cells having different origin and usually performing a different function.
d. Maize plant has scattered vascular bundles, each surrounded by parenchymatous bundle sheath.
e. Vascular cambium and cork cambium are involved in secondary growth in most dicotyledonous plants.
(1) a and c only
(2) a, c and d only
(3) c and d only
(4) a, b and d only

47. In the light of given statements, choose the **correct** answer from the options given below.
Statement I: A gaseous hormone is also responsible for apical hook formation in dicot seedlings.
Statement II: Both ethylene and ABA are responsible for promoting shedding of leaves, fruits and flowers.
(1) Only statement I is correct
(2) Only statement II is correct
(3) Both statements are correct
(4) Both statements are incorrect

48. Read the following statements and select the **correct** option.
Assertion (A): Pollen grains are well-preserved as fossils.
Reason (R): Exine made up of sporopollenin can withstand high temperatures but susceptible to strong acids and alkali.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

49. G_0 state of cells in eukaryotic cell cycle denotes
(1) Check point before entering the next phase
(2) Death of a cell
(3) Exit of cells from G_1 phase of cell cycle
(4) Proliferating phase of cells

50. Nuclear matter without envelope occurs in
(1) Bacteria and green algae
(2) Bacteria and cyanobacteria
(3) Cyanobacteria and mesophyll cells
(4) Mycoplasma and tracheid

Space for Rough Work

ZOOLOGY

SECTION-A

51. During the natural processing of proinsulin into the mature insulin
    (1) C-peptide is added to the proinsulin
    (2) C-peptide is removed from the proinsulin
    (3) B-peptide is added to the proinsulin
    (4) B-peptide is removed from the proinsulin

52. Select the odd one w.r.t. vectorless methods of gene transfer.
    (1) Biolistics
    (2) Disarmed pathogen mediated
    (3) Gene gun
    (4) Micro-injection

53. If *Hin*dIII was used to cut the DNA during isolation of gene of interest, then to facilitate the cloning process, the vector DNA should be cut by using
    (1) *Hin*dII (2) *Eco*RI
    (3) *Bam*HI (4) *Hin*dIII

54. Enzymes that catalyse the removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds belong to which class of enzymes?
    (1) Class I (2) Class II
    (3) Class III (4) Class IV

55. Which of the following primarily generates an action potential which eventually leads to atrial systole?
    (1) Bundle of His
    (2) AVN
    (3) Purkinje fibres
    (4) Pacemaker of the heart

56. In *Periplaneta americana*, the head is connected with thorax by a short extension of
    (1) Pronotum (2) Prothorax
    (3) Metathorax (4) Mesothorax

57. How many of the following given in the box below are directly involved in the coagulation of blood?

Thrombins, Fibrins, Rh antigens, Albumins, Calcium ions

    Select the correct option.
    (1) Two (2) Three
    (3) Four (4) Five

58. Which of the below given processes is included in the downstream processing in biotechnology?
    (1) Ligation of the foreign DNA with a plasmid
    (2) Isolation of the desired DNA
    (3) Separation and purification of the product
    (4) Amplification of the DNA

59. How many cycles of PCR are required for obtaining 256 molecules of a dsDNA from a single molecule of dsDNA?
    (1) 6 (2) 8
    (3) 9 (4) 10

60. Consider the figures given below:

(a)

(b)

The common feature between (a) and (b) is that both
    (1) Belong to the same phylum
    (2) Are metamerically segmented
    (3) Exhibit pulmonary respiration
    (4) Are terrestrial invertebrates

Space for Rough Work

61. The organisms whose adult forms are radially symmetrical but larvae are bilaterally symmetrical is exclusively characterised by the presence of
(1) Water canal system
(2) Ciliated comb plates
(3) Water vascular system
(4) Pseudocoelom

62. Select the correct statement w.r.t. humans.
(1) Ethmoid and sphenoid are unpaired facial bones
(2) Maxilla and mandible are paired facial bones
(3) Coccyx and sacrum are fused vertebral bones
(4) Patella, ischium and pubis fuse to form the coxal bone.

63. The sum of total number of tibia and fibula in both the hindlimbs of an adult human is
(1) Equal to the number of floating ribs
(2) More than the number of lumbar vertebrae
(3) Less than the total number of patella
(4) Thrice the number of sacral vertebrae

64. Darwin either kept silence or ignored the observations made by 'X' who talked about inheritable 'factors' influencing phenotype.
Identify the scientist 'X' and select the correct option.
(1) Lamarck (2) Mendel
(3) Malthus (4) Haldane

65. Read the given statements and select the **correct** option.
Statement (A) : The finches of Galapagos islands provide an evidence in the favour of biogeographical evolution.
Statement (B) : Adaptive radiation refers to the power of adaptation in an individual to a variety of environments.
(1) Both statements (A) and (B) are correct
(2) Both statements (A) and (B) are incorrect
(3) Only statement (A) is correct
(4) Only statement (B) is correct

66. All of the following factors favour the formation of concentrated urine, **except**
(1) Suppression of release of antidiuretic hormone
(2) Activation of osmoreceptors in the body due to changes in ionic concentration
(3) Increased release of vasopressin from hypothalamus
(4) Transport of substances facilitated by the special arrangement of Henle's loop and vasa recta

67. About how many nephrons are present in both the kidneys of an adult human?
(1) 1 million (2) 2 million
(3) 10 million (4) 1 billion

68. Select the **incorrect** statement w.r.t. drug and alcohol abuse.
(1) Nicotine stimulates the release of catecholamines from adrenal medulla.
(2) Smoking increases carbon monoxide content in the blood.
(3) Coca alkaloid has an inhibiting action on the CNS.
(4) *Datura* shows hallucinogenic properties.

69. In human adults, the temperature necessary for spermatogenesis under normal conditions is
(1) Equal to the normal internal body temperature
(2) Slightly more than the environmental temperature during summer season
(3) 2-2.5°C lower than the normal internal body temperature
(4) 2-5°C higher than the normal internal body temperature.

70. The dinosaurs suddenly disappeared from the Earth about
(1) 55 mya
(2) 65 mya
(3) 75 mya
(4) 85 mya

Space for Rough Work

71. Which of the following has been found to be effective as an emergency contraceptive if used within 72 hours of unprotected coitus to avoid possible pregnancy?
(1) Diaphragm (2) IUD
(3) Vault (4) Cervical cap

72. As chances of fertilisation are very high from the day _____ of the 28 days menstrual cycle, it is called the _____ period.
Select the **correct** option to fill the blanks respectively.
(1) 17 to 24, fertile
(2) 10 to 17, sterile
(3) 14 to 21, sterile
(4) 10 to 17, fertile

73. Programmes like RCH stands for
(1) Reproduction and Clinical Health Care
(2) Reproductive and Child Health Care
(3) Rehabilitation and Child Health Care
(4) Rehabilitation and Crucial Health Care

74. Large number of which of the ovarian follicles degenerate in human females from birth to puberty?
(1) Primary follicles
(2) Secondary follicles
(3) Tertiary follicles
(4) Graafian follicles

75. Match column I with column II w.r.t. diseases and their causative agents and select the correct option.

	Column I		Column II
a.	Common cold	(i)	Protozoan
b.	Elephantiasis	(ii)	Helminth
c.	Amoebiasis	(iii)	Virus
d.	Pneumonia	(iv)	Bacteria

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

76. When CO_2 concentration in blood increases, then breathing rate in humans
(1) Becomes faster than the normal breathing rate
(2) Becomes slower than the normal breathing rate
(3) Does not show any change
(4) Is not controlled by central nervous system

77. Human lungs are covered by a
(1) Single layered pericardium
(2) Single layered pleura
(3) Double layered pericardium
(4) Double layered pleura

78. The dorsal portion of the human midbrain consists mainly of four round swellings called
(1) Corpus callosum
(2) Cerebral aqueduct
(3) Corpora quadrigemina
(4) Corpus luteum

79. The structure responsible for maintaining the balance or equilibrium in frogs is
(1) Tongue (2) Eye
(3) Ear (4) Nose

80. Which of the following biomolecules is correctly matched?
(1) Cytidine – Cytosine with a hexose sugar
(2) Lecithin – Phosphorylated organic compound
(3) Serine – Diglyceride
(4) Palmitic acid – Acidic amino acid

81. The new potential developed in the post- synaptic neurons may be excitatory or inhibitory based on the
(1) Strength of stimulus received by the pre-synaptic neurons
(2) Conduction velocity of impulses in pre-synaptic neurons
(3) Presence of gap junctions in the regions of synapse
(4) Type of neurotransmitters released in the synaptic cleft

Space for Rough Work

82. Select the incorrect match w.r.t. biomolecules.
(1) Cellulose – Contains complex helices
(2) Glycogen – Has a branched structure
(3) Chitin – Is a complex polysaccharide
(4) Starch – Can hold I_2 molecules

83. A hormone that mostly regulates gene expression or chromosome function by the interaction of hormone-receptor complex with the genome is
(1) ADH (2) Melatonin
(3) Thyroxine (4) Insulin

84. Select the odd one w.r.t. exocrine secretions.
(1) Earwax (2) Saliva
(3) Enzyme (4) Secretin

85. α-1-antitrypsin is used for the treatment of
(1) Phenylketonuria (2) Polio
(3) Emphysema (4) Cystic fibrosis

SECTION-B

86. Consider the features given below
(a) Involuntary in nature
(b) Non-striated appearance
(c) Voluntary in nature
(d) Centrally placed nucleus
(e) Striated appearance
Select the option with correct set w.r.t. cardiac muscle fibres.
(1) (a) and (c) (2) (a), (d) and (e)
(3) (c) and (e) (4) (b), (c) and (d)

87. Read the following statements.
Statement (A) : Glucagon acts mainly on the liver cells and stimulates glycogenolysis resulting in an increased blood sugar.
Statement (B) : Glucocorticoids, particularly cortisol, produces anti-inflammatory reactions and suppresses the immune response.
Select the **correct** option.
(1) Both statements (A) and (B) are correct
(2) Both statements (A) and (B) are incorrect
(3) Only statement (A) is correct
(4) Only statement (B) is correct

88. Under normal conditions, which of the following events occur when ventricular pressure increases during the cardiac cycle?
(1) Closure of semilunar valves
(2) Opening of tricuspid and mitral valves
(3) Production of second heart sound
(4) Closure of tricuspid and bicuspid valves

89. The mechanism of mRNA silencing has been used in producing transgenic tobacco plants that are resistant to
(1) Beetles (2) Nematodes
(3) Bollworms (4) Corn borers

90. **Assertion (A):** In India, there is a statutory ban on amniocentesis for sex determination.
Reason (R): Amniocentesis is misused by some people for the purpose of female foeticide.
In the light of above statements, select the most appropriate option.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

91. Read the following statements w.r.t. humans.
Statement (A) : Pons consists of fibrous tracts of collagen fibres that interconnect different regions of the brain.
Statement (B) : Neurosecretory cells of hypothalamus secrete hypothalamic hormones for neurohypophysis only.
Choose the **correct** option.
(1) Both statements (A) and (B) are correct
(2) Both statements (A) and (B) are incorrect
(3) Only statement (A) is correct
(4) Only statement (B) is correct

92. Select the structure which is absent in frogs.
(1) Cloaca (2) Tympanum
(3) Salivary gland (4) Cranium

Space for Rough Work

93. Choose the **correct** match w.r.t. neural system of humans.
(1) Somatic neural system – Transmits impulses from CNS to skeletal muscles
(2) Central neural system – Includes cranial nerves and spinal cord
(3) Peripheral neural system – Contains only efferent nerve fibres
(4) Visceral neural system – Lacks ganglia and plexuses

94. The term 'restriction' in the restriction endonucleases is related to the fact that
(1) They cut the DNA molecules after finding the recognition sequences
(2) They prevent the multiplication of bacteriophages in the bacteria
(3) They cleave the phosphodiester bond in the DNA molecule
(4) They facilitate the growth of bacteriophages in the bacteria

95. Select the **incorrect** statement.
(1) Psoriasis is an auto immune disease.
(2) Radiotherapy is a method for treatment of cancer.
(3) DNA genome of the HIV replicates to form viral RNA with the help of reverse transcriptase.
(4) The size of thymus is reduced in old people.

96. Darwin's finches represent one of the best examples of the phenomenon named 'X'. Industrial melanism also shows 'X'.
Identify 'X' and select the **correct** option.
(1) Founder effect
(2) Mutation
(3) Saltation
(4) Natural selection

97. Choose the **incorrect** statement.
(1) Muscular dystrophy is a genetic disorder that causes progressive degeneration of mostly smooth muscles.
(2) Osteoporosis is an age-related disorder and is characterised by increased chances of fractures.
(3) Arthritis is the inflammation of joints.
(4) Tetany is caused due to the hyposecretion of PTH.

98. Which of the following is the main fluid that acts as the medium of transport for O_2 and CO_2 in humans?
(1) A fluid connective tissue with formed elements and plasma
(2) A specialized connective tissue consisting of fibroblast cells, plasma and formed elements
(3) A colourless fluid containing specialised lymphocytes which are responsible for the immune response of the body
(4) A light yellow colour watery fluid produced by the kidneys which is slightly acidic and has a characteristic odour

99. Match column I with column II and select the **correct** option w.r.t. common name of animals.

	Column I		**Column II**
a.	*Petromyzon*	(i)	Blue whale
b.	*Balaenoptera*	(ii)	Sea horse
c.	*Struthio*	(iii)	Lamprey
d.	*Hippocampus*	(iv)	Ostrich

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

100. Co-enzymes differ from prosthetic groups as the former
(1) Are tightly bound to apoenzymes
(2) Do not play any crucial role in the catalytic activity of enzymes
(3) Require metal ions for their activity
(4) Have transient association with apoenzymes

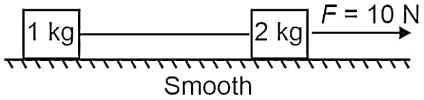
Space for Rough Work

PHYSICS

SECTION-A

101. A particle is falling from infinity towards the surface of the earth. If the air friction is neglected and initial velocity is zero, then the velocity of the particle on reaching the earth's surface is (Take, the radius of earth's surface = 6.4×10^6 m)
(1) 11.2 km/s
(2) 5.5 km/s
(3) 22 km/s
(4) The particle will not reach the surface of earth

102. Two bodies of masses 1 kg and 2 kg are connected by a metal wire as shown in figure. A force of 10 N is applied on the body of mass 2 kg. The breaking stress of metal wire is $\frac{6.25}{3\pi} \times 10^9$ N/m^2. What should be minimum radius of the wire so that it does not break?

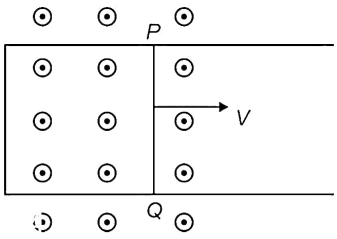


(1) 0.23×10^{-4} m
(2) 4×10^{-5} m
(3) 5×10^{-5} m
(4) 5.2×10^{-4} m

103. A particle is moving such that its angular momentum keeps decreasing. If its angular momentum is along east then torque is acting along
(1) West (2) South
(3) East (4) North

104. A particle of mass m is rotating in a plane in circular path of radius r. Its angular momentum is L. The centripetal force acting on the particle is
(1) $\frac{L^2}{mr}$ (2) $\frac{L^2 m}{r}$
(3) $\frac{L^2}{m^2 r^2}$ (4) $\frac{L^2}{mr^3}$

105. A conducting rod PQ of length 1 m is moving perpendicular to magnetic field 10^{-3} T with a speed 10^2 m s^{-1}, then induced emf in the rod is



(1) 0.1 V with end P at positive potential
(2) 0.1 V with end Q at positive potential
(3) 0.2 V with end P at positive potential
(4) 0.2 V with end Q at positive potential

106. A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between the current and voltage is $\frac{\pi}{4}$. If instead of L, C is removed from the circuit, the phase difference is again $\frac{\pi}{4}$ between the voltage and current. Then
(1) $X_L = X_C = R$
(2) $X_L = X_C = \sqrt{2}R$
(3) $X_L = X_C = \frac{R}{\sqrt{2}}$
(4) $X_L = X_C = 2R$

107. A point mass m is moving in a vertical circle of radius r with the help of light string. The velocity of the mass is $\sqrt{5gr}$ at the lowest point. Then tension in the string at the highest point is
(1) Zero (2) $\frac{mg}{2}$
(3) $2mg$ (4) $\frac{3mg}{2}$

Space for Rough Work

108. The potential energy of a particle of mass 2 kg moving along the x-axis is given by $U(x)=\left[x^2-2x\right]$ J. If the total mechanical energy of the particle is 8 J, then its maximum speed is

(1) $\sqrt{3}$ m s^{-1} (2) 2 m s^{-1}

(3) $2\sqrt{2}$ m s^{-1} (4) 3 m s^{-1}

109. In photoelectric effect, the work function of metallic surface used is dependent on

(1) Frequency of incident radiation

(2) Intensity of incident radiation

(3) Nature of the metallic surface

(4) All of these

110. Assume that a neutron breaks into a proton and an electron. (Given, mass of neutron = 1.675 × 10^{-27} kg, mass of proton = 1.672 × 10^{-27} kg, mass of electron = 9 × 10^{-31} kg)

Then,

(a) Mass defect is 1.6725 × 10^{-27} kg

(b) Energy is released during the process

(c) Energy is absorbed during process

Choose the correct option.

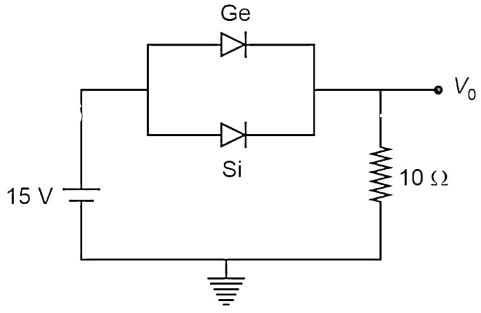
(1) (a), (b) and (c) all are correct

(2) Only (a) is correct

(3) (b) and (c) are correct only

(4) Only (b) is correct

111. Ge and Si diodes start conducting at 0.3 V and 0.7 V respectively. In the following figure, if Ge diode connection are reversed, the value of V_0 changes by: (Assume that the Ge diode has large breakdown voltage)



(1) 0.2 V (2) 0.3 V

(3) 0.4 V (4) 0 V

112. Which of the following statement is incorrect?

(1) Pure Si doped with pentavalent impurities gives an *n*-type semiconductor

(2) Minority carriers in a *p*-type semiconductor are electrons

(3) Majority carriers in an *n*-type semiconductor are electrons

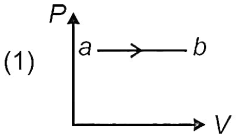
(4) Pure Ge doped with trivalent impurities gives an *n*-type semiconductor

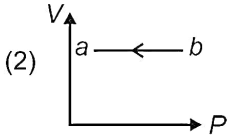
113. The coefficient of linear expansion of a certain crystal in one direction is β_1 and in the other two directions is β_2, then the coefficient of volumetric expansion will be

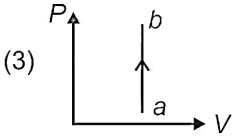
(1) $2\beta_1+\beta_2$ (2) $3\beta_1$

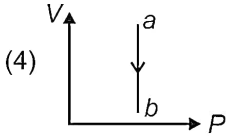
(3) $\beta_1+2\beta_2$ (4) $\beta_2-\beta_1$

114. Choose the correct depiction between pressure and volume shown in figure that represents negative work done.

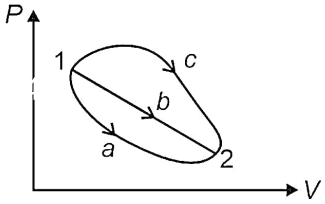
(1) 

(2) 

(3) 

(4) 

115. For the curve between pressure and volume of an ideal gas taken through processes *a*, *b* and *c* as shown in figure, choose the correct relation for change in internal energy.



(1) $dU_a > dU_b > dU_c$ (2) $dU_a < dU_b < dU_c$

(3) $dU_a = dU_b = dU_c$ (4) $dU_a < dU_b = dU_c$

Space for Rough Work

116. A sample of metal weighs 300 gram in air, 270 gram in water. Then the relative density of metal is

(1) 12 (2) 10

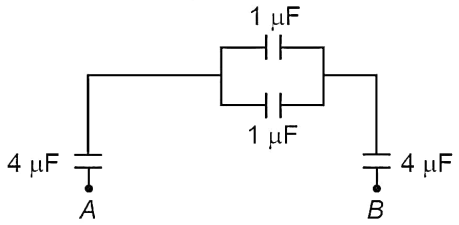
(3) 44 (4) $\frac{21}{3}$

117. If the screw on a screwguage is given 8 rotations, it moves by 4 mm on the main scale. If there are 50 divisions on the circular scale then the least count of the screwgauge is

(1) 0.1 cm (2) 0.01 cm

(3) 0.001 cm (4) 1.0 cm

118. Find equivalent capacitance between *A* and *B*.



(1) 2 μF (2) 4 μF

(3) 1 μF (4) 5 μF

119. **Assertion (A):** If a proton and an electron are placed in the same uniform electric field, they experiences different accelerations.

Reason (R): Electric force on a test charge is independent of its mass.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true and (R) is not the correct explanation of (A)

(3) Only (A) is true but (R) is false

(4) Both (A) and (R) are false

120. A seconds pendulum is fixed on a lift which has upward acceleration $\frac{g}{4}$. Its time period is

(1) $\sqrt{5}$ s (2) $\frac{4}{\sqrt{5}}$ s

(3) $\frac{2}{\sqrt{5}}$ s (4) $2\sqrt{5}$ s

121. The fundamental frequency of a closed organ pipe is 100 Hz. The frequency of the first overtone is

(1) 300 Hz (2) 100 Hz

(3) 200 Hz (4) 500 Hz

122. An object is placed at 30 cm in front of a concave mirror whose focal length is 10 cm. The image formed will be

(1) Magnified, Virtual and Inverted

(2) Diminished, Virtual and Inverted

(3) Diminished, Inverted and Real

(4) Magnified, Erect and Virtual

123. A lens made of glass whose index of refraction is 1.5 has a focal length of +20 cm in air. Its focal length in water (refractive index is $\frac{4}{3}$) will be

(1) 10 cm (2) 80 cm

(3) 20 cm (4) 5 cm

124. In a single slit diffraction of light of wavelength λ by a slit of width *a*, the width of the central maximum on a screen at a distance *b* is

(1) $\frac{2\lambda a}{b}$ (2) $\frac{\lambda b}{a}$

(3) $\frac{2\lambda b}{a}$ (4) $\frac{\lambda a}{b}$

125. If v_1, v_2 and v_3 are the speeds of gamma rays, X-rays and microwaves respectively in vacuum, then

(1) $v_1 > v_2 > v_3$

(2) $v_1 < v_2 > v_3$

(3) $v_1 < v_2 < v_3$

(4) $v_1 = v_2 = v_3$

126. If length as well as radius of cross section of a cylindrical wire are doubled, then its resistance

(1) Will be halved

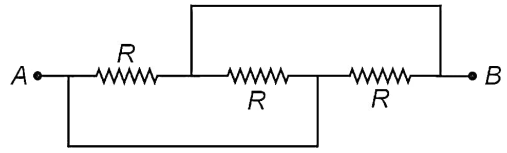
(2) Will be doubled

(3) Will remain same

(4) Will be quadrupled

Space for Rough Work

127. The equivalent resistance between the points A and B of the given circuit is



(1) $3R$ (2) $\frac{2R}{3}$

(3) $\frac{R}{3}$ (4) $\frac{4R}{3}$

128. The magnetic field lines close to a straight conductor carrying current will be

(1) Radially outward

(2) Along the length of the conductor

(3) In the form of concentric circles

(4) Helical

129. A charged particle is moving with velocity v in a magnetic field of induction B. The rate of change of linear momentum of the particle will be maximum when

(1) v and B are perpendicular

(2) v and B are at an angle of 45°

(3) v and B are parallel

(4) v and B are antiparallel

130. A magnet of magnetic moment 25 A m^2 is placed along x-axis in a magnetic field $\vec{B}=\left(2\hat{i}+3\hat{j}\right)$ tesla. The torque acting on the magnet is

(1) Zero (2) 50 N m

(3) 75 N m (4) 125 N m

131. An object of mass 3 kg is at rest. Now a force $\vec{F}=\left(6t^2\hat{i}\right)$ N is applied on the object, then velocity of object at t = 1 s is

(1) $\frac{2}{3}$ m s^{-1} (2) $\frac{1}{4}$ m s^{-1}

(3) $\frac{3}{2}$ m s^{-1} (4) 2 m s^{-1}

132. **Assertion (A):** An object can have constant speed but variable velocity.

Reason (R): Speed is a vector but velocity is scalar quantity.

(1) Both (A) and (R) are true and (R) is correct explanation of (A)

(2) Both (A) and (R) are true and (R) is not correct explanation of (A)

(3) Only (A) is true but (R) is false

(4) Both (A) and (R) are false

133. A body falling from height h takes time t_1 to reach the ground. The time taken to cover the first half of height is

(1) $\frac{t_1}{\sqrt{2}}$ (2) $\frac{\sqrt{2}t_1}{3}$

(3) $\frac{t_1}{\sqrt{3}}$ (4) $\frac{3t_1}{4}$

134. A boat is sailing with velocity $\left(3\hat{i}+4\hat{j}\right)$ m/s with respect to ground and water in river is flowing with a velocity $\left(-3\hat{i}-4\hat{j}\right)$ m/s. The relative velocity of boat (in m/s) w.r.t. water is

(1) $6\hat{i}$

(2) $8\hat{j}$

(3) $6\hat{i}+8\hat{j}$

(4) $8\hat{i}+6\hat{j}$

135. Two non-reactive monoatomic ideal gases have their atomic masses in the ratio 5 : 7. The ratio of their partial pressure when enclosed in a vessel kept at a constant temperature. is 4 : 3. The ratio of their densities is

(1) 16 : 9

(2) 25 : 21

(3) 20 : 21

(4) 8 : 9

Space for Rough Work

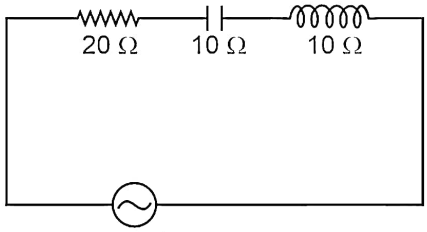
SECTION - B

136. The radius (in km) to which the present radius of the earth (R = 6400 km) should be compressed so that the escape velocity is increased 10 times, is (Assume mass of earth is constant)
(1) 6.4 km (2) 64 km
(3) 640 km (4) 4800 km

137. A ballet dancer, dancing on a smooth floor is spinning about a vertical axis (with her arms folded) with an angular velocity of 20 rad/s. When she stretches her arms fully, the spinning speed decreases to 10 rad/s. If I is the initial moment of inertia of the dancer, the new moment of inertia is
(1) $2I$ (2) I
(3) $\frac{I}{2}$ (4) $\frac{I}{3}$

138. Two conducting coils are placed near each other. Their mutual inductance can be increased by
(1) Increasing the distance between them
(2) Increasing the number of turns in them
(3) Increasing the current in one of the coil
(4) Both (1) and (3)

139. The RLC circuit shown below is operating at resonance.



$V = 200\sqrt{2}\ \sin 100t$

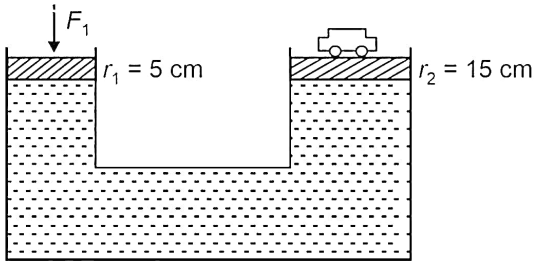
The value of rms current in the circuit is
(1) $10\sqrt{2}$ A (2) 10 A
(3) $20\sqrt{2}$ A (4) 20 A

140. If a NOT gate is connected to the output of a AND gate, then the resulting gate will be
(1) AND gate (2) NAND gate
(3) NOR gate (4) NOT gate

141. Consider an electron in a hydrogen atom revolving in its first excited state (having radius 2.12 Å). The de-Broglie wavelength of this electron is
(1) 5.55 Å (2) 6.66 Å
(3) 7.32 Å (4) 9.46 Å

142. When a metal ball is heated, the largest percentage increase will occur in its
(1) Diameter (2) Area
(3) Volume (4) Density

143. For the given arrangement shown in figure where car of mass 900 kg is to be lifted. Calculate the required forces (F_1) to lift the car.



(1) 500 N (2) 1000 N
(3) 600 N (4) 250 N

144. A, B, C and D are four different physical quantities having different dimensions. None of them is dimensionless. It is given that equation $AD = C\ \ln(BD)$ holds true then which of the combination is not a meaningful quantity?
(1) $\frac{C}{BD}$
(2) $\frac{A-C}{B}$
(3) $\frac{A}{B}-C$
(4) $A^2 - B^2C^2$

145. A parallel plate condenser is connected to a battery of emf 6 volt. If a plate of dielectric constant 4 is inserted into it, then the potential difference on the condenser will be
(1) 6 V (2) 3 V
(3) 24 V (4) 2 V

Space for Rough Work

146. Force between two-point charges q_1 and q_2 is F. The new force between q_1 and q_2 when q_3 is inserted between them, is

(1) $\frac{q_3F}{q_1}$ (2) $\frac{q_3F}{q_1+q_2}$

(3) $\frac{q_1F}{q_2}$ (4) F

147. When the angle of incidence on a air-material interface is 53°, the reflected light is completely polarized. The velocity of the refracted ray inside the material is

(1) 4×10^8 m/s (2) 2.5×10^8 m/s

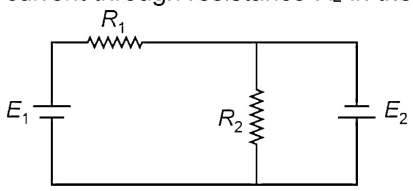
(3) 1.33×10^8 m/s (4) 2.25×10^8 m/s

148. An equiconvex lens of focal length 14 cm is cut along a plane perpendicular to principal axis into two equal parts. The ratio of focal length of new lenses formed is

(1) 1 : 4 (2) 1 : 2

(3) 1 : 1 (4) 3 : 1

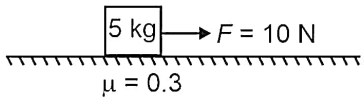
149. Two resistances R_1 and R_2 are joined as shown in the figure to two ideal batteries of emf E_1 and E_2. The current through resistance R_2 in the circuit is



(1) $\frac{E_1+E_2}{R_2}$ (2) $\frac{E_1-E_2}{R_1}$

(3) $\frac{E_2}{R_2}$ (4) $\frac{E_2-E_1}{R_2}$

150. A block of mass 5 kg is placed on a rough surface (μ = 0.3). A horizontal force of 10 N is acting as shown, the value of friction force acting on the block is



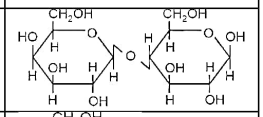
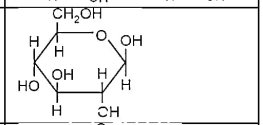
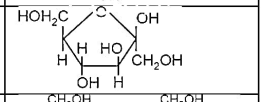
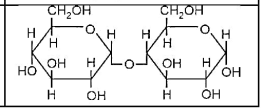
(1) 15 N (2) 5 N

(3) Zero (4) 10 N

CHEMISTRY

SECTION-A

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

	Column-I		Column-II
a.	β-D-(+)-Glucopyranose	(i)	
b.	β-D-(–)-Fructofuranose	(ii)	
c.	Maltose	(iii)	
d.	Lactose	(iv)	

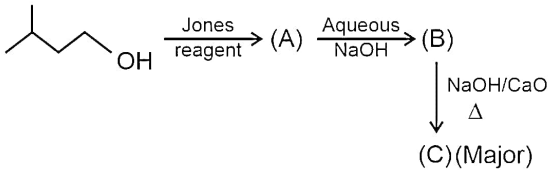
(1) a(iii), b(ii), c(iv), d(i)

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

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

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

152. Consider the following reaction sequence



Major product C is

(1)  (2) 

(3) 

(4) 

Space for Rough Work

153. Given below are two statements:

Statement I: Boiling point of pentane is more than 2, 2-dimethylpropane.

Statement II: With increase in number of branched chains, the molecule attains the spherical shape so surface area decreases.

In the light of the above statements, choose the **correct** answer.

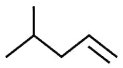
(1) Statement I is correct, but statement II is incorrect.

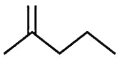
(2) Both statement I and statement II are correct.

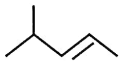
(3) Both statement I and statement II are incorrect.

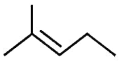
(4) Statement I is incorrect, but statement II is correct.

154. Which among the following compounds on catalytic hydrogenation releases minimum amount of energy?

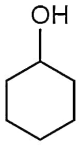
(1) 

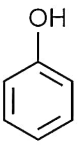
(2) 

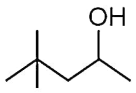
(3) 

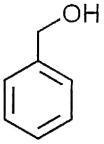
(4) 

155. The compound which will dissolve most readily in aqueous alkali is

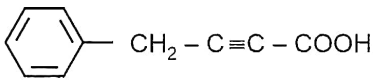
(1) 

(2) 

(3) 

(4) 

156. Total number of sp^2 hybridised carbon atoms present in the following compound is



(1) 6 (2) 7

(3) 8 (4) 9

157. The compound which can show both functional group isomerism as well as metamerism is

(1) C_3H_8O (2) C_3H_6O

(3) $C_4H_{10}O$ (4) C_5H_{12}

158. Choose the incorrect statement from the following.

(1) SnF_4 and PbF_4 are ionic in nature.

(2) Considering thermal and chemical stability, GeX_2 is more stable than GeX_4.

(3) Except CCl_4, other tetrachlorides of group 14 elements are easily hydrolysed by water.

(4) Complete hydrolysis of $SiCl_4$ results in the formation of silicic acid.

159. Consider the following species

(i) ClO_2^-

(ii) Cu^+

(iii) P_4

(iv) SO_4^{2-}

Which of the above species can undergo disproportionation reaction?

(1) (i) and (ii) only

(2) (ii) and (iii) only

(3) (i), (ii) and (iv) only

(4) (i), (ii) and (iii) only

160. Oxidation state of Cr in CrO_6 is

(1) +2 (2) +3

(3) +4 (4) +6

161. Maximum number of electrons in a subshell of an atom is given by

(1) 2l +1 (2) 4l + 2

(3) $2n^2$ (4) 2(l + 1)

162. Aqua regia is formed by mixing

(1) 2 parts of conc. HCl + 1 part of conc. HNO_3

(2) 1 part of conc. HCl + 3 parts of conc. HNO_3

(3) 3 parts of conc. H_2SO_4 + 1 part of conc. HNO_3

(4) 3 parts of conc. HCl + 1 part of conc. HNO_3

Space for Rough Work

163. The correct statements from the following are:

(a) Bleaching action of chlorine is an oxidation process.

(b) Bleaching effect of chlorine is temporary.

(c) Chlorine water on standing forms HOCl only.

(d) Hypochlorous acid (HOCl) is responsible for bleaching and oxidising properties of chlorine.

(1) (a), (c) and (d) only

(2) (a) and (d) only

(3) (b) and (c) only

(4) (a) and (c) only

164. Consider the following reaction

$$H_3C - C \equiv CH \xrightarrow[Hg^{2+}]{dil\ H_2SO_4} \underset{(Major)}{P}$$

Product P is

(1) $H_3C - \overset{OH}{\overset{|}{C}} = CH_2$

(2) $H_3C - CH_2 - CHO$

(3) $H_3C - CH = CHOH$

(4) $CH_3 - \underset{O}{\overset{||}{C}} - CH_3$

165. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A): Cannizzaro reaction is an example of disproportionation reaction.

Reason (R): During Cannizzaro reaction one molecule of aldehyde converts to corresponding alcohol and another forms carboxylic acid salt.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both (A) and (R) are true but (R) is **NOT** the correct explanation of (A)

(2) (A) is true but (R) is false

(3) (A) is false but (R) is true

(4) Both (A) and (R) are true and (R) is the correct explanation of (A)

166. Rate law for the given elementary reaction will be

$A + 2B \rightarrow C$

(1) $r = k[A][B]$

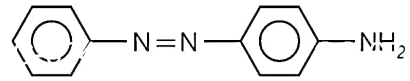
(2) $r = k[A][2B]$

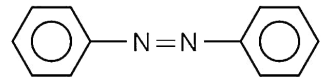
(3) $r = k[A]^2[B]$

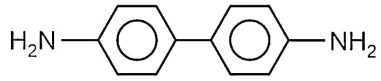
(4) $r = k[A][B]^2$

167. Aniline yellow is

(1) 

(2) 

(3) 

(4) 

168. Colour of phenolphthalein in acidic medium is

(1) Pink

(2) Orange

(3) Blue

(4) Colourless

169. Given below are two statements.

Statement I: Frequency of light absorbed is determined by nature of ligand in complex compounds.

Statement II: Colour absorbed in the visible region corresponds to the adjacent colour of the light absorbed.

In the light of above statements, choose the most appropriate answer from the options given below.

(1) Statement I is correct but statement II is incorrect

(2) Statement I is incorrect but statement II is correct

(3) Both statement I and statement II are correct.

(4) Both statement I and statement II are incorrect

Space for Rough Work

170. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A): Heat (q) has a randomising influence on the system.

Reason (R): When heat is added to the system, it increases molecular motion causing increased randomness in the system.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(3) (A) is correct but (R) is incorrect

(4) Both (A) and (R) are incorrect

171. The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$. The atomic number and the group number of element X which is just below the given element in the periodic table are respectively

(1) 33, 15

(2) 51, 15

(3) 32, 14

(4) 31, 13

172. Match **column I** with **column II** and choose the correct option.

	Column I (Elements)		**Column II** (Block)
a.	Z = 19	(i)	*p* - block
b.	Z = 45	(ii)	*s* - block
c.	Z = 60	(iii)	*d* - block
d.	Z = 32	(iv)	*f* - block

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

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

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

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

173. Given below are two statements.

Statement I: The cations of strong bases and anions of strong acids do not hydrolyse.

Statement II: The pH of salt $NaClO_4$, is greater than 7 at 298 K.

In the light of above statements, choose the **correct** option among the following.

(1) Both statement I and statement II are correct.

(2) Both statement I and statement II are incorrect.

(3) Statement I is correct but statement II is incorrect.

(4) Statement I is incorrect but statement II is correct.

174. Out of the following salt solutions, for which the pH of the solution does not depend on concentration of salt will be

(1) NH_4Cl

(2) CH_3COONH_4

(3) NaCN

(4) CH_3COONa

175. For which of the following hydrogen electrode, the electrode potential is zero?

(a) $Pt(s)\,|\,\underset{1\,atm}{H_2(g)}\,|\,\underset{1\,M}{H^+(aq)}$

(b) $Pt(s)\,|\,\underset{0.01\,atm}{H_2(g)}\,|\,\underset{0.1\,M}{H^+(aq)}$

(c) $Pt(s)\,|\,\underset{2\,atm}{H_2(g)}\,|\,\underset{0.2\,M}{H^+(aq)}$

(1) (a) only

(2) (a) and (b) only

(3) (b) and (c) only

(4) (a), (b) and (c)

Space for Rough Work

176. Consider the following two statements.

Statement I: Resonance stabilizes the molecule as the energy of resonance hybrid is more than the energy of any single canonical structure.

Statement II: There exist equilibrium between the canonical forms of a molecule.

In light of above two statements, choose the **correct** option.

(1) Both statement I and statement II are correct.

(2) Both statement I and statement II are incorrect.

(3) Statement I is correct but statement II is incorrect.

(4) Statement I is incorrect but statement II is correct.

177. Bond order of C_2 is

(1) 2 (2) 1

(3) 2.5 (4) 1.5

178. 250 cm^3 of an aqueous solution of protein contains 1.5 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.5×10^{-3} bar. Calculate the molar mass of protein (approximately).

(1) 55670 g mol^{-1} (2) 56750 g mol^{-1}

(3) 59760 g mol^{-1} (4) 63450 g mol^{-1}

179. If $Ca_3(PO_4)_2$ dissociates 50% then find value of van't Hoff factor 'i', if initial concentration is 1 M.

(1) 2 (2) 2.5

(3) 3 (4) 5

180. The correct order of reactivity for dehydrohalogenation is

(1) $CH_3 - CH_2 - F > CH_3 - CH_2 - Cl > CH_3 - CH_2 - Br > CH_3 - CH_2 - I$

(2) $CH_3 - CH_2 - I > CH_3 - CH_2 - Br > CH_3 - CH_2 - Cl > CH_3 - CH_2 - F$

(3) $CH_3 - CH_2 - I > CH_3 - CH_2 - Cl > CH_3 - CH_2 - Br > CH_3 - CH_2 - F$

(4) $CH_3 - CH_2 - F > CH_3 - CH_2 - I > CH_3 - CH_2 - Br > CH_3 - CH_2 - Cl$

181. Consider the following statements.

Statement I: Haloalkanes react with KCN and AgCN to form alkyl cyanides and alkyl isocyanides respectively.

Statement II: AgCN is mainly covalent in nature and nitrogen is free to donate electron pair forming isocyanide as the major product.

Choose the **correct** option.

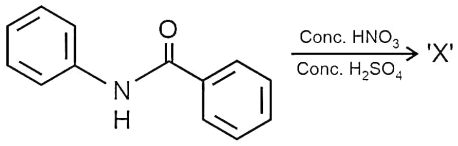
(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

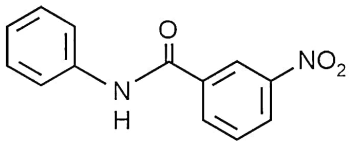
(3) Statement I is correct but statement II is incorrect

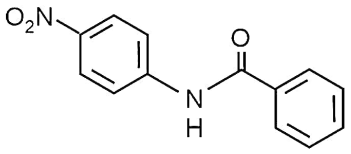
(4) Statement I is incorrect but statement II is correct

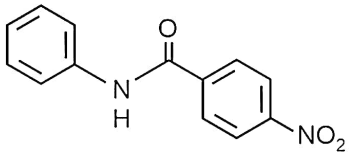
182. In the following reaction,

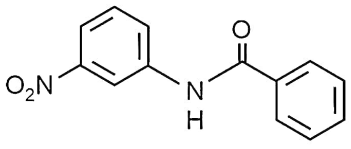


The structure of major product 'X' is

(1) 

(2) 

(3) 

(4) 

Space for Rough Work

183. The primary and secondary valency exhibited by complex $K[Cr(H_2O)_2(C_2O_4)_2]$ respectively are

(1) 3, 3 (2) 3, 6

(3) 6, 6 (4) 6, 3

184. The total number of atoms present in 5.6 L of SO_2 at STP is approximately

(1) 1.25×10^{23} (2) 1.5×10^{23}

(3) 4.5×10^{23} (4) 3×10^{23}

185. In the reaction,

$$3NO_2(g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO(g)$$

When 2 moles of NO_2 and 1 mole of H_2O are made to react to completion, then choose the incorrect statement.

(1) All the NO_2 will be consumed

(2) 0.66 mole of NO will be produced

(3) 1.33 moles of HNO_3 will be produced

(4) 0.66 moles of H_2O will be left

SECTION-B

186. Consider the following statements

(a) In DNA, adenine forms hydrogen bond with thymine.

(b) Nucleotides are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of pentose sugar.

(c) In DNA, the sugar moiety present is β-D-ribose.

The correct statements are

(1) (a) and (b) only (2) (b) and (c) only

(3) (a), (b) and (c) (4) (a) and (c) only

187. Incorrect statement among the following is

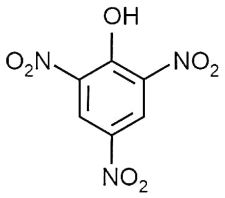
(1) But-2-ene on reductive ozonolysis gives ethanal as major product.

(2) Ethene on reaction with Baeyer's reagent gives ethylene glycol.

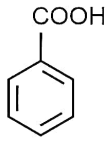
(3) Propene does not react with Tollens' reagent.

(4) Calcium carbide on reaction with water gives ethene gas.

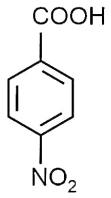
188. Correct order of acidic strength of the given compounds is



(i)



(ii)



(iii)

(1) (iii) > (i) > (ii)

(2) (iii) > (ii) > (i)

(3) (i) > (iii) > (ii)

(4) (ii) > (iii) > (i)

189. The number of waves in one complete revolution in 3rd Bohr orbit of electron is

(1) 1 (2) 4

(3) 2 (4) 3

190. Given below are two statements.

Statement I: Noble gases have weak dispersion forces and have low boiling points.

Statement II: Neon has the lowest boiling point of any known substance.

In the light of the above statements, choose the most appropriate answer from the options given below.

(1) Statement I is correct but statement II is incorrect.

(2) Statement I is incorrect but statement II is correct.

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

191. If 75% of a first order reaction is completed in 30 min then $t_{87.5\%}$ for reaction will be

(1) 60 min

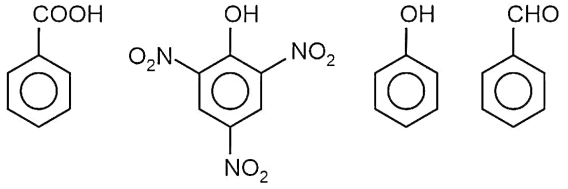
(2) 45 min

(3) 50 min

(4) 40 min

Space for Rough Work

192. Which of the following will give CO_2 with $NaHCO_3$?



(i) (ii) (iii) (iv)

(1) (i) and (ii) only
(2) (i), (ii) and (iii) only
(3) (ii) and (iii) only
(4) (i) and (iv) only

193. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A): The decrease in size from Th to Lr series is greater than in Ce to Lu series.

Reason (R): 5f orbitals have poor shielding effect.

In the light of the above statements, choose the correct answer from the options given below.

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(3) (A) is correct but (R) is incorrect
(4) Both (A) and (R) are incorrect

194. For the reaction, $X_2O_4(l) \rightarrow 2XO_2(g)$, ΔU = 1.5 kcal, ΔS = 18 cal K^{-1} at 300 K.

Hence, ΔG is

(1) –7.8 kcal
(2) 2.7 kcal
(3) –2.7 kcal
(4) 7.8 kcal

195. Which of the following is a correct expression of K_{sp} for a salt A_xB_y [s is the solubility of A_xB_y]?

(1) $K_{sp} = x^y y^x s$
(2) $K_{sp} = x^x y^y s$
(3) $K_{sp} = x^x y^y s^{(x+y)}$
(4) $K_{sp} = x^y y^x s^{(x+y)}$

196. The E_{cell} for the following concentration cell

$$Zn(s) \,|\, \underset{(C_1M)}{Zn^{2+}(aq)} \,||\, \underset{(C_2M)}{Zn^{2+}(aq)} \,|\, Zn(s)$$

is found to be positive. The possible values of C_1 and C_2 can be respectively.

(1) 0.2 M, 0.1 M
(2) 0.01 M, 0.10 M
(3) 0.05 M, 0.03 M
(4) 0.1 M, 0.1 M

197. Consider the following statements.

Statement I: Formal charges helps in selection of the lowest energy structure from a number of possible Lewis structures for a given species.

Statement II: The lowest energy structure is the one with the smallest formal charges on the atoms.

In the light of above two statements, choose the **correct** option.

(1) Both statements I and II are correct.
(2) Statement I is correct and statement II is incorrect.
(3) Statement I is incorrect and statement II is correct.
(4) Both statements I and II are incorrect.

198. Match **column I** with **column II** and choose the correct option.

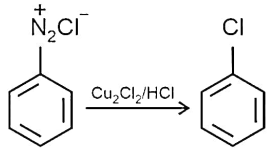
	Column I Complex ion		**Column II** Number of unpaired electrons
a.	$[CoF_6]^{3-}$	(i)	5
b.	$[Ni(CO)_4]$	(ii)	2
c.	$[FeF_6]^{3-}$	(iii)	4
d.	$[NiCl_4]^{2-}$	(iv)	Zero

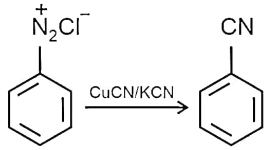
Choose the **correct** answer from the options given below.

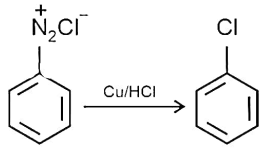
(1) a(ii), b(iii), c(i), d(iv) (2) a(iv), b(ii), c(iii), d(i)
(3) a(iii), b(iv), c(i), d(ii) (4) a(i), b(iv), c(ii), d(iii)

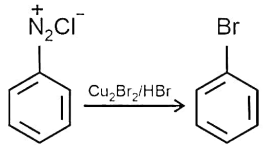
Space for Rough Work

199. Which among the following reactions does not represent Sandmeyer reaction?

(1) 

(2) 

(3) 

(4) 

200. Consider the following statements:

Statement I: Paper chromatography is a type of partition chromatography.

Statement II: Partition chromatography is based on the fact that different compounds are adsorbed on an adsorbent to different degrees.

In the light of above statements, choose the **correct** option.

(1) Both the statements I and II are correct

(2) Both the statements I and ii are incorrect

(3) Statement I is correct and statement II is incorrect

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

❑ ❑ ❑

Space for Rough Work