12/04/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

CST – 6

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.

CHEMISTRY

SECTION-A

1. One mole of a non-volatile solute is dissolved in three moles of water. The vapour pressure of the solution relative to that of water is

(1) $\frac{1}{4}$ (2) $\frac{2}{3}$

(3) $\frac{3}{4}$ (4) $\frac{1}{3}$

2. When common salt is dissolved in water
(1) Melting point of the solution increases
(2) Boiling point of the solution increases
(3) Boiling point of the solution decreases
(4) Both melting point and boiling point decreases

3. Bond order of N_2^+ and O_2^- are
(1) 2.5 and 1.5 respectively
(2) 1.5 and 1.5 respectively
(3) 2.5 and 2.5 respectively
(4) 1.5 and 2.5 respectively

4. Hybridisation and shape of XeF_4 is
(1) sp^2, Trigonal planar
(2) sp^3, Tetrahedral
(3) sp^3d^2, Octahedral
(4) sp^3d^2, Square planar

5. The number of protons, neutrons and electrons in $^{152}_{63}Eu$ respectively are

(1) 63, 63, 89 (2) 89, 63, 89
(3) 63, 89, 63 (4) 89, 89, 63

6. What is the covalency of nitrogen in N_2O_5?

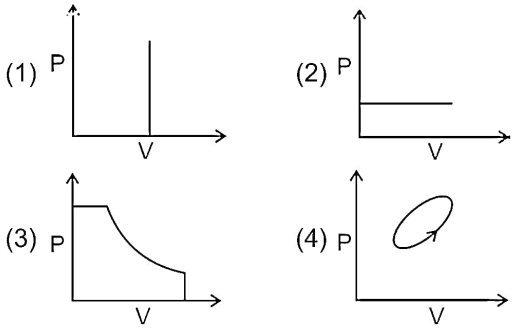
(1) 2 (2) 5
(3) 3 (4) 4

7. Which among the following oxoacids contains S–O–S linkage?

(1) $H_2S_2O_3$ (2) $H_2S_2O_4$
(3) $H_2S_2O_7$ (4) $H_2S_2O_8$

8. Choose the **incorrect** statement among the following.
   (1) Tetrahedral complexes (MA_3B) cannot show geometrical isomerism
   (2) All the octahedral complexes of Zn^{2+} must be outer orbital complex
   (3) Metal carbonyls are organometallic compounds
   (4) Compound $[MA_3B_3]$ does not have fac-mer isomers

9. Which of the following P-V curve represents maximum work done?



10. Which among the following is/are endothermic process?
   (a) $He_{(g)} + e^- \rightarrow He^-_{(g)}$
   (b) $O^-_{(g)} + e^- \rightarrow O^{2-}_{(g)}$
   (c) $H_{(g)} + e^- \rightarrow H^-_{(g)}$
   (d) $Cl_{(g)} + e^- \rightarrow Cl^-_{(g)}$
   (1) (a) only
   (2) (a) and (b) only
   (3) (b) and (c) only
   (4) (a), (c) and (d) only

11. Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).
   Assertion (A): The second ionization enthalpy will be higher than the first ionization enthalpy of an atom.
   Reason (R): It is more difficult to remove an electron from a positively charged ion than from a neutral atom.
   In the light of above statements choose the **correct** answer.
   (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

12. Deficiency of vitamin B_6 causes
   (1) Increased blood clotting time
   (2) Convulsions
   (3) Cheilosis
   (4) Scurvy

13. Among the following salts, highest pH will be of
   (1) NaCl (2) NH_4Cl
   (3) CH_3COONa (4) CH_3COONH_4

14. Match List-I with List-II and choose the correct option.

	List-I		List-II
(a)	$2HI(g) \rightleftharpoons H_2(g) + I_2(g)$	(i)	$\frac{K_p}{K_c} = RT$
(b)	$4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(g)$	(ii)	$\frac{K_p}{K_c} = 1$
(c)	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	(iii)	$\frac{K_p}{K_c} = (RT)^{-1}$
(d)	$2NO(g) + Cl_2(g) \rightleftharpoons 2NOCl(g)$	(iv)	$\frac{K_p}{K_c} = (RT)^{-2}$

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

Space for Rough Work

15. Number of atoms in 18 mL H_2O at STP will be

(1) $\frac{18}{22400}N_A$ (2) $\frac{54}{22400}N_A$

(3) N_A (4) $3N_A$

16. Given below are two statements.

Statement I: Molar mass of glucose is six times its empirical formula mass.

Statement II: An empirical formula represents the simplest whole number ratio of various atoms present in a compound.

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

17. If rate constant of a reaction doubles on rise of every 10°C, then ratio of rate of reaction at 340 K to rate of reaction at 300 K will be

(1) 4 : 1 (2) 8 : 1

(3) 16 : 1 (4) 32 : 1

18. Prussian blue colour is observed on addition of $Na_4[Fe(CN)_6]$ in

(1) $FeCl_2$ (2) $FeCl_3$

(3) $CuCl_2$ (4) $AlCl_3$

19. Addition of $AgNO_3$ in a salt solution gives white precipitate, solution may contain

(1) Cl^- (2) Br^-

(3) I^- (4) PO_4^{3-}

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

Assertion (A): $ClCH_2COOH$ is more acidic than CH_3COOH.

Reason (R): Due to –I effect of Cl, pK_a of carboxylic acid increases.

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)

21. Which among the following will give iodoform test?

(a) CH_3CHO

(b) CH_3CH_2CHO

(c) ICH_2CHO

(d) HCHO

(1) (a) Only (2) (a) & (b) Only

(3) (a) & (c) Only (4) (a), (b) & (c) Only

22. In the given set of reactions

2-Bromobutane $\xrightarrow[\text{heat}]{\text{AgCN(alc)}}$ $\underset{\text{(major)}}{X}$ $\xrightarrow{LiAlH_4}$ Y

The IUPAC name of product 'Y' is

(1) Butan-2-amine

(2) N-Methylbutanamine

(3) N-Isobutylmethanamine

(4) N-Methylbutan-2-amine

23. Consider the following statements.

Statement (I): Allylic and benzylic halides show high reactivity towards S_N1 reaction.

Statement (II): The allylic and benzylic carbocations get stabilised through resonance.

Choose the **correct** option.

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

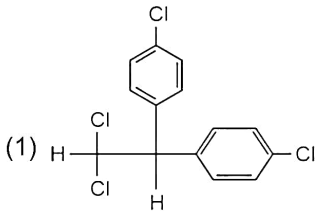
(2) Statement (I) is incorrect but statement (II) is correct

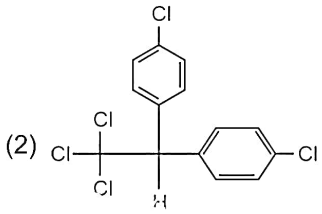
(3) Both statement (I) and statement (II) are correct

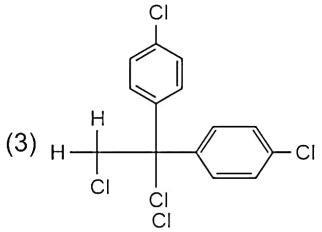
(4) Both statement (I) and statement (II) are incorrect

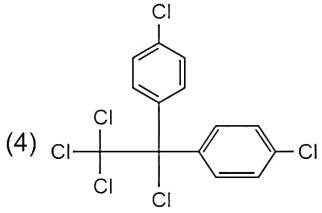
Space for Rough Work

24. The correct structure of DDT is

(1) 

(2) 

(3) 

(4) 

25. The most basic hydroxide among the following is
(1) $Tb(OH)_3$ (2) $Dy(OH)_3$
(3) $Er(OH)_3$ (4) $Pr(OH)_3$

26. The ratio of total number of σ bonds to the total number of π bonds present in naphthalene is
(1) 4 : 1 (2) 19 : 5
(3) 3 : 1 (4) 21 : 5

27. Kjeldahl's method is not applicable for estimation of nitrogen is
(1) Urea (2) Aniline
(3) Pyridine (4) Methanamine

28. Consider the following reaction:

$$K + O_2 \rightarrow KO_2$$

The change in oxidation state of oxygen is
(1) 0 to –1 (2) 0 to –2
(3) 0 to $-\frac{1}{2}$ (4) 0 to +1

29. Consider the given half cell reactions and their respective reduction potentials

$Pb^{2+} + 2e^- \rightarrow Pb(s)$ $E^\circ_{Pb^{2+}/Pb} = -0.13$ V

$Ag^+ + e^- \rightarrow Ag(s)$ $E^\circ_{Ag^+/Ag} = +0.80$ V

The E°_{cell} of galvanic cell in which the following reaction takes place is

$Pb(s) + 2Ag^+(aq) \rightarrow Pb^{2+}(aq) + 2Ag(s)$

(1) – 0.67 V (2) 0.67 V
(3) – 0.93 V (4) 0.93 V

30. The incorrect statement about borax is
(1) It contains two 3-centre-2-electron bonds
(2) It dissolves in water to give orthoboric acid
(3) The total number of bridging oxygen atoms between two boron atoms is 5
(4) Two boron atoms are sp^2 hybridised while other two are sp^3 hybridised

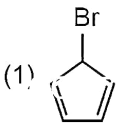
31. Given below are the two statements.

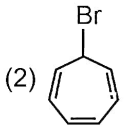
Statement I: Complete hydrolysis of DNA yields a pentose sugar, phosphoric acid and nitrogen containing heterocyclic compounds.

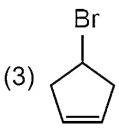
Statement II: In DNA molecule, the sugar moiety is β-D-(-)-fructofuranose.

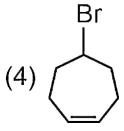
In the light of the above statements, choose the correct answer.
(1) Both statement I and statement II are correct
(2) Both statement I and statement II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

32. The compound which reacts at fastest rate with aqueous $AgNO_3$ solution is

(1) 

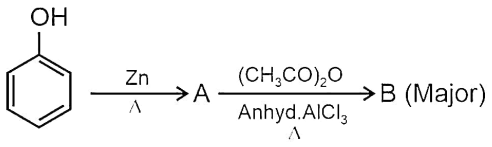
(2) 

(3) 

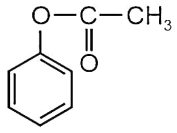
(4) 

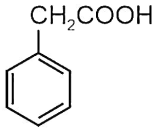
Space for Rough Work

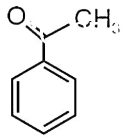
33. Consider the following reaction sequence

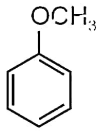


Major product B is

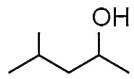
(1) 

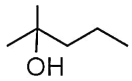
(2) 

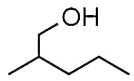
(3) 

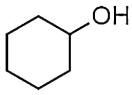
(4) 

34. The compound which reacts fastest with $ZnCl_2$ and conc. HCl is

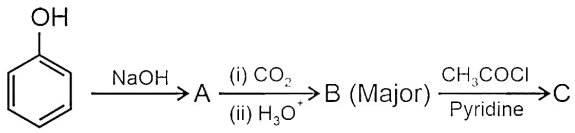
(1) 

(2) 

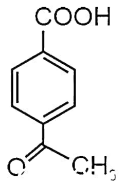
(3) 

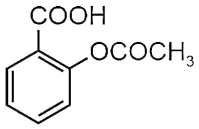
(4) 

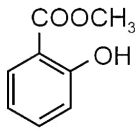
35. Consider the following reaction sequence

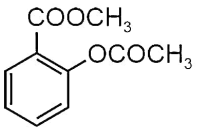


Product C is

(1) 

(2) 

(3) 

(4) 

SECTION-B

36. According to collision theory of chemical reaction, rate of reaction can be expressed as rate = $PZ_{AB}e^{-E_a/RT}$, Z_{AB} represents.

(1) The fraction of molecules with energies more than E_a

(2) Steric factor

(3) Threshold energy

(4) The collision frequency of reactants, A and B

37. Which among the following will be most reactive with HCN?

(1) CH_3CHO

(2) HCHO

(3) C_6H_5CHO

(4) CH_3COCH_3

38. If the molar conductivities at infinite dilution of NaOH, NaCl and NH_4OH respectively are x, y and z S cm^2 mol^{-1}. Then the limiting molar conductivity of NH_4Cl is equal to [S cm^2 mol^{-1}]

(1) x + y – z

(2) x + y + z

(3) y – z + x

(4) y + z – x

39. The value of K_c = 4 at 800 K for the reaction,

$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$

If only CO and H_2O are present initially at concentration of 0.2 M each, then concentration of CO(g) at equilibrium will be

(1) 0.67 M (2) 0.335 M

(3) 0.067 M (4) 0.21 M

40. Number of $p\pi - d\pi$ bonds in SO_4^{2-} is

(1) 1 (2) 2

(3) 3 (4) 4

41. Maximum number of electrons in a subshell with n = 4 and l = 3 is

(1) 10 (2) 12

(3) 14 (4) 16

Space for Rough Work

42. $\alpha - \text{sulphur} \underset{\text{Temperature}}{\overset{\text{Transition}}{\rightleftharpoons}} \beta - \text{sulphur}$

The transition temperature of α and β-sulphur is

(1) 369 K (2) 340 K

(3) 423 K (4) 496 K

43. What is the correct electronic configuration of the central atom in $K_3[Fe(CN)_6]$ based on crystal field theory?

(1) $t_{2g}^3 e_g^2$ (2) $t_{2g}^5 e_g^0$

(3) $e^2t_2^3$ (4) $e^4t_2^2$

44. An ideal gas is allowed to expand isothermally against a constant external pressure of 2.5 atm from an initial volume of 2.5 L to final volume of 4.5 L. ΔU for this process is

(1) – 505 J (2) 505 J

(3) 113.625 J (4) 0 J

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

Assertion (A): During nitration of aniline, significant amount of meta derivative is formed.

Reason (R): In strongly acidic medium, aniline is protonated to form the anilinium ion which is meta directing.

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

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

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

Assertion (A): Many Cu(I) compounds are unstable in aqueous solution and undergo disproportionation.

Reason (R): The stability of $Cu^{2+}(aq)$ is less than $Cu^+(aq)$ due to much more negative $\Delta_{hyd}H^\circ$ of $Cu^{2+}(aq)$ than $Cu^+(aq)$.

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

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

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

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

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

47. Which of the following will **not** show metamerism?

(i) $C_4H_{10}O$

(ii) C_2H_6O

(iii) C_3H_8O

(iv) C_5H_{12}

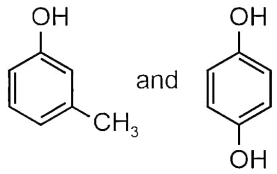
(1) (ii) & (iii) only

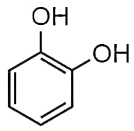
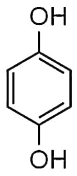
(2) (i), (ii) & (iii) only

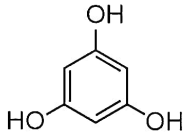
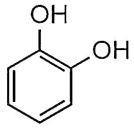
(3) (ii), (iii) & (iv) only

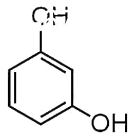
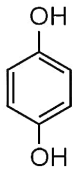
(4) (i) & (iv) only

48. Resorcinol and quinol respectively are

(1)  and

(2)  and 

(3)  and 

(4)  and 

Space for Rough Work

49. Consider the following statements.

(a) There are infinite number of conformations of ethane.

(b) The repulsive interaction between the electron clouds, which affects stability of a conformation, is called torsional strain.

(c) In ethane, magnitude of torsional strain depends upon the angle of rotation about C–C bond.

The **correct** statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a) and (c) only

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

50. Match List-I with List-II and choose the correct option [Assume T = 298 K]

	List-I		List-II
(a)	$Zn\|Zn^{2+}_{(0.1M)}\|\|Zn^{2+}_{(0.01M)}\|Zn$	(i)	E_{cell} = +0.0295 V
(b)	$Zn\|Zn^{2+}_{(0.01M)}\|\|Zn^{2+}_{(0.1M)}\|Zn$	(ii)	E_{cell} = 0 V
(c)	$Zn\|Zn^{2+}_{(0.1M)}\|\|Zn^{2+}_{(0.1M)}\|Zn$	(iii)	E_{cell} = – 0.0295 V
(d)	$Zn\|Zn^{2+}_{(0.1M)}\|\|Zn^{2+}_{(0.001M)}\|Zn$	(iv)	E_{cell} = – 0.0591 V

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

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

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

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

BOTANY

SECTION-A

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

Statement-A: Active transport across cell membrane is an energy dependent process in which ATP is utilised.

Statement-B: Na^+/K^+ pump allows the movement across the membrane along the concentration gradient.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both the statements A and B are correct

(4) Both the statements A and B are incorrect

52. Which of the following is **not** a feature of mitochondria?

(1) Circular DNA in the matrix

(2) Double membrane bound

(3) Presence of cristae

(4) Presence of 80S ribosomes

53. Which of the following cell organelles is absent in cells of higher plants but present in animal cells?

(1) Endoplasmic reticulum

(2) Mitochondria

(3) Centrosome

(4) Ribosomes

54. Final stage of meiotic prophase I is marked by

(1) Dissolution of synaptonemal complex

(2) Terminalisation of chiasmata

(3) Crossing over

(4) Appearance of chiasmata

55. In which stage of prophase I, bivalent is clearly visible as tetrad?

(1) Zygotene

(2) Leptotene

(3) Diplotene

(4) Pachytene

Space for Rough Work

56. Select the **incorrect** statement.
(1) Sister chromatids remain associated at their centromeres during anaphase I
(2) Meiosis-II resembles a normal mitosis
(3) Prophase-I of meiosis is typically longer and much more complex than prophase of mitosis
(4) Bivalent chromosomes align on the equatorial plate in mitotic metaphase

57. "The Earth Summit"
(1) Was held in 2002 in Johannesburg, South Africa
(2) Pledged to achieve a significant reduction in the current rate of biodiversity loss at global, regional and local levels
(3) Was a historic Convention on Biological Diversity
(4) Emphasised on human settlement in biosphere reserve

58. The TCA cycle
(1) Involves the synthesis of 6C compound as byproduct
(2) Starts with the condensation of acetyl group with OAA and water
(3) Involves only one step of decarboxylation reaction
(4) Requires continued replenishment of $NADH + H^+$

59. In human, a disorder caused due to the absence of one of the X chromosome, *i.e.* 45 with X0, is
(1) Klinefelter's syndrome
(2) Myotonic dystrophy
(3) Down's syndrome
(4) Turner's syndrome

60. Read the following given statements.
Statement-A: In pea seeds, starch is synthesised effectively by BB homozygotes and therefore, large starch grains are produced.
Statement-B: The two alleles of a gene pair are located on homologous sites on non-homologous chromosomes.
In the light of above statements, choose the **correct** option from the following.
(1) Statement A is correct but statement B is incorrect
(2) Statement A is incorrect but statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

61. Which among the following was **not** a subspecies of tiger?
(1) Bali (2) Javan
(3) Quagga (4) Caspian

62. Read the following statements and choose the **correct** option for them.
Assertion (A): Phenylketonuria is caused by mutation in the gene that codes for the enzyme phenylalanine hydroxylase.
Reason (R): Phenylketonuria is inherited as the autosomal recessive trait.
(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 the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

63. Which rule was proposed by Mendel based on his observations regarding monohybrid cross?
(1) Incomplete dominance
(2) Multiple allelism
(3) Law of Independent Assortment
(4) Law of dominance

64. In taxonomic hierarchy, which of the following groups of taxa will have higher number of similarities as compared to other?
(1) Polymoniales, Poales and Sapindales
(2) Bryophyta, Gymnosperms and Angiosperms
(3) Solanaceae, Liliaceae and Brassicaceae
(4) *Canis lupus*, *Canis familiaris* and *Canis aureus*

Space for Rough Work

65. Which of the following statements is **incorrect** w.r.t. ascomycetes?
(1) *Saccharomyces* is an unicellular sac fungi.
(2) The asexual spores are conidia, produced exogenously on conidiophores.
(3) Sexual spores is produced endogenously in ascus.
(4) Asci are arranged in different types of fruiting bodies called basidiocarps.

66. Select the **mismatched** pair.
(1) Potato spindle tuber disease – Viroids
(2) Small pox – Virus
(3) Mad cow disease – Prions
(4) Tobacco mosaic disease – dsDNA virus

67. If any other floral whorls apart from ovary take part in fruit formation, this kind of fruit is termed as
(1) Parthenocarpic fruit
(2) True fruit
(3) Pseudocarpic fruit
(4) Aggregate fruit

68. All the given statements w.r.t. racemose inflorescence are incorrect, **except**
(1) The main axis (peduncle) terminates into a flower
(2) The flowers are borne in basipetal order
(3) Main axis shows limited growth
(4) Young flowers are present towards the apex and older flowers are present at the base

69. How many plants in the list given below belong to the family Solanaceae.

Tomato, Brinjal, Potato, Chilli, Belladonna, *Aloe*, *Asparagus*, Tobacco, *Petunia*

(1) Four (2) Two
(3) Seven (4) Six

70. In grasses, guard cells are
(1) Bean shaped (2) Star shaped
(3) Dumb-bell shaped (4) Pear shaped

71. Tracheids are
a. Tube like cells with tapering ends
b. Dead cells without protoplasm
c. Cells with suberised wall thickenings
d. Absent in angiosperms
The **correct** ones are
(1) a, b and c only (2) a, b and d only
(3) c and d only (4) a and b only

72. Which one of the following is the site for perception of light/dark photoperiods for flowering?
(1) Leaf (2) Root apex
(3) Shoot apex (4) Axillary bud

73. Double fertilization event is unique to
(1) Gymnosperms (2) Angiosperms
(3) Pteridophytes (4) Bryophytes

74. Select the **correct** location w.r.t. filiform apparatus.
(1) Synergids at the micropylar tip
(2) Antipodal cells at the micropylar tip
(3) Antipodal cells at the chalazal end
(4) Synergids at the chalazal end

75. Read the following statements and select the **correct** option w.r.t. pteridophytes.
Statement-A: The dominant phase or the main plant body is a free-living sporophyte.
Statement-B: Gametophyte is the haploid stage of a plant that generates gametes by the process of mitosis.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both the statements A and B are correct
(4) Both the statements A and B are incorrect

76. Which of the following statements is **incorrect** w.r.t. bryophytes?
(1) They are non-vascular terrestrial plants
(2) The plant body is attached to the substratum by root like structures called rhizoids
(3) They produce only one type of spores
(4) The sex organs anther and archegonia are produced on same thalli in *Marchantia*

Space for Rough Work

77. Which of the following is the major component of biogas?
(1) Methane (2) Carbon dioxide
(3) Hydrogen (4) Hydrogen sulphide

78. State **True (T)** or **False (F)** for the following statements and select the **correct** option.
a. Antarctic fishes can survive below 0°C. The body fluid of these fishes contains antifreeze solutes.
b. Kangaroo rat can concentrate its urine so that minimal volume of water is used to remove excretory products.
c. Altitude sickness can be experienced at high altitudes where body does not get enough oxygen due to low atmospheric pressure.

	a	b	c
(1)	T	F	T
(2)	F	F	T
(3)	T	T	F
(4)	T	T	T

79. Primary consumers are also known as
(1) Transducers
(2) Key industry animals
(3) Reducers
(4) Scavengers

80. How many *E. coli* cells will have DNA totally free from ^{14}N, after 40 minutes, if 10 *E. coli* cells with ^{14}N-dsDNA are incubated in a medium containing $^{15}NH_4Cl$ the only nitrogen source and each *E. coli* cell completes the division in 20 minutes?
(1) 60 cells (2) 40 cells
(3) 20 cells (4) 80 cells

81. DNA polymerase
(1) Catalyse polymerisation only in 5′ → 3′ direction
(2) Leads to the synthesis of Okazaki fragments only
(3) Performs template independent synthesis
(4) Utilises ribonucleoside triphosphates as substrate

82. The gene, that codes for the synthesis of protein which increases permeability of the cell to β-galactosides in *E. coli* is
(1) *lac i* gene (2) *lac y* gene
(3) *lac a* gene (4) *lac z* gene

83. Which of the following outcomes can be expected if Hershey and Chase would have used radioactive carbon and nitrogen to label the bacteriophage?
(1) Bacterial cells remained non-radioactive
(2) The viral particles became non-functional and unable to infect the bacteria
(3) All the bacterial cells would show the radioactivity of both carbon and nitrogen
(4) Protein would be considered as genetic material

84. How many different assimilatory powers are utilized during the reduction phase of CO_2 fixation in the mesophyll cells of C_3 plants, if two CO_2 molecules are fixed?
(1) 4ATP and 4NADPH (2) 2ATP and 2NADPH
(3) 4ADP and 4NADPH (4) 4ATP and 2NADPH

85. Splitting of the water molecules during the photochemical phase of photosynthesis occurs in
(1) Lumen side of the thylakoid membrane
(2) Stroma side of the thylakoid membrane
(3) Cytoplasmic side of the plasma membrane
(4) Intermembrane space of chloroplast

SECTION-B

86. Select the **correct** option w.r.t. organelle which is common to both prokaryotic and eukaryotic cells.
(1) It translates mRNA into proteins
(2) It is composed of nucleic acid only
(3) It is involve in lipid synthesis
(4) It is found only in cytosol of cell

87. The recombination between the homologous chromosomes is completed and the two chromatids are linked at the sites of crossing over by the end of
(1) Diplotene (2) Pachytene
(3) Zygotene (4) Diakinesis

Space for Rough Work

88. Choose the **wrong** statement with reference to the ABO blood groups in humans.
(1) The gene '*I*' has three alleles and all of them produce slightly different form of the sugar
(2) When I^A and I^B are present together they both express their own types of sugar
(3) There are total six different genotypes regarding ABO blood group in the population
(4) ABO blood grouping provides a good example of multiple alleles and co-dominance

89. The value of respiratory quotient for fatty acid is
(1) Equal to 1 (2) More than 1
(3) Less than 1 (4) Infinite

90. Which of the following plant groups are considered to be the first embryophytes?
(1) Algae (2) Bryophytes
(3) Pteridophytes (4) Gymnosperms

91. Read the following statements and select the **correct** option.
Statement-A: Treatment of waste water is done by heterotrophic microbes naturally present in sewage.
Statement-B: Aeration tanks show vigorous growth of useful aerobic heterotrophic microbes into flocs.
(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

92. Epiphytes such as orchids growing on other plants, like mango, is an example of which population interaction?
(1) Competition
(2) Parasitism
(3) Commensalism
(4) Predation

93. Which of the following sequences of hydrarch succession is **correct**?
(1) Phytoplankton → Submerged plant stage → Submerged free-floating plant stage → Reed-swamp stage → Marsh meadow stage → Scrub stage → Forest
(2) Phytoplankton → Submerged plant stage → Submerged free-floating plant stage → Marsh-meadow stage → Reed-swamp stage → Scrub stage → Forest
(3) Marsh meadow → Reed-swamp stage → Scrub stage → Phytoplankton → Submerged plant stage → Submerged free-floating plant stage → Forest
(4) Forest → Scrub stage → Marsh-meadow stage → Submerged plant stage → Reed-swamp stage → Submerged free-floating plant stage → Phytoplankton

94. Which pigment is responsible for bacterial photosynthesis?
(1) Paramylon (2) Xanthophyll
(3) Bacteriochlorophyll (4) Carotene

95. Select the **correct** option for the family to which *Pisum sativum* belongs and the characteristic features of this family.
(1) Brassicaceae – Sepals four, petals four, six stamens, bicarpellary ovary, siliqua type of fruit.
(2) Fabaceae – Perianth represented by membranous scales, usually three stamens, tricarpellary ovary, caryopsis type of fruit.
(3) Fabaceae – Sepals five, petals five, ten stamens, diadelphous, monocarpellary ovary, legume type of fruit.
(4) Solanaceae – Sepals five, petal five, five stamens, bicarpellary ovary, berry type of fruit.

Space for Rough Work

96. Which of the following statements are **incorrect** about secondary growth in dicot roots?
    a. Vascular cambium is primary in origin.
    b. Tissue located above the phloem bundles also contributes in the formation of vascular cambium.
    c. The portion of pericycle tissue that lie above the protoxylem become meristematic and form vascular cambium.
    d. Initially formed cambial ring is circular which later becomes wavy.
    (1) a, b and d (2) a and c only
    (3) a, c and d (4) c and d only

97. In the light of given statements, choose **correct** answer from the options given below.
    Statement-A: Ethylene induces flowering in mango.
    Statement-B: Ethylene promotes rapid internode elongation in deep water rice plants.
    (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

98. Read the following statements and select the **correct** option.
    Assertion(A): In the seeds of some grasses there is remain of second cotyledon called epiblast.
    Reason (R): Scutellum in grass seed is situated towards one side (lateral) of the embryonal axis.
    (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

99. How many type(s) of RNA polymerase(s) are found in the *E. coli*?
    (1) Two (2) Only one
    (3) Four (4) Three

100. Which chromosome has least number of genes in human genome?
    (1) X chromosome
    (2) Chromosome-1
    (3) Y chromosome
    (4) Chromosome-11

ZOOLOGY

SECTION-A

101. Repeated activation of the skeletal muscles can lead to the accumulation of 'X' due to anaerobic breakdown of
    (1) Cellulose (2) Glycogen
    (3) Glycerol (4) Glycine

102. Select the **incorrect** statement w.r.t. 'Saheli'.
    (1) It was developed at CDRI, Lucknow.
    (2) It is a non-steroidal preparation.
    (3) It is 'once a week' pill.
    (4) It has more side effects and low contraceptive value than vaults.

103. The forebrain of frog does not include
    (1) Cerebral hemisphere
    (2) Olfactory lobes
    (3) Diencephalon
    (4) Optic lobes

104. Select the **correct** match w.r.t. humans.
    (1) Plug of mucus – Present in cervix during pregnancy
    (2) Chorionic villi – Finger-like projections formed before implantation
    (3) Trophoblast – Inner cell mass
    (4) Yolk sac – Forms placental villi

Space for Rough Work

105. How many feature(s) given in the box below is/are associated with the muscle fibres present in the wall of heart?

Unstriated, Spindle-shaped, Branched, Voluntary

Choose the **correct** option.

(1) Three (2) One

(3) Four (4) Two

106. The middle layer of wall of blood vessels *i.e.*, tunica media consists of

(1) Only fibrous connective tissue with elastic fibres

(2) Smooth muscle and elastic fibres

(3) Only fibrous connective tissue with collagen fibres

(4) Smooth muscle and collagen fibres

107. All the following statements are incorrect w.r.t. steroidal oral contraceptive pills, **except**

(1) They have to be taken daily for a period of 28 days.

(2) All are made up of progestogens only.

(3) They inhibit ovulation.

(4) They maintain the quality of cervical mucus for conception.

108. All of the following are descendants of Psilophyton, **except**

(1) Horsetails (2) Ginkgos

(3) Gnetales (4) Bryophytes

109. Choose the correct option w.r.t. red and white muscle fibres.

(1) Former possesses less mitochondria than the latter

(2) Former have high number of sarcoplasmic reticulum than latter

(3) Latter carry out anaerobic oxidation for energy production

(4) Former are dark red due to less quantity of myoglobin

110. The first successful clinical gene therapy was given to a four-year old girl with deficiency of

(1) β-galactosidase

(2) Adenosine deaminase

(3) α-1-antitrypsin

(4) Human α-lactalbumin

111. How much CO_2 is delivered by 4 L of blood present in systemic veins to the alveoli under normal physiological conditions?

(1) 4 mL (2) 40 mL

(3) 160 mL (4) 16 mL

112. In humans, renal corpuscle consists of

(1) PCT, DCT and Bowman's capsule

(2) Glomerulus and PCT

(3) Bowman's capsule and glomerulus

(4) DCT, glomerulus and collecting duct

113. In humans, the diffusion membrane for exchange of gases is made up of

(1) One celled thick squamous epithelium of alveoli, basement substance and the endothelium of alveolar capillaries

(2) Two celled thick squamous epithelium, the endothelium of blood capillaries and the basement substance

(3) Thin squamous epithelium of alveoli and the basement membrane only

(4) Cellular basement membrane, thin squamous epithelium of alveoli and the endothelium of alveolar capillaries

114. In humans, a chemosensitive area is situated adjacent to respiratory rhythm centre. It is highly sensitive to

(1) CO_2 and hydrogen ions

(2) O_2 and hydrogen ions

(3) CO_2 and potassium ions

(4) O_2 only

Space for Rough Work

115. The mode of action of _____ is similar to that of steroidal contraceptive pills and their effective periods are _____.
Select the option which fills the blanks correctly.
(1) Implants, Much shorter
(2) Implants, Much longer
(3) Cu-T, Much shorter
(4) Diaphragm, Much longer

116. A gene locus has two alleles 'B' and 'b'. If the frequency of dominant allele 'B' is 0.6 in a population that is in Hardy-Weinberg equilibrium, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in this population respectively?
(1) 0.16; 0.24; 0.36 (2) 0.36; 0.48; 0.16
(3) 0.36; 0.24; 0.16 (4) 0.36; 0.16; 0.24

117. According to Darwin, evolution is caused due to
(1) Multiple step mutations
(2) Saltations
(3) Small and directional variations
(4) Random and directionless variations

118. The chorionic villi and uterine tissue become interdigitated with each other to form
(1) Placenta (2) Umbilical cord
(3) Yolk-sac (4) Inner cell mass

119. Cancer is one of the most dreaded non-infectious disease. All the below mentioned techniques/tests are used for its detection, **except**
(1) Computed tomography
(2) MRI
(3) Widal test
(4) Radiography

120. Which of the following processes leads to pregnancy?
(1) Gametogenesis (2) Parturition
(3) Implantation (4) Atresia

121. Which of the following structures opens into the Bidder's canal in a male frog?
(1) Cloaca (2) Vasa efferentia
(3) Testes (4) Urinary bladder

122. During resting conditions, axonal membrane is impermeable to
(1) Potassium ions
(2) Sodium ions
(3) Negatively charged proteins present in axoplasm
(4) All types of cations

123. Bt toxin protein is toxic for insects but not toxic to human beings because
(1) The activation of protoxin requires pH lower than that present in the human stomach.
(2) The Bt-protoxin activation requires temperature above the human body temperature.
(3) Most Bt-toxins are insect-group specific and are digested in humans in their stomach.
(4) Bt-toxin is an exotoxin.

124. Cannabinoids do not include
(1) Hashish (2) Ganja
(3) Marijuana (4) Heroin

125. An animal 'X' belongs to the class whose name refers to their creeping or crawling mode of locomotion and has two atria and two ventricles. Identify the 'X' and select the **correct** option.
(1) *Crocodilus* (2) *Bangarus*
(3) *Naja* (4) *Chameleon*

126. All of the hormones mentioned below are produced in human females only during pregnancy, **except**
(1) Relaxin (2) Progesterone
(3) hCG (4) hPL

127. Thalamus is a major coordinating centre for sensory and motor signaling which is wrapped by
(1) Hypothalamus (2) Cerebellum
(3) Midbrain (4) Cerebrum

Space for Rough Work

128. The digestive system is complete in all of the following animals, **except**

(1) *Ascaris* (2) *Ancylostoma*

(3) *Pleurobrachia* (4) *Culex*

129. Which among the following steps of recombinant DNA technology should be performed before the ligation of DNA fragment into a vector?

(1) Culturing the host cells in bioreactors

(2) Extraction of the desired product

(3) Isolation of desired DNA fragment

(4) Transformation of rDNA into host

130. Match column I with column II and select the **correct** option.

	Column I		**Column II**
(a)	Porifera	(i)	Spiny-skinned invertebrates
(b)	Platyhelminthes	(ii)	Presence of water canal system
(c)	Arthropoda	(iii)	Triploblastic and coelomate
(d)	Echinodermata	(iv)	Organ level of organisation

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

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

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

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

131. All of the following are pre-requisite for employing PCR, **except**

(1) *Taq* polymerase

(2) Restriction exonuclease

(3) Primers

(4) A DNA template

132. Choose the correct option to complete the analogy w.r.t. glands and diseases related with their hyposecretions.

Adrenal gland : Addison's disease : : Thyroid gland : _____

(1) Cretinism

(2) Exopthalmic goitre

(3) Graves' disease

(4) Thyroid cancer

133. Select the **incorrect** match.

(1)	Starch	–	Glycosidic bond
(2)	Haemoglobin	–	Peptide bond
(3)	Deoxyribonucleic acid	–	Phosphodiester bond
(4)	Palmitic acid	–	Disulphide bond

134. Choose the neutral amino acid from the following.

(1) Valine (2) Arginine

(3) Glutamic acid (4) Lysine

135. Consider the following statements:-

(A) All the elements present in a sample of Earth's crust are also present in a sample of living tissue.

(B) The selective abundance of carbon and hydrogen with respect to other elements is higher in any living organism than in Earth's curst.

Select the **correct** option.

(1) Both statements (A) and (B) are true

(2) Statement (A) is true but (B) is false

(3) Both statements (A) and (B) are false

(4) Statement (A) is false but (B) is true

SECTION-B

136. Consider the following:-

a. Presence of a fluid filled synovial cavity between articulating surfaces of two bones.

b. Allows considerable movement.

c. Belongs to the same category of synovial joint present between humerus and pectoral girdle

The above given features are true for

(1) Hip joint (2) Knee joint

(3) Gliding joint (4) Saddle joint

Space for Rough Work

137. Select the **incorrect** statement w.r.t. parathyroid glands.
(1) They are present on the back side of the thyroid gland.
(2) They secrete a peptide hormone called parathyroid hormone.
(3) Its hormone stimulates reabsorption of Ca^{2+} by the renal tubules.
(4) It secretes a hypocalcemic hormone.

138. Match column I with column II and select the **correct** option.

	Column I		Column II
(i)	*Salpa*	(a)	Cyclostomata
(ii)	*Chelone*	(b)	Reptilia
(iii)	*Petromyzon*	(c)	Mammalia
(iv)	*Felis*	(d)	Urochordata

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

139. Select the **correct** statement.
(1) Ramachandran plot is used to confirm the structure of DNA.
(2) Adenine and cytosine are purines found in both RNA and DNA.
(3) Sulphur is an integral part of cysteine.
(4) Lecithin is an example of aromatic amino acid.

140. The major part of the skeleton provides structural frame and support to the body in most vertebrate animals and protect the various other organs of the body. It has 'X' type of ground substance. Choose the option which represents 'X' correctly.
(1) Hard and pliable
(2) Soft and non-pliable
(3) Hard and non-pliable
(4) Soft and pliable

141. The chronological order of human evolution from recent to older is
(1) *Homo sapiens* → *Homo erectus* → *Homo habilis* → *Australopithecines* → *Ramapithecus*
(2) *Homo habilis* → *Homo erectus* → *Dryopithecus* → *Ramapithecus*
(3) *Homo sapiens* → *Homo habilis* → *Homo erectus* → *Australopithecines*
(4) Neanderthal man → *Homo habilis* → *Australopithecines* → *Homo erectus*

142. Which of the following are cells of PNS and are involved in the formation of myelin sheath around the axon?
(1) Schwann cells (2) Microglia
(3) Oligodendrocytes (4) Astrocytes

143. Which of the following enzymes is used to cut the DNA at a palindromic sequence?
(1) DNA polymerase (2) Restriction enzyme
(3) DNA ligase (4) Protease

144. Match column I with column II and select the **correct** option.

	Column I		Column II
(a)	AIDS symptoms appear usually	(i)	3-7 days
(b)	Tobacco has been used for more than	(ii)	12-18 years of age
(c)	Common cold lasts for	(iii)	5-10 years after infection
(d)	Adolescence period in humans	(iv)	400 years
		(v)	3-7 weeks

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

Space for Rough Work

145. Read the following statements.

(i) Insulin used for diabetes insipidus was earlier extracted from pancreas of slaughtered cattle and pigs.

(ii) Mature insulin consists of two short polypeptide and one long polypeptide chain : chain A, chain B and chain C.

(iii) In mammals including humans, insulin is synthesised as a pro-hormone.

(iv) Eli Lilly an American company prepared human insulin in 1985.

(v) Insulin from an animal source caused allergy in some patients.

How many of the above statement(s) is/are **correct**?

(1) Five

(2) Three

(3) One

(4) Two

146. **Assertion (A):** Administration of IUDs within 72 hours of unprotected coitus is found very effective as an emergency contraceptive.

Reason (R): IUDs make uterus suitable for implantation.

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

(1) Both (A) and (R) are true and (R) correctly explains (A)

(2) Both (A) and (R) are true but (R) does not correctly explain (A)

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

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

147. Which of the following gets converted into a network of threads by enzyme thrombin?

(1) Active prothrombin

(2) Inactive prothrombin in the plasma

(3) Active fibrin

(4) Inactive fibrinogens present in the plasma

148. Read the following statements A and B w.r.t. humans and choose the **correct** option.

Statement (A): The neural system and endocrine system function in a synchronised fashion.

Statement (B): The increased supply of O_2 necessitates an increase in the rate of respiration.

(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

149. Select the **incorrect** statement.

(1) All recombinants are transformants but all transformants are not recombinants.

(2) The purified DNA precipitates out after the addition of chilled C_2H_5OH.

(3) Restriction enzyme *Eco*RV produces sticky ends.

(4) Plasmids are used for cloning of small fragments of DNA.

150. If a foreign DNA is cut using *Hin*d II at a restriction site, then in order to successfully ligate the desired fragment with the cloning vector, the cloning vector should be cut using

(1) *Bam* HI

(2) *Eco* RI

(3) *Hin*d II

(4) *Cla* I

Space for Rough Work

PHYSICS

SECTION-A

151. Consider the following statements:

Statement (A): Light year is the unit of distance.

Statement (B): Magnitude of any physical quantity is large in the SI system than in the CGS system.

Statement (C): One nanometer is equal to 10^{-6} mm.

Which of the following option is correct?

(1) Statement (A) and statement (B) are correct

(2) Statement (B) and statement (C) are correct

(3) Statement (A) and statement (C) are correct

(4) Statement (A) and statement (B) are incorrect

152. A rod of weight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is

(1) $\frac{Wd}{x}$ (2) $\frac{W(d-x)}{x}$

(3) $\frac{W(d-x)}{d}$ (4) $\frac{Wx}{d}$

153. The approximate depth of an ocean is 2700 m. The compressibility of water is 45.4×10^{-11} Pa^{-1} and its density is 10^3 kg/m^3. What fractional compression of water will be observed at the bottom of the ocean? [Take g = 10 m/s^2]

(1) 1.0×10^{-4} (2) 1.2×10^{-2}

(3) 1.4×10^{-3} (4) 0.8×10^{-12}

154. The value of acceleration due to gravity on moving from equator to poles will

(1) Decrease (2) Increase

(3) Remains same (4) Either (1) or (3)

155. Analogue of mass in rotational motion is

(1) Moment of inertia

(2) Angular momentum

(3) Torque

(4) None of these

156. If plane surface of a plano convex lens of focal length 40 cm is silvered, then new focal length will be

(1) +20 cm

(2) +10 cm

(3) –20 cm

(4) –10 cm

157. In a plane electromagnetic wave propagating in space has a electric field of amplitude 9×10^4 V m^{-1}, then the amplitude of the magnetic field is

(1) 3×10^{-4} T

(2) 3×10^4 T

(3) 3×10^{12} T

(4) 9×10^{-4} T

158. For a real object, which of the following can produce a real image?

(1) Plane mirror

(2) Concave lens

(3) Convex mirror

(4) Concave mirror

159. At what angle should an unpolarised beam be incident on a crystal of $\mu = \sqrt{3}$, so that reflected beam is polarised?

(1) 37°

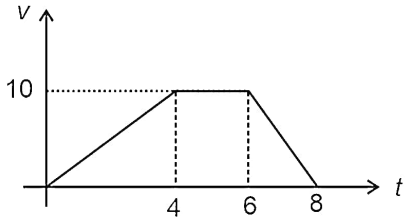
(2) 60°

(3) 30°

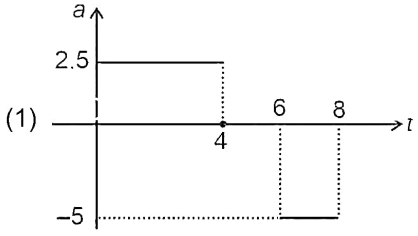
(4) 45°

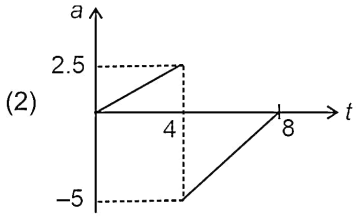
Space for Rough Work

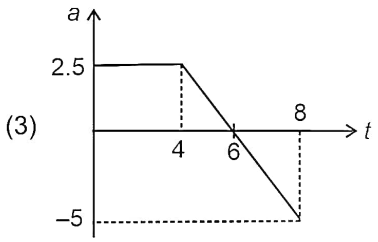
160. The velocity-time graph of a body moving along straight line is shown

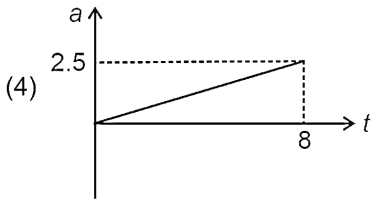


The corresponding acceleration time graph will be

(1)


(2)


(3)


(4)


161. Two particles *A* and *B* are thrown from same point vertically upward with velocity 5 m s^{-1} and 10 m s^{-1} respectively. The separation between them after 1 s is

(1) 5 m (2) 15 m

(3) Zero (4) 10 m

162. A standing man observes rain falling with velocity of 20 m s^{-1} at an angle 30° with the vertical. The velocity with which the man should move so that rain appears to far vertically to him is

(1) $10\sqrt{3}$ m s^{-1} (2) 20 m s^{-1}

(3) 10 m s^{-1} (4) $5\sqrt{3}$ m s^{-1}

163. **Statement 1:** Normal reaction is a pushing force.

Statement 2: Tension in string can push a body.

Based upon the given statements choose the correct answer.

(1) Both statements 1 and 2 are false

(2) Both statements 1 and 2 are true

(3) Statement 1 is true while statement 2 is false

(4) Statement 1 is false while statement 2 is true

164. The average translational kinetic energy of molecules in a sample of oxygen gas at 300 K is 6.21×10^{-21}J. The corresponding value at 600 K is

(1) 12.42×10^{-21} J

(2) 6.21×10^{-21} J

(3) 8.78×10^{-21} J

(4) 7.89×10^{-21} J

165. A spring 2 cm long is stretched by the application of force very slowly. If the force is equal to 10 N when spring is stretched through 1 mm, then total work done in stretching the spring to 2 mm is

(1) 10 mJ (2) 15 mJ

(3) 20 mJ (4) 30 mJ

166. A stationary bomb exploded into two parts of 2 kg and 1 kg. The total kinetic energy after explosion is 2400 J. Then after explosion the

(1) Kinetic energy of 1 kg will be 1600 J

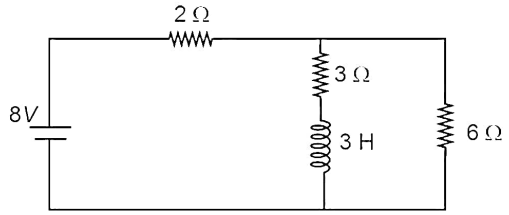
(2) Kinetic energy of 2 kg will be 1200 J

(3) Momentum of 1 kg will be $80\sqrt{2}$ N s

(4) Momentum of 2 kg will be 40 N s

Space for Rough Work

167. In the circuit shown below, energy stored in the inductor at steady state is



(1) $\frac{8}{3}$ J (2) $\frac{4}{3}$ J

(3) $\frac{2}{3}$ J (4) $\frac{1}{3}$ J

168. An alternating current of frequency '*f*' flowing in a circuit containing *R* and capacitor *C* in series. The impedance of the circuit is

(1) $R + \frac{1}{2\pi fC}$ (2) $\sqrt{R^2 + \frac{1}{4\pi^2 f^2 C^2}}$

(3) $\sqrt{R^2 + \frac{1}{C^2}}$ (4) $\sqrt{R^2 + 4\pi f^2 C^2}$

169. The percentage change in internal energy, when a gas is cooled from 927°C to 27°C is

(1) 100% (2) 200%

(3) 75% (4) 300%

170. For an adiabatic expansion, the increase in volume is associated with

(1) Increase in pressure and temperature

(2) Decrease in pressure and temperature

(3) Increase in pressure and decrease in temperature

(4) Decrease in pressure and increase in temperature

171. If surface tension of a detergent solution is 4.8×10^{-2} N/m, then work done in blowing a bubble of 4 cm radius is

(1) 19.29×10^{-4} J (2) 1.9×10^{-6} J

(3) 1.2×10^{-6} J (4) 19.29×10^{-8} J

172. A body cools down from 45° C to 30°C in 30 minutes in the surrounding temperature of 20ºC. The approximate time taken by same body to cool down from 60°C to 50°C will be (Assume newton's law of cooling is valid)

(1) 20 minutes (2) 30 minutes

(3) 10 minutes (4) 60 minutes

173. For a certain metal, incident frequency (ν) is nine times of threshold frequency (ν_0) and the maximum velocity of coming out photoelectrons is 6×10^5 m s^{-1}. If $\nu = 3\nu_0$, the maximum velocity of photoelectrons will be

(1) 2×10^5 m s^{-1}

(2) 8.4×10^5 m s^{-1}

(3) 3×10^5 m s^{-1}

(4) 6.4×10^5 m s^{-1}

174. A nucleus with mass number 200 initially at rest emits an α-particle. If the *Q* value of the reaction is 4.6 MeV, the kinetic energy of the α particle is

(1) 4.8 MeV (2) 5.5 MeV

(3) 4.5 MeV (4) 6.4 MeV

175. The maximum wavelength of electromagnetic radiation, which can create a hole-electron pair in semiconductor. (Given that forbidden energy gap in semiconductor is 0.5 eV)

(1) 2.48×10^{-7} m (2) 2.48×10^{-6} m

(3) 2.48×10^{-8} m (4) 2.48×10^{-9} m

176. **Statement I:** In n-type semiconductor free electrons are majority carriers.

Statement II: n-type semiconductor is negatively charged.

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

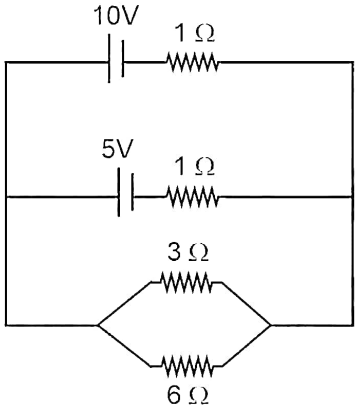
(2) Statement II is correct but statement I is incorrect

(3) Both statements are correct

(4) Both statements are incorrect

Space for Rough Work

177. Current through 3 Ω resistor in the circuit shown is



(1) 2 A (2) 3 A

(3) 0.5 A (4) 1 A

178. Metallic wire of radius 1.5 mm contains 10^{25} free electrons per cubic metre. The drift velocity of free electrons when 5 A current flows through the wire will be

(1) 22.2 cm/s (2) 63.2 cm/s

(3) 94.8 cm/s (4) 44.2 cm/s

179. The shape of magnetic field lines inside a long solenoid carrying steady current is

(1) Straight line (2) Circular

(3) Elliptical (4) Spherical

180. Consider the following statements:

(A) Speed of a charged particle may remain constant in uniform electric field.

(B) Speed of a charged particle must remain constant in magnetic field.

(C) Speed of a charged particle may remain constant in combined electric and magnetic field.

The correct statements is/are

(1) Only (A)

(2) Only (B)

(3) Both (B) and (C)

(4) Both (A) and (C)

181. The magnetic susceptibility is positive for

(1) Ferromagnetic material only

(2) Paramagnetic material only

(3) Diamagnetic material only

(4) Paramagnetic and ferromagnetic materials

182. If the temperature increases, then what happens to the frequency of the sound produced by an organ pipe

(1) Increases

(2) Decreases

(3) Unchanged

(4) Changes erratically

183. The average acceleration in one time period in S.H.M is (symbol have their usual meaning)

(1) $\omega^2 A$ (2) $\frac{\omega^2 A}{2}$

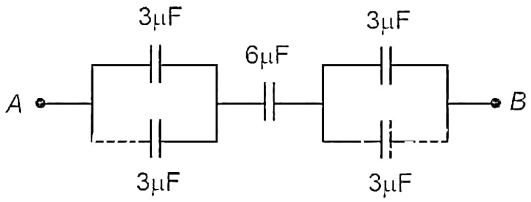
(3) $\frac{\omega^2 A}{\sqrt{2}}$ (4) Zero

184. Electric field due to uniformly charged conducting ring of radius R and having charge Q at its centre will be

(1) $\frac{Q}{4\pi\varepsilon_0 R^2}$ (2) $\frac{3Q}{4\pi\varepsilon_0 R^2}$

(3) $\frac{Q}{2\pi\varepsilon_0 R^2}$ (4) Zero

185. The equivalent capacitance between point A and B in the network below is



(1) 1 μF (2) 3 μF

(3) 2 μF (4) 6 μF

Space for Rough Work

SECTION-B

186. Match the physical quantities given in column-A with the dimensional formula given in column-B and tick the correct option.

	Column-A		Column-B
(A)	Pressure	(P)	$[M^1L^2T^{-2}]$
(B)	Work	(Q)	$[M^1L^2T^{-1}]$
(C)	Angular momentum	(R)	$[M^1L^1T^{-2}]$
(D)	Force	(S)	$[M^1L^{-1}T^{-2}]$

(1) A→ P, B → Q, C → S, D → R

(2) A→ S, B → P, C → Q, D → R

(3) A→ S, B → Q, C → R, D → P

(4) A→ P, B → R, C → S, D → Q

187. A particle of mass 2 kg on a horizontal table moves in a circular path of radius 0.6 m. If the angular speed of the particle is 12 rad s^{-1}, the magnitude of its angular momentum about centre of the circle is

(1) 14.4 kg m^2 s^{-1} (2) 8.64 kg m^2 s^{-1}

(3) 20.16 kg m^2 s^{-1} (4) 11.52 kg m^2 s^{-1}

188. Which of the following is/are not correct statement(s) about Kepler's laws of planetary motion?

I. Kepler's second law is based on law of conservation of angular momentum.

II. Every planet revolves around the sun in circular orbits with sun at the centre of the orbit.

III. Planets situated at larger distances from the sun take longer time to complete one revolution

(1) I only (2) II only

(3) II and III (4) I, II and III

189. Yellow light is used in single slit diffraction experiment with slit width *d*. If yellow light is replaced by red light, then the pattern will reveal

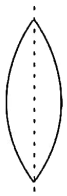
(1) That the central maxima is narrower

(2) Less number of fringes observed on screen

(3) More number of fringes observed on screen

(4) No diffraction patterns

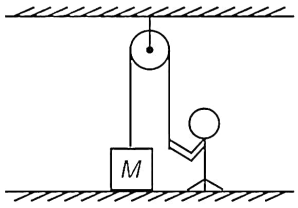
190. A convex lens has a focal length *f*. If it is cut into two parts along the dotted line as shown in the figure, then the focal length of each part will be



(1) $\frac{f}{2}$ (2) f

(3) $2f$ (4) $\frac{3}{2}f$

191. In the given arrangement, a heavy block of mass *M* is at rest on the floor. The minimum acceleration with which boy of mass *m* should climb along the rope of negligible mass so as to lift the block from the floor is



(1) $\left(\frac{M+m}{m}\right)g$ (2) $\left(\frac{M-m}{m}\right)g$

(3) $\left(\frac{M+m}{M}\right)g$ (4) $\left(\frac{M-m}{M}\right)g$

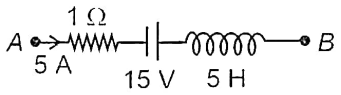
192. A step– down transformer is connected to 2400 V line and 100 ampere of current is found to flow in output load. The ratio of turns in primary and secondary coil is 20 : 1. If the transformer efficiency is 80%, the current flowing in primary coil will be

(1) 5 A (2) 6.25 A

(3) 10 A (4) 12.50 A

Space for Rough Work

193. The network shown in the figure is part of a complete circuit. If at a certain instant current is 5 A and potential difference $V_A - V_B$ is 10 V, then current in the circuit is



(1) Increasing at a rate of 4 A/s

(2) Decreasing at a rate of 4 A/s

(3) Increasing at a rate of 6 A/s

(4) Decreasing at a rate of 6 A/s

194. The speed at which the velocity head of water is equal to 13.6 cm of mercury column is

(1) $136\sqrt{2}$ cm/s

(2) 136 cm/s

(3) $272\sqrt{5}$ cm/s

(4) $1360\sqrt{2}$ cm/s

195. The quantity of heat required to change the unit mass of a solid substance to the liquid state at its melting point is

(1) Latent heat of fusion

(2) Latent heat of vaporisation

(3) Heat capacity

(4) Specific heat

196. According to Bohr's theory, the wave number of last line of Paschen series of hydrogen atom is ($R = 1.1\times10^7$ m^{-1})

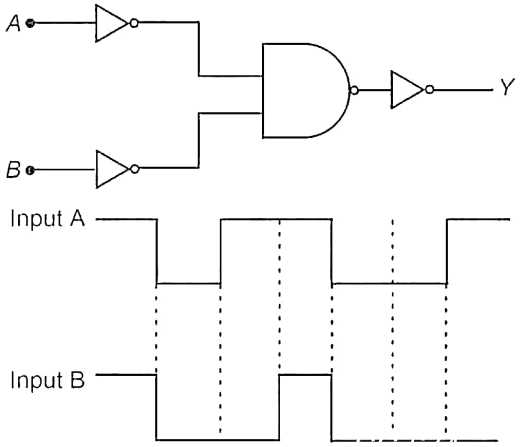
(1) 8.3×10^{-7} m

(2) 1.2×10^6 m^{-1}

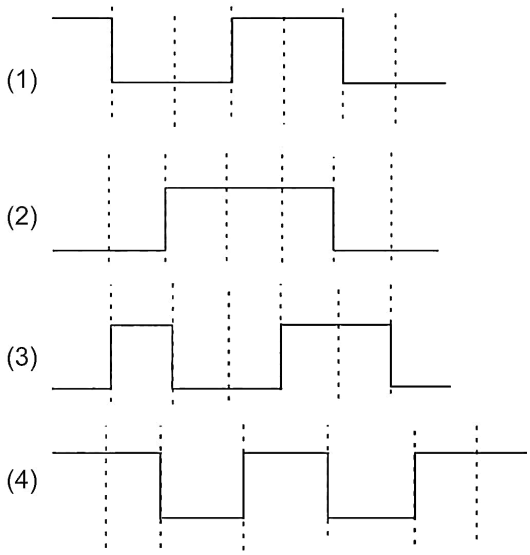
(3) 1.2×10^7 m^{-1}

(4) 8.3×10^{-8} m

197. The logic circuit shown below has the input waveforms *A* and *B* as shown. Pick out the correct output waveform.



Output is



198. A wire of resistance 9 Ω is stretched to make a uniform wire of triple its previous length, then it is bent into a circle. The equivalent resistance between the points on the circle which makes 40° at the centre is

(1) 9 Ω

(2) 8 Ω

(3) 81 Ω

(4) 72 Ω

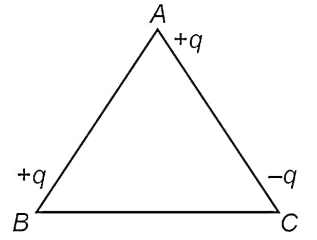
Space for Rough Work

199. The electric potential in a region is given by $V = (4x - 3y + 5z)$ volt. The magnitude of electric field in that region will be

(1) $5\ \frac{N}{C}$ (2) $12\ \frac{N}{C}$

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

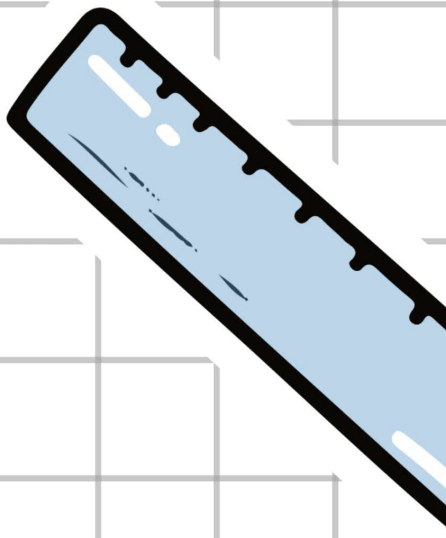
200. Three particles have charge $+q$, $+q$ and $-q$ are placed at the corner of an equilateral triangle of side a. The net electric force on a charge placed at point A will be



(1) $\frac{q^2}{4\pi\varepsilon_0 a^2}$ (2) $\frac{q^2}{2\sqrt{2}\pi\varepsilon_0 a^2}$

(3) $\frac{\sqrt{3}q^2}{4\pi\varepsilon_0 a^2}$ (4) $\frac{q^2}{2\pi\varepsilon_0 a^2}$

Space for Rough Work



AAKASH

Channel :-
@AAKASH_INTENSIVE

TG ID :- @RAJHARSH77