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AIM - 720

(Advanced INTENSIVE Mastery for 720)

CST - 2

Time : 3 Hrs. 20 Mins.

Complete Syllabus of NEET

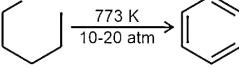
Instructions:

- 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.
- 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.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- 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

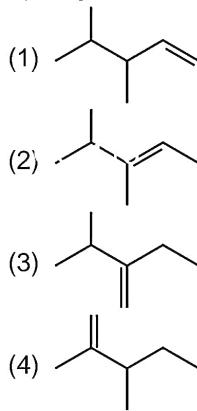
1. Match the reactions given in column I with the catalyst required given in column II.

	Column I		Column II
a.	$2\text{CH}_4 + \text{O}_2 \xrightarrow[100 \text{ atm}]{523\text{ K}} 2\text{CH}_3\text{OH}$	(i)	Mo_2O_3
b.		(ii)	$(\text{CH}_3\text{COO})_2\text{Mn}$
c.	$\text{CH}_4 + \text{H}_2\text{O} \xrightarrow{\Delta} \text{CO} + 3\text{H}_2$	(iii)	Cu
d.	$2\text{CH}_3\text{CH}_3 + 3\text{O}_2 \xrightarrow{\Delta} 2\text{CH}_3\text{COOH} + 2\text{H}_2\text{O}$	(iv)	Ni

The **correct** match is

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

2. For which of the given compounds, the heat of hydrogenation is maximum?



3. Which among the following is a pair of essential amino acids?

- Serine and Cysteine
- Glutamine and Aspartic acid
- Arginine and Lysine
- Proline and Tyrosine

4. Given below are the two statements.

Statement I: Benzylamine is more basic than aniline.

Statement II: In Benzylamine, the lone pair of nitrogen is in resonance with benzene nucleus.

In 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

5. Kjeldahl's method of estimation of nitrogen cannot be used to estimate nitrogen in which of the following compounds?

- (1) Aniline
- (2) Pyridine
- (3) Acetamide
- (4) Acetonitrile

6. Consider the following statements.

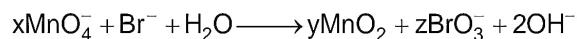
Statement I: The resonance structures are hypothetical and individually do not represent any real molecule.

Statement II: The energy of actual structure of the molecule is more than that of any of the canonical structures.

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

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

7. Consider the given balanced redox reaction:



Coefficients x, y and z respectively are

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

8. Total number of peroxide linkages in CrO_5 is

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

9. Number of molecules present in 2.24 L SO_3 gas at STP is

- (1) 0.1 N_A
- (2) 0.2 N_A
- (3) 0.4 N_A
- (4) N_A

10. Mass of water produced on reaction of 1 g H_2 and 4 g O_2 is

- (1) 5 g
- (2) 4.5 g
- (3) 2.25 g
- (4) 2 g

11. If rate constant of a reaction is $1.1515 \times 10^{-3} \text{ s}^{-1}$ then the time required for the completion of 90% of the reaction will be

- (1) 500 s
- (2) 750 s
- (3) 2000 s
- (4) 2500 s

12. Which among the following is group zero cation?

- (1) Cu^{2+}
- (2) Pb^{2+}
- (3) Zn^{2+}
- (4) NH_4^+

13. Which among the following sulphides has maximum solubility in water?

- (1) PbS
- (2) CuS
- (3) NiS
- (4) As_2S_3

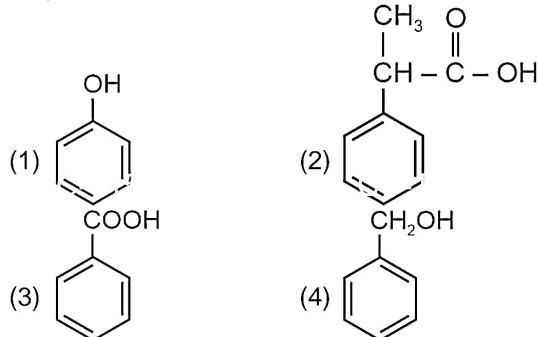
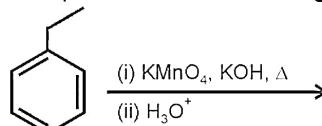
14. Volume of oxygen evolved at anode at STP on electrolysis of water by passing 10 Faraday electricity is

- (1) 22.4 L
- (2) 44.8 L
- (3) 67.2 L
- (4) 56 L

15. Colour of $[\text{Fe}(\text{SCN})]^{2+}$ is

- (1) Yellow
- (2) Blood red
- (3) Green
- (4) Blue

16. The product in the following reaction is

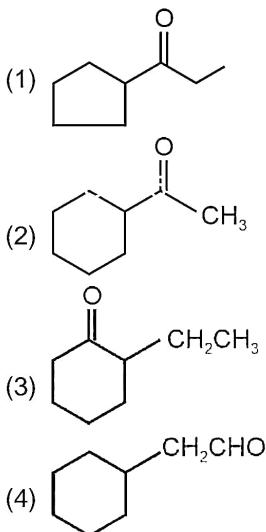


Space for Rough Work

17. Correct order of boiling point of hydrides of group 15 elements is
- $\text{PH}_3 < \text{AsH}_3 < \text{NH}_3 < \text{SbH}_3 < \text{BiH}_3$
 - $\text{BiH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3 < \text{NH}_3$
 - $\text{PH}_3 < \text{NH}_3 < \text{AsH}_3 < \text{SbH}_3 < \text{BiH}_3$
 - $\text{AsH}_3 < \text{PH}_3 < \text{NH}_3 < \text{SbH}_3 < \text{BiH}_3$
18. Consider the following statements
- N_2O is a colourless and neutral gas.
 - Lead nitrate on heating gives N_2O gas.
 - N_2O is a resonance hybrid of two canonical structures.
- The correct statements are
- (a) and (b) only
 - (b) and (c) only
 - (a) and (c) only
 - (a), (b) and (c)
19. The correct order of acidic strength of the following acids is
- $\text{FCH}_2\text{COOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{NO}_2\text{CH}_2\text{COOH} > \text{CF}_3\text{COOH}$
 - $\text{CF}_3\text{COOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{NO}_2\text{CH}_2\text{COOH}$
 - $\text{CF}_3\text{COOH} > \text{NO}_2\text{CH}_2\text{COOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{FCH}_2\text{COOH}$
 - $\text{NC} - \text{CH}_2\text{COOH} > \text{NO}_2\text{CH}_2\text{COOH} > \text{CF}_3\text{COOH} > \text{FCH}_2\text{COOH}$
20. The structure of diborane contains
- Four 2c–2e bonds and two 3c–2e bonds
 - Two 2c–2e bonds and four 3c–2e bonds
 - Two 2c–2e bonds and two 3c–2e bonds
 - Four 2c–2e bonds and four 3c–2e bonds
21. Which among the following is most reactive towards $\text{S}_{\text{N}}2$ reaction?
- $\text{CH}_3\text{CH}_2\text{Cl}$
 - $(\text{CH}_3)_2\text{CH} - \text{Cl}$
 - $(\text{CH}_3)_3\text{CCl}$
 - $\text{CH}_3 - \text{Cl}$
22. Consider the following statements.
- In haloarenes, the electron pairs on halogen atom are in conjugation with π -electrons of the benzene ring.
 - The presence of an electron withdrawing group at ortho and para positions decreases the reactivity of haloarenes towards nucleophilic substitution reaction.
 - In haloarenes, the chlorobenzene does not react via $\text{S}_{\text{N}}1$ mechanism.
- Choose the correct statements.
- (I) and (III) only
 - (II) and (III) only
 - (I), (II) and (III)
 - (I) and (II) only
23. If small amount of helium gas is added to the given reaction at equilibrium at constant pressure then
- $$2\text{NO(g)} + \text{O}_2\text{(g)} \rightleftharpoons 2\text{NO}_2\text{(g)}$$
- Choose the correct option among the following.
- Dissociation of NO_2 increases
 - Formation of NO_2 increases
 - There is no effect on equilibrium
 - Equilibrium constant value increases
24. Among the following which set represents the Lewis acids?
- $\text{HF}, \text{AlCl}_3, \text{CO}_2, \text{NH}_4^+$
 - $\text{BF}_3, \text{SnCl}_4, \text{NH}_4^+, \text{HF}$
 - $\text{BF}_3, \text{AlCl}_3, \text{SO}_3, \text{Mg}^{2+}$
 - $\text{NH}_4^+, \text{SnCl}_4, \text{HF}, \text{SO}_2$
25. Consider the following statements.
- Benzaldehyde when heated with concentrated NaOH gives benzyl alcohol and sodium benzoate as major products
 - Benzaldehyde on reaction with acetophenone in presence of aqueous alkali at 293K gives benzalacetophenone as major product.
 - Trimethylacetaldehyde does not undergo aldol reaction
- The correct statements are
- (a) and (b) only
 - (b) and (c) only
 - (a), (b) and (c)
 - (a) and (c) only

Space for Rough Work

26. An organic compound A with molecular formula $C_8H_{14}O$ gives positive 2, 4-DNP and iodoform tests. It does not reduce Tollens' reagent or Fehling's reagent. On reacting with sodium hypohalite solution followed by hydrolysis it gives carboxylic acid with molecular formula $C_7H_{12}O_2$. What is the structure of organic compound A



27. Correct order of standard enthalpy change for vaporisation for the given substances is

- (1) $NH_3 > H_2O > HCl > N_2$
 (2) $H_2O > NH_3 > HCl > N_2$
 (3) $N_2 > HCl > NH_3 > H_2O$
 (4) $HCl > N_2 > H_2O > NH_3$

28. Correct order of spin only magnetic moment of the given species is

- $[MnCl_6]^{3-}$ $[Fe(CN)_6]^{3-}$ $[FeF_6]^{3-}$
 (i) (ii) (iii)
 (1) (i) > (iii) > (ii) (2) (ii) > (iii) > (i)
 (3) (iii) > (i) > (ii) (4) (iii) > (ii) > (i)

29. The correct decreasing order of size for the given species is

- (1) $Na^+ > Mg^{2+} > F^- > O^{2-}$
 (2) $Mg^{2+} > F^- > O^{2-} > Na^+$
 (3) $O^{2-} > F^- > Na^+ > Mg^{2+}$
 (4) $F^- > O^{2-} > Mg^{2+} > Na^+$

30. If the name of the element according to IUPAC nomenclature is Unnilennium then its atomic number and symbol will be

- (1) 105, Uup (2) 112, Uno
 (3) 108, Uno (4) 109, Une

31. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Graphite conducts electricity along the sheet.

Reason (R): In graphite, the electrons are delocalised over the whole sheet.

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

32. S – O bond order in SO_4^{2-} is

- (1) 1.5 (2) 2
 (3) 3 (4) 2.5

33. Shape of BrF_3 is

- (1) Pyramidal
 (2) Trigonal planar
 (3) Tetrahedral
 (4) Bent T-shaped

34. Which among the following concentration term is independent of temperature?

- (1) (w/w) % (2) (w/V) %
 (3) Normality (4) Molarity

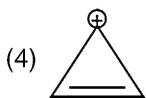
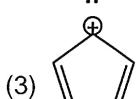
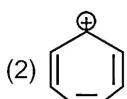
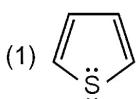
35. 5 g of a non-electrolyte solute is dissolved in 250 g of water. The freezing point of solution is $-0.46^\circ C$. The molar mass of solute (K_f of water = 1.86 K kg mol $^{-1}$) is

- (1) 40 g mol $^{-1}$
 (2) 80 g mol $^{-1}$
 (3) 60 g mol $^{-1}$
 (4) 100 g mol $^{-1}$

Space for Rough Work

SECTION-B

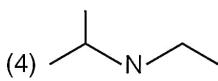
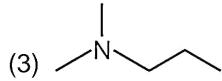
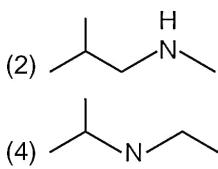
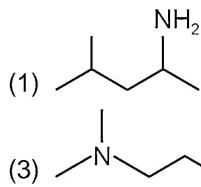
36. Which among the following is not an aromatic species?



37. Cellulose is composed of

- (1) α -D-glucose (2) β -D-glucose
 (3) β -D-galactose (4) β -D-fructose

38. Which among the following compounds give positive isocyanide test?



39. Which one is the wrong statement?

- (1) For $l = 2$ the minimum value of principal quantum number (n) has to be 3.
 (2) Energies of the orbitals in the same subshell increase with increase in the atomic number (Z_{eff}).
 (3) The energy of $2s$ orbital is same as energy of $2p$ orbital in case of hydrogen like atoms.
 (4) The shapes of d_{xy} , d_{yz} , d_{zx} , $d_{x^2-y^2}$ orbitals are similar to each other whereas d_{z^2} is different from others.
40. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Manganate ion is paramagnetic in nature.
Reason (R): Manganate ion contains one unpaired electron.

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

- (1) Both (A) and (R) are true statements and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true statements but (R) is not the correct explanation of (A)
 (3) (A) is false but (R) is true
 (4) (A) is true but (R) is false

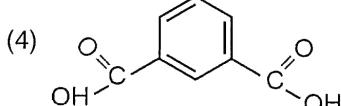
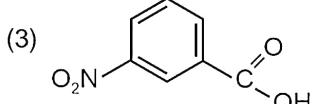
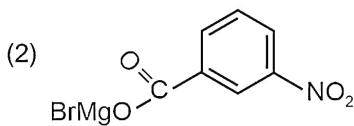
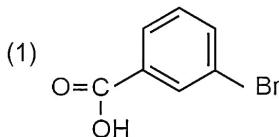
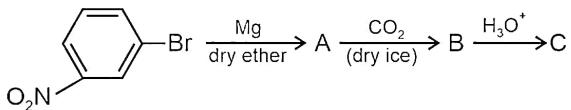
41. Consider the following statements.

- (a) White phosphorus is a translucent, white, waxy solid.
 (b) White phosphorus dissolves in boiling NaOH solution in an inert atmosphere giving PH_3 gas.
 (c) P-P-P bond angle in white phosphorus is 90° .

The correct statements are

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

42. The product 'C' in the following reaction is



Space for Rough Work

43. Which among the following group reagents is used for qualitative analysis of group-IV cations?
- Dilute HCl
 - H_2S gas in presence of dil. HCl
 - H_2S gas in presence of NH_4OH
 - NH_4OH in presence of NH_4Cl
44. Solubility product of AX , AX_2 and AX_3 are 4×10^{-12} , 1.08×10^{-13} and 4.32×10^{-26} respectively. The solubility of these compounds are in the order
- $\text{AX} > \text{AX}_2 > \text{AX}_3$
 - $\text{AX}_3 > \text{AX}_2 > \text{AX}$
 - $\text{AX} > \text{AX}_3 > \text{AX}_2$
 - $\text{AX}_2 > \text{AX} > \text{AX}_3$
45. The enthalpy of combustion of H_2 , benzene and cyclohexane are -200 , -4000 and -4200 kJ per mol respectively. Heat of hydrogenation of benzene is
- -400 kJ per mol
 - 400 kJ per mol
 - 800 kJ per mol
 - -800 kJ per mol
46. Match the metal ions given in column I with the spin magnetic moments of the ions given in column II and assign the correct code.
- | | Column I | | Column II |
|----|------------------|-------|------------------|
| a. | Mn^{3+} | (i) | $\sqrt{8}$ BM |
| b. | Fe^{3+} | (ii) | $\sqrt{15}$ BM |
| c. | Ni^{2+} | (iii) | $\sqrt{35}$ BM |
| d. | Cr^{3+} | (iv) | $\sqrt{24}$ BM |
- (1) a(iv), b(iii), c(i), d(ii) (2) a(iii), b(i), c(ii), d(iv)
 (3) a(ii), b(iii), c(i), d(iv) (4) a(iv), b(iii), c(ii), d(i)
47. Reduction potential of hydrogen electrode in which pressure of H_2 is 1 atm and $[\text{H}^+] = 0.001$ M at 298 K is
- -0.591 V
 - $+0.1773$ V
 - -0.1773 V
 - 0.0591 V

48. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).
- Assertion (A):** $\text{CH}_2 = \text{C} = \text{CH}_2$ is a planar molecule.
- Reason (R):** All C atoms of $\text{CH}_2 = \text{C} = \text{CH}_2$ are sp^2 hybridised.
- In the light of above statement, choose the most appropriate answer from the options given below.
- Both (A) and (R) are true and (R) is correct explanation of (A)
 - Both (A) and (R) are true and (R) is not the correct explanation of (A)
 - (A) is true but (R) is false
 - Both (A) and (R) are false
49. Given below are two statements.
- Statement (I):** $t_{1/2}$ for a zero order reaction is directly proportional to the initial concentration of the reactants.
- Statement (II):** First order reaction never goes to completion.
- In the light of above statements, choose the most appropriate answer from the options given below.
- Statement (I) is correct but statement (II) is incorrect
 - Statement (I) is incorrect but statement (II) is correct
 - Both statement (I) and statement (II) are correct
 - Both statement (I) and statement (II) are incorrect
50. The most stable carbocation among the following is
- $\text{CH}_3 - \text{CH}_2 - \overset{\oplus}{\text{C}}(\text{CH}_3)_2$
 - $(\text{CH}_3)_3 - \text{C} - \overset{\oplus}{\text{CH}} - \text{CH}(\text{CH}_3) - \text{CH}_3$
 - $\text{CH}_3 - \text{CH}_2 - \overset{\oplus}{\text{CH}} - \text{CH}_2 - \text{CH}_3$
 - $\text{CH}_3 - \text{CH}_2 - \overset{\oplus}{\text{CH}}_2$

Space for Rough Work

BOTANY

SECTION-A

51. Vascular tissues of gymnosperms lacks
 - (1) Tracheids
 - (2) Vessels
 - (3) Xylem parenchyma
 - (4) Sieve cells
52. Given below are two statements.
Assertion (A): Stem of monocotyledonous plants, such as grasses, lacks collenchyma.
Reason (R): Mechanical support in leaf petiole and young stem is provided by collenchyma.
 In the light of above statements, choose **correct** answer from options given below:
 - (1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 - (2) Both (A) and (R) are true and (R) is the correct explanation of (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
53. Which of the following plant hormones is composed of terpenes and induces stem elongation in rosette plants?
 - (1) Gibberellin
 - (2) Auxin
 - (3) Cytokinin
 - (4) Abscisic acid
54. Basal part of the angiospermic ovule is represented by
 - (1) Funicle
 - (2) Chalaza
 - (3) Hilum
 - (4) Integument
55. Find the **odd one(s)** out w.r.t. features of insect pollinated flowers.
 - (a) Majorly small sized flowers
 - (b) Non-sticky pollen grain
 - (c) Colourful, fragrant
 - (d) Presence of nectaries
 - (1) (a) and (b)
 - (2) (a) only
 - (3) (b) only
 - (4) (c) and (d)

56. Read the following statements and choose the **correct** option.
Statement A: *Volvox* and *Eudorina* are colonial form of algae while *Spirogyra* and *Ulothrix* are filamentous.
Statement B: Algae reproduce by vegetative, asexual and sexual methods.
 - (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
57. Which of the following alga is unicellular and used as food supplement even by space travellers?
 - (1) *Fucus*
 - (2) *Laminaria*
 - (3) *Macrocystis*
 - (4) *Chlorella*
58. Which of the following statements is **not true**?
 - (1) Puffed up appearance of dough is due to production of CO_2 .
 - (2) LAB play beneficial role in checking disease causing microbes in our stomach.
 - (3) Wine and beer are produced by distillation of fermented broth.
 - (4) Large hole swiss cheese is ripened by a bacterium
59. Which of the following is **correct** match w.r.t. population interaction?

Species A	Species B	Interaction	
(1)	(+)	(0)	Amensalism
(2)	(-)	(0)	Commensalism
(3)	(-)	(-)	Predation
(4)	(+)	(+)	Mutualism
60. Which of the following is **not** a characteristic of an anthropogenic ecosystem?
 - (1) Simple food chain
 - (2) Little diversity
 - (3) High productivity
 - (4) Self-regulatory mechanism

Space for Rough Work

61. Select the option that correctly depicts the sequential steps of DNA fingerprinting.
- Transferring (blotting) of separated DNA fragments to synthetic membranes, such as nitrocellulose or nylon
 - Isolation of DNA
 - Separation of DNA fragments by electrophoresis
 - Digestion of DNA by restriction endonucleases
 - Detection of hybridised DNA fragments by autoradiography
 - Hybridisation using labelled VNTR probe
- b → d → c → a → f → e
 - a → d → b → e → c → f
 - b → e → c → f → d → a
 - c → f → d → a → e → b
62. If a non-sense mutation occurs in the *lac y* gene of *lac* operon, then which of the following consequence is most probably going to be observed?
- There will be a constitutive expression of β -galactosidase
 - Lactose is not going to be catabolized in the cell as it is not able to enter inside the cell
 - Lac a* gene will continue to synthesise transacetylase enzyme
 - Repressor molecule will not be produced
63. Observe the given sequence of coding strand of transcription unit.
 5' – ATGCTCGACCCGAAGGCCACGTAA – 3'
 The mRNA synthesized by this transcription unit will code for how many amino acids?
- 5
 - 6
 - 7
 - 8
64. Which of the following processes is template-dependent?
- Capping of hnRNA
 - Tailing of hnRNA
 - Polymerisation of ribonucleotides by polynucleotide phosphorylase
 - Polymerisation of nucleotides by DNA polymerase
65. Cyclic photophosphorylation differs from non-cyclic photophosphorylation as the former
- Occurs only in thylakoid membrane
 - Occurs under low light intensity, anaerobic conditions or when CO_2 availability is poor
 - Has the output of NADPH and ATP
 - Involves the photosystem that has the reaction centre known as P680
66. Which of the following is the chief photosynthetic pigment in plants?
- Chlorophyll a
 - Chlorophyll b
 - Xanthophylls
 - Carotenoids
67. The subunits of the ribosomes found in mitochondria are
- 60S and 40S
 - 30S and 40S
 - 60S and 30S
 - 50S and 30S
68. Match the Column I and Column II and choose the **correct** option.
- | Column I | Column II |
|-------------------|---|
| A Cristae | (i) Flat membranous tubules |
| B Cisternae | (ii) Infoldings of inner membrane of mitochondria |
| C Thylakoids | (iii) Disc-shaped sac in Golgi apparatus |
| D Stroma lamellae | (iv) Flattened membranous sacs in stroma |
- A-(i), B-(ii), C-(iii), D-(iv)
 - A-(ii), B-(iii), C-(iv), D-(i)
 - A-(ii), B-(i), C-(iv), D-(iii)
 - A-(i), B-(iii), C-(ii), D-(iv)
69. Ends of chromosomes are known as
- Chromomeres
 - Centromeres
 - Telomeres
 - Centrosomes

Space for Rough Work

70. Which of the following events is **not** associated with synthesis phase of cell cycle?
- Chromosome duplication
 - DNA replication
 - Centriole duplication
 - Chloroplast duplication
71. In which of the given stages of M-phase splitting of centromere does not occur but shows poleward movement of chromosomes?
- Anaphase I
 - Mitotic Anaphase
 - Anaphase II
 - Metaphase II
72. Nucleolus, Golgi complex and ER reform during which of the following phases of cell cycle?
- Prophase
 - Metaphase
 - Telophase
 - Anaphase
73. The taxonomic category 'order' of man, mango and potato are respectively
- Primates, Polymoniales and Solanaceae
 - Hominidae, Sapindales and Anacardiaceae
 - Primates, Sapindales and Polymoniales
 - Mammalia, Dicotyledonae and Polymoniales
74. In which of the following organisms cell wall is embedded with silica and thus the walls are indestructible?
- Dinoflagellates
 - Cyanobacteria
 - Euglenoids
 - Diatoms
75. Choose the **wrong** statement.
- Neurospora* is used extensively in biochemical and genetic work.
 - Yeast is unicellular and useful in fermentation.
 - Malaria is caused by a sporozoan.
 - The term '*Contagium vivum fluidum*' was coined by W.M. Stanley.
76. The individual members of the corolla and calyx respectively are called
- Sepals and petals
 - Stamens and stigma
 - Petals and sepals
 - Pedicel and petiole
77. Which of the following pairs are **correctly** matched?
- (a) Staminode – Involved in microsporogenesis
 - (b) Epipetalous – Stamens attached to calyx
 - (c) Polyandrous – Free stamens
 - (d) Anther – Usually bilobed
- (1) (a), (b) and (c) (2) (b), (c) and (d)
 - (3) Only (a) and (b) (4) Only (c) and (d)
78. In brinjal the flowers are
- Actinomorphic, epigynous with valvate aestivation in both calyx and corolla.
 - Zygomorphic, hypogynous with imbricate aestivation in calyx.
 - Actinomorphic, epigynous with valvate and twisted aestivation in calyx and corolla respectively.
 - Actinomorphic, hypogynous with valvate aestivation in both calyx and corolla.
79. Mendel conducted hybridisation experiments on garden pea plants
- During mid-eighteenth century
 - For seven years
 - From 1856–1863
 - Because these plants have many distinct alternative traits
- The **correct** ones are
- Only (ii) and (iv)
 - (i), (ii) and (iii)
 - (ii), (iii) and (iv)
 - Only (iii) and (iv)
80. Experimental verification of the chromosomal theory of inheritance was given by
- Walter Sutton
 - Thomas Hunt Morgan
 - Theodore Boveri
 - Von Tschermark
81. Which among the following is **not** released/formed during the process of glycolysis?
- Water
 - NADH + H⁺
 - ATP
 - Carbon dioxide

Space for Rough Work

82. Match the Column I with Column II and choose the **correct** option.

	Column I		Column II
A.	Phenylketonuria	i.	Sex linked recessive disorder
B.	Colour blindness	ii.	Result of aneuploidy
C.	Turner's syndrome	iii.	Autosomal dominant trait
D.	Myotonic dystrophy	iv.	Autosomal recessive trait

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

83. The historic convention in 1992 on Biological Diversity (The Earth summit) was held in

 - Sri Lanka
 - South Africa
 - Johannesburg
 - Rio de Janeiro

84. Which among the following shows the **correct** representation of species diversity of birds among different countries?

 - New York < Greenland
 - Columbia > India
 - Greenland > Columbia
 - India < New York

85. Select the rules proposed by Mendel, based on his observations on monohybrid cross.

 - Law of Segregation
 - Law of Dominance
 - Law of Independent Assortment

The **correct** one(s) is/are

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

SECTION-B

86. Select the **incorrect** statement(s) regarding secondary growth in dicot stem and choose the option accordingly.

 - (a) Generally cambium ring is more active on the outer side than on the inner side.
 - (b) Primary xylem remains more or less intact in or around the centre.
 - (c) Primary and secondary phloem get gradually crushed.
 - (d) Secondary medullary rays are narrow band of sclerenchyma that passes through secondary xylem and phloem in radial direction.
 - (e) Only the stelar region constitute the bark.
 - (1) (a), (d) and (e)
 - (2) (b) and (e)
 - (3) (a) only
 - (4) (b), (c) and (d)

- 87. Match List I with List II.**

List I (PGR)	List II (Composition)
a. Abscisic acid	i. Indole compound
b. Auxin	ii. Adenine derivative
c. Ethylene	iii. Carotenoid derivative
d. Kinetin	iv. Gaseous PGR

Select the **correct** option.

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

88. State true (**T**) or false (**F**) for the given statements w.r.t. angiosperms.

 - (a) Endosperm development precedes embryo development.
 - (b) Generally endosperm is a triploid tissue develops from central cell of embryo sac.
 - (c) Endosperm persists in mature seeds of pea and beans.

Space for Rough Work

- (d) During cellular endosperm formation multiple division occur in primary endosperm nucleus but each division is not followed by wall formation.

Select the **correct** option.

(a) (b) (c) (d)

- (1) T T F F
- (2) F T F F
- (3) F T T T
- (4) F F T T

89. How many of the following algae have floridean starch as stored food?

- | | |
|----------------------|--------------------|
| a. <i>Eudorina</i> | b. <i>Chara</i> |
| c. <i>Volvox</i> | d. <i>Gelidium</i> |
| e. <i>Gracilaria</i> | f. <i>Porphyra</i> |
| g. <i>Laminaria</i> | |
| (1) Two | (2) Three |
| (3) Five | (4) Four |

90. (A) is used as immunosuppressive agent in organ transplant patients and produced by the fungus (B).

Select the option to fill (A) and (B) correctly.

- (1) Statin, *Monascus purpureus*
- (2) Cyclosporin A, *Trichoderma polysporum*
- (3) Lipase, *Aspergillus*
- (4) Pectinase, *Lactobacillus*

91. Interaction between fig and fig wasp represents

- (1) Commensalism
- (2) Proto-cooperation
- (3) Mutualism
- (4) Amensalism

92. Which one of the following is **not** the key functional aspects of an ecosystem?

- (1) Nutrient cycling
- (2) Productivity
- (3) Energy flow
- (4) Stratification

93. Which of the following RNA is transcribed by RNA polymerase II?

- (1) tRNA
- (2) rRNA
- (3) hnRNA
- (4) snRNA

94. Which of the following scientists gave the unequivocal proof that DNA is the genetic material?

- (1) Griffith
- (2) Meselson and Stahl
- (3) Taylor
- (4) Hershey and Chase

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

Statement A: Meiosis occurs in the diploid cells which are destined to form gametes.

Statement B: Gametic chromosome number becomes half of the mother cell by mitotic division.

- (1) Both the statements are correct
- (2) Both the statements are incorrect
- (3) Only statement A is correct
- (4) Only statement B is correct

96. Which of the following feature is **not true** w.r.t. cell wall?

- (1) Gives shape to the cell
- (2) Protects the cell from mechanical damage
- (3) Helps in cell to cell interaction
- (4) Helps in transport of the molecules inside the cell

97. Consider the following statements (a-e) regarding the characteristics of different organisms.

- a. *Trypanosoma* cause diseases such as sleeping sickness.
- b. Mycoplasma can pass through bacteriological filters and have cell wall.
- c. Basidiomycetes are arranged in fruiting bodies called basidiocarps.
- d. *Nostoc* is a filamentous blue-green alga which fixes atmospheric nitrogen in specialised cell called heterocyst.

Space for Rough Work

- e. Insectivorous plants such as Venus fly trap have chlorophyll.
- The **correct** statements are
- (1) Only c and d
 - (2) a, b, c and e
 - (3) a, c, d and e
 - (4) Only a, b and e
98. How many plants in the list given below have axile placentation?
- Mustard, Primrose, Lemon, Tulip, Asparagus, Argemone, Dianthus, Chilli, Colchicum, Onion, Marigold, Pea, Tobacco
- (1) Four
 - (2) Five
 - (3) Seven
 - (4) Six
99. Choose the **incorrect** match.
- (1) NADH dehydrogenase – Transfers protons from matrix of mitochondria to inter membrane space.

- (2) Cytochrome c – Acts as a mobile carrier for transfer of electrons.
- (3) Ubiquinone – Receives electrons from complex I and complex III
- (4) Complex IV of ETS – Contains two copper centres

100. Read the following Assertion (A) and Reason (R) and choose the **correct** option.

Assertion (A) : There is a reduced synthesis of α -globin chain of haemoglobin in the individuals affected with α -thalassemia.

Reason (R) : It is an autosome linked recessive blood disease which could be transmitted from unaffected carrier parents to their offspring.

- (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

ZOOLOGY

SECTION-A

101. The most abundant and widely distributed tissue in the body of complex animals is
- (1) Epithelial tissue (2) Connective tissue
 - (3) Muscular tissue (4) Neural tissue
102. Based on the hypothesis proposed by Oparin and Haldane, S.L. Miller provided an experimental evidence of the chemical evolution. He observed the formation of
- (1) Sugars (2) Fats
 - (3) Amino acids (4) Pigments
103. Choose the **incorrect** statement.
- (1) The geological history of Earth closely correlates with the biological history of Earth.
 - (2) All the existing life forms share similarities and share common ancestors.

- (3) After 50 million years of formation of Earth, life appeared on this planet.
- (4) The first cellular forms of life appeared on Earth about 2000 million years ago.

104. In frog, the undigested waste passes out of the body through
- (1) Anus
 - (2) Skin
 - (3) Caecum
 - (4) Cloaca
105. Which among the following recognition sequences can be acted upon by a restriction endonuclease?
- (1) 5' G A T T C G 3' (2) 5' G T C G A C 3'
 - 3' C T A A G C 5' 3' C A G C T G 5'
 - (3) 5' G T A C T T 3' (4) 5' G A T C A G 3'
 - 3' C A T G A A 5' 3' C T A G T C 5'

Space for Rough Work

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106. Early detection of diseases is not possible by
 (1) ELISA and RDT
 (2) PCR and RDT
 (3) PCR and ELISA
 (4) Serum and urine analysis

107. Match Column I with Column II and select the correct option w.r.t. total number of bones present in an adult human.

	Column I		Column II
(a)	Cranial bones	(i)	14
(b)	Facial bones	(ii)	29
(c)	Skull bones	(iii)	8
(d)	Ribs	(iv)	24

- (1) (a) – (ii), (b) – (iii), (c) – (i), (d) – (iv)
 (2) (a) – (iii), (b) – (ii), (c) – (i), (d) – (iv)
 (3) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)
 (4) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)
108. Which among the following was a flying reptile?

- (1) *Stegosaurus*
- (2) *Brachiosaurus*
- (3) *Pteranodon*
- (4) *Triceratops*

109. The endocrine system provides

- (1) Point-to-point connections for a quick coordination
- (2) Chemical integration through hormones
- (3) An organised network through arterial blood only
- (4) An isolated system to coordinate all the activities of organs

110. Which of the following is associated with the first heart sound?
- (1) Closure of the semilunar valves
 - (2) Opening of the bicuspid and tricuspid valves
 - (3) Opening of the semilunar and mitral valves
 - (4) Closure of the bicuspid and tricuspid valves

111. Cellular respiration produces a gaseous waste product which is removed by the lungs. What is the amount of this gas removed in one hour in an adult man under normal physiological conditions?

- (1) 1200 mL
- (2) 12000 mL
- (3) 18000 mL
- (4) 2000 mL

112. Select the correct option w.r.t. the chambers present in the heart of *Salamandra*.

- (1) Two-chambered heart with an atrium and a single ventricle
- (2) Three-chambered heart with two atria and a single ventricle
- (3) Four-chambered heart with two atria and two ventricles
- (4) Three-chambered heart with an atrium and two ventricles

113. Comprehend the statements A and B and select the **correct** option.

Statement A: In humans, blood is a fluid connective tissue containing plasma, red blood cells (RBCs), fibroblasts, white blood cells (WBCs) and platelets.

Statement B: Blood is the main circulating fluid that helps in the transport of various substances.

- (1) Both statements A and B are correct
- (2) Only statement B is correct
- (3) Statement A is correct and B is incorrect
- (4) Both statements A and B are incorrect

114. The same type of movement assists in the maintenance of water current in the canal system of *Sycon* and

- (1) Swimming of human spermatozoa
- (2) Movement of leucocytes in blood
- (3) Passage of ova through the female reproductive tract
- (4) Removal of dust particles from trachea

Space for Rough Work

115. Consider the statements A, B and C and select the **correct** option.
- Animals that have had their genetic material manipulated to possess and express an extra (foreign) gene are known as transgenic animals.
 - Transgenic animals can be specifically designed to allow the study of how genes are regulated and how they affect the normal functions of the body.
 - Over 95% of all existing transgenic animals are pigs and monkeys.
- Both statements B and C are correct
 - Both statements A and C are correct
 - Only statement C is correct
 - Both statements A and B are correct
116. All of the following lead to decrease in maternal and infant mortality rates, **except**
- Better awareness about sex related matters
 - Better post-natal care
 - Decreased numbers of medically assisted deliveries
 - Better detection and cure of STDs
117. Select the odd one among the following w.r.t. marine habitat.
- | | |
|--------------------|----------------------|
| (1) <i>Adamsia</i> | (2) <i>Spongilla</i> |
| (3) <i>Nereis</i> | (4) <i>Antedon</i> |
118. In a normal human female, formation of the blastocyst is usually followed by
- Formation of zygote
 - Development of zygote into embryo
 - Its attachment and implantation in the wall of oviduct
 - Its embedding in the endometrium
119. Match Column I and Column II and select the **correct** option.
- | | Column I | | Column II |
|-----|-----------------------|-------|--------------------|
| (a) | Growth hormone | (i) | Diabetes mellitus |
| (b) | Thyroxine | (ii) | Cretinism |
| (c) | Anti-diuretic hormone | (iii) | Acromegaly |
| (d) | Insulin | (iv) | Diabetes insipidus |
- (1) (a) – (iii), (b) – (i), (c) – (iv), (d) – (ii)
(2) (a) – (iii), (b) – (ii), (c) – (iv), (d) – (i)
(3) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)
(4) (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)
120. Choose the correct sequence of different cells involved in spermatogenesis in humans.
- Male germ cells → Primary spermatocytes → Spermatids → Secondary spermatocytes → Sperms
 - Spermatogonia → Primary spermatocytes → Spermatids → Secondary spermatocytes → Sperms
 - Spermatogonia → Primary spermatocytes → Secondary spermatocytes → Spermatids → Sperms
 - Primary spermatocytes → Secondary spermatocytes → Spermatids → Male germ cells
121. The sequence in pBR322 that initiates replication is also responsible for
- Directly injecting the foreign DNA into the host
 - Controlling the copy number of linked DNA
 - Providing the resistance against ampicillin
 - Selectively permitting the growth of transformants
122. A host cell can be made competent to take up a rDNA by treating with
- Trichloroacetic acid
 - Divalent calcium cation
 - Divalent sulphate anion
 - Heat shock at 42°C

Space for Rough Work

123. Select the **incorrect** match.

- | | |
|--------------------|----------------------------------|
| (1) Poriferans | – Commonly known as sponges |
| (2) Cnidarians | – Presence of cnidoblasts |
| (3) Ctenophores | – Reproduce via binary fission |
| (4) Platyhelminths | – Dorso-ventrally flattened body |

124. All of the following are considered advantages of amniocentesis in India, **except**

- (1) Detection of genetic disorders
- (2) Determination of the survival chances of the foetus
- (3) Detection of congenital diseases
- (4) Determination of the sex of foetus

125. Read the following carefully.

- (i) Organic compounds
- (ii) Tightly bound to the apoenzyme
- (iii) NADP is one of its example
- (iv) Forms coordination bonds with side chains at the active site

How many of the above is/are true for a prosthetic group?

- | | |
|----------|-----------|
| (1) One | (2) Three |
| (3) Four | (4) Two |

126. Select the component whose per cent of the total cellular mass is more than lipids but less than nucleic acids.

- | | |
|--------------|-------------------|
| (1) Water | (2) Ions |
| (3) Proteins | (4) Carbohydrates |

127. Which among the following structures is not associated with abdomen of cockroaches?

- (1) Genital pouch
- (2) Tegmina

- (3) Gonapophysis
- (4) Anal cerci

128. Foetal ejection reflex is induced by

- (1) Delivery of foetus
- (2) Oxytocin released by foetal adenohypophysis
- (3) Oxytocin released by maternal pars distalis
- (4) Fully developed foetus and placenta

129. **Assertion (A):** In gel electrophoresis, DNA fragments move towards anode under the effect of an electric field through a medium.

Reason (R): DNA fragments are negatively charged molecules.

In the light of above statements, select the **correct** 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, (R) is false
- (4) (A) is false, (R) is true

130. 'X' has the ability to replicate within bacterial cells independent of the control of genomic DNA. Here 'X' can be

- (a) Plasmid
- (b) Chromosomal DNA
- (c) Bacteriophage

Select the **correct** option.

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

131. The maximum volume of air a person can breathe in after a forced expiration can be represented as

- (1) FRC + EC – RV
- (2) IC + FRC – RV
- (3) IC + FRC
- (4) TV + IC + RV – FRC

Space for Rough Work

132. Which of the following statements is not **incorrect** w.r.t. the enzyme catalysing the breakdown and formation of carbonic acid?
- Mg^{+2} is the co-factor of this enzyme
 - The enzyme accelerates the reaction rate by about 100 million times
 - RBCs contain a very less concentration of this enzyme
 - At the tissue site, this enzyme facilitates the reaction to proceed in forward direction
133. Unmyelinated nerve fibres are
- Enclosed by Schwann cells
 - Found only in cranial and spinal nerves
 - Not found in sympathetic neural system
 - Characterised by the presence of nodes of Ranvier
134. The infectious stage of *Plasmodium* that enters the human body is
- Female gametocyte
 - Male gametocyte
 - Trophozoite
 - Sporozoite
135. Which of the following is one of the most dreaded non- infectious disease?
- Cancer
 - Polio
 - Diphtheria
 - Pneumonia
- SECTION – B**
136. Select the **incorrect** statement.
- A competitive inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme.
 - Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys the enzymatic activity.
 - Competitive inhibitors are often used in the control of bacterial pathogens.
 - Enzymes are divided into 4 classes each with 4 – 13 subclasses and names accordingly by a six digit number.
137. Select the pair of antagonistic hormones.
- Thyroxine and Thyrocalcitonin
 - Thyrocalcitonin and PTH
 - Insulin and ADH
 - Thymosin and Thyroxine
138. Choose the correct option to complete the analogy.
- Genetic disorder : Down's syndrome :: Sexually transmitted infection : _____
- Sickle-cell anemia
 - AIDS
 - Haemophilia
 - Cancer
139. In the year 1900, the world population was around
- 1000 million
 - 200 million
 - 2000 million
 - 350 million
140. ELISA is based on the principle of
- Antigen – Antibody interaction
 - Antigen – Antigen interaction
 - Antibody – Antibody interaction
 - Antibody – Interferon interaction
141. ATP binding sites are present on
- Light meromyosin
 - Head of heavy meromyosin
 - Short arm of heavy meromyosin
 - A subunit of troponin
142. Select the **correct** option w.r.t. thorn of *Bougainvillea* and tendril of *Cucurbita*.
- Represent convergent evolution
 - Indicate common ancestry
 - Represent analogous organs
 - Both perform same function

Space for Rough Work

143. How many cells given in the box below are phagocytic in nature?

Fibroblasts,	RBCs,	Monocytes,
Thrombocytes, Neutrophils, Macrophages		

Choose the **correct** option.

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

144. **Assertion (A):** Breast-feeding during the initial period of infant growth is recommended by doctors for bringing up a healthy baby.

Reason (R): Milk produced by mother contains several antibodies absolutely essential to develop resistance for the new-born babies.

In the light of 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) Both (A) and (R) are true but (R) is the not correct explanation of (A)
- (3) (A) is true, (R) is false
- (4) Both (A) and (R) are false

145. Select the **correct** match.

- | | |
|---------------------------|---------------|
| (1) Cytokine barrier | – PMNLs |
| (2) Physiological barrier | – Interferons |
| (3) Physical barrier | – Tears |
| (4) Cellular barrier | – Macrophages |

146. In frogs, which type of respiration occurs during aestivation and hibernation?

- (1) Branchial respiration
- (2) Cutaneous respiration
- (3) Pulmonary respiration
- (4) Buccopharyngeal respiration

147. _____ may be attributed to allergic reaction due to the increased activity of mast cells in the lungs. Select the correct option that fills the blank.

- (1) Emphysema
- (2) Respiratory acidosis
- (3) Silicosis
- (4) Asthma

148. Activation of chemoreceptors due to an excessive loss of fluid from the body stimulates the hypothalamus and the release of a hormone from

- (1) Pars distalis
- (2) Pars nervosa
- (3) Pars intermedia
- (4) Adenohypophysis

149. Highly specialized cells called neurons can detect, receive and transmit different kinds of stimuli. Select the organism in which neural organisation is composed of network of neurons without brain.

- (1) *Hirudinaria*
- (2) *Hippocampus*
- (3) *Hydra*
- (4) *Hyla*

150. In 'A', notochord is present only in larval tail, while in 'B', it extends from head to tail region and is persistent throughout their life. Choose the correct option that fills the blanks.

	A	B
(1)	Urochordata	Cephalochordata
(2)	Cephalochordata	Urochordata
(3)	Cephalochordata	Cyclostomata
(4)	Cyclostomata	Urochordata

Space for Rough Work

PHYSICS

SECTION-A

151. All components of the electromagnetic spectrum in vacuum have the same

 - Frequency
 - Energy
 - Wavelength
 - Velocity

152. The focal length of a convex lens of refractive index $\frac{3}{2}$ is 20 cm in air. Focal length of this lens when immersed in a liquid of refractive index of $\frac{5}{2}$ will be

 - + 50 cm
 - 25 cm
 - + 25 cm
 - 50 cm

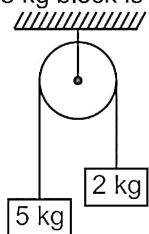
153. Three prisms A, B and C have the prism angle 6° but their refractive indices are respectively 1.4, 1.6 and 1.8. If δ_1 , δ_2 , δ_3 be their respective angles of deviation then

 - $\delta_1 > \delta_2 > \delta_3$
 - $\delta_1 < \delta_2 > \delta_3$
 - $\delta_1 < \delta_2 < \delta_3$
 - $\delta_1 = \delta_2 > \delta_3$

154. In Young's double slit experiment distance between slits is 1 mm and distance between the screen and source is 1 m. If the fringe width obtained on the screen is 0.02 cm, then wavelength of light used is

 - 4000 nm
 - 1000 Å
 - 4000 Å
 - 2000 Å

155. The unequal masses of 5 kg and 2 kg are connected by an inextensible light string passing



- (1) g (2) $\frac{7g}{3}$
 (3) $\frac{3g}{7}$ (4) $\frac{2g}{7}$

156. In uniform circular motion the speed of particle is 4 m/s and radius of circle is 4 m, then the value of tangential and centripetal acceleration respectively are

 - (1) 0, 0
 - (2) 0, 4 m/s^2
 - (3) 4 m/s^2 , 4 m/s^2
 - (4) 4 m/s^2 , 2 m/s^2

157. A stone is dropped from the top of a building. If it covers $\frac{5}{9}$ th of its total height in the last second of its journey, then the total time of fall is

 - (1) 1.5 s
 - (2) 3 s
 - (3) 2 s
 - (4) 2.5 s

158. When a particle is moving with variable acceleration then its speed

 - (1) Always increases
 - (2) Always decreases
 - (3) May remain constant
 - (4) Must remain constant

159. The translational kinetic energy of n moles of a monoatomic gas at absolute temperature T is given by (where symbols have their usual meaning)

 - (1) $\frac{3}{2} n k_B T$
 - (2) $\frac{3}{2} RT$
 - (3) $\frac{3}{2} nRT$
 - (4) $\frac{5}{2} nRT$

160. A constant torque of 10 N m acts on an object which makes it rotate at 4 rad/s. The instantaneous power delivered to the object will be

 - (1) 10 W
 - (2) 20 W
 - (3) 35 W
 - (4) 40 W

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161. The CGS unit of radius of gyration is

- (1) m
- (2) cm
- (3) kg m²
- (4) g cm²

162. Consider the following statements and choose the **correct** option.

- (i) A malleable material has a larger plastic region.
- (ii) A body deformed within its elastic limit regains its shape after removal of deforming forces.
- (1) Only (i) is correct
- (2) Only (ii) is correct
- (3) Both (i) and (ii) are correct
- (4) Both (i) and (ii) are incorrect

163. Which of the following statement is correct regarding acceleration due to gravity?

- (1) Its value decreases with depth from earth's surface
- (2) Its value increases with height from earth's surface
- (3) Its value increases due to effect of rotation of earth
- (4) Its value becomes zero at a height equal to radius of earth

164. Which of the following quantity is dimensionless?

- (1) Relative velocity
- (2) Gravitational constant
- (3) Relative density
- (4) Both (1) & (3)

165. The work function of a photosensitive material is 2.48 eV. The longest wavelength of light that can cause photon emission from the substance is (approximately)

- (1) 5000 nm
- (2) 500 nm
- (3) 50 nm
- (4) 50000 nm

166. Read the following statements and select the **correct** option.

Assertion : In nuclear fission process, energy is released.

Reason : When a nucleus is broken into two or more parts then this process is called nuclear fission.

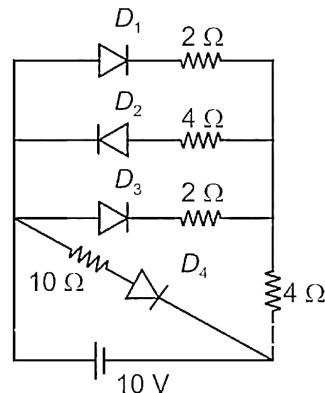
Choose the correct answer

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
- (3) Assertion is true but Reason is false
- (4) Both Assertion and Reason are false

167. When aluminium is added as an impurity to silicon, the resulting material is

- (1) p-type semiconductor
- (2) n-type semiconductor
- (3) Intrinsic semiconductor
- (4) May be p-type or n-type depending upon doping concentration

168. In the given circuit, the current through the battery is



- (1) 5 A
- (2) 10 A
- (3) 3 A
- (4) 2 A

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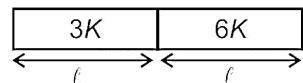
177. When the frequency of AC voltage applied to series LCR circuit is gradually increased from zero to infinity, then peak current in the circuit

- (1) Monotonically increases
- (2) First increases then decreases
- (3) First decreases then increases
- (4) Monotonically decreases

178. If a liquid wets a solid, then the angle of contact may be

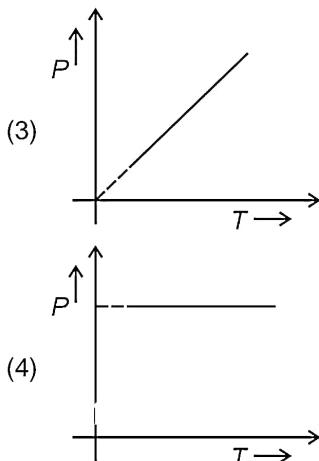
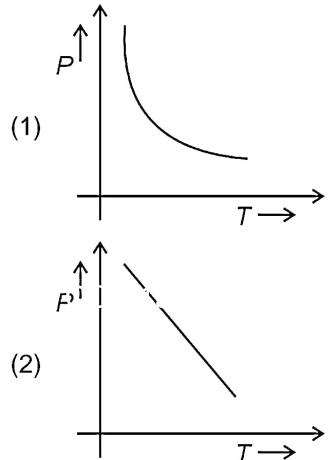
- | | |
|-----------------|----------------------|
| (1) 30° | (2) 120° |
| (3) 100° | (4) Both (2) and (3) |

179. Two equally long rods having same cross-sectional area joined together. The equivalent thermal conductivity for the combination is

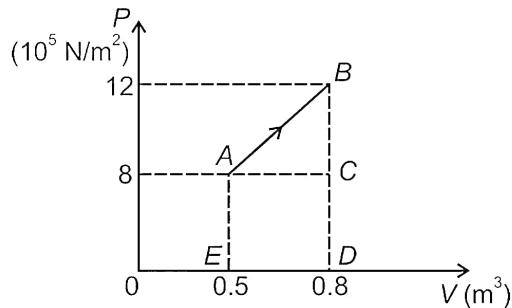


- (1) $4K$
- (2) $3K$
- (3) $6K$
- (4) $5K$

180. Choose the correct curve representing variation of pressure and temperature of an ideal gas for an isochoric process



181. The pressure of one mole monoatomic gas increases linearly from $8 \times 10^5 \text{ N/m}^2$ to $12 \times 10^5 \text{ N/m}^2$ when its volume increases from 0.5 m^3 to 0.8 m^3 . Calculate the work done by the gas



- (1) $6 \times 10^4 \text{ J}$
- (2) $3 \times 10^5 \text{ J}$
- (3) $5 \times 10^5 \text{ J}$
- (4) $8 \times 10^5 \text{ J}$

182. The quantity which do not vary periodically in S.H.M is

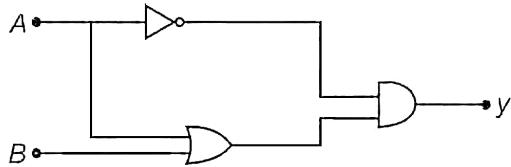
- (1) Displacement
- (2) Acceleration
- (3) Total energy
- (4) Velocity

183. A stretched string of length 3 m vibrates in 6 segments. The distance between adjacent node and antinode will be

- (1) 0.5 m
- (2) 0.25 m
- (3) 1 m
- (4) 1.5 m

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193. In the figure shown, if $A = 0$ and $B = 1$ then y will be



194. At a depth of 2000 m in an ocean the gauge pressure (if density of sea water is 1.03×10^3 kg/m 3 and g = 10 m/s 2) is nearly

[$10^5 \text{ Pa} = 1 \text{ atm}$]

- (1) 206 atm
 - (2) 120 atm
 - (3) 140 atm
 - (4) 406 atm

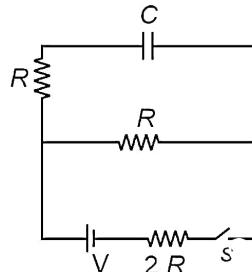
195. Column A contains coefficient of expansion and column B contains the expression between coefficient of expansion and change in temperature.

Match column A and column B and choose the correct option. (Symbols have usual meaning)

	Column A		Column B
a.	Coefficient of linear expansion	(p)	$\gamma = \frac{\Delta V}{V_0 \Delta T}$
b.	Coefficient of superficial expansion	(q)	$\alpha = \frac{\Delta L}{L_0 \Delta T}$
c.	Coefficient of volumetric expansion	(r)	$\beta = \frac{\Delta A}{A_0 \Delta T}$

- (1) $a - p, b - q, c - r$
 - (2) $a - r, b - p, c - q$
 - (3) $a - q, b - p, c - r$
 - (4) $a - q, b - r, c - p$

196. In the circuit shown, the battery is ideal. The switch is closed at time $t = 0$ then after a long time, the charge on the capacitor and current through the battery respectively are



- (1) $\frac{CV}{3}, \frac{V}{R}$
 - (2) $\frac{2CV}{3}, \frac{V}{3R}$
 - (3) $\frac{2CV}{3}, \frac{V}{R}$
 - (4) $\frac{CV}{3}, \frac{V}{3R}$

197. An infinite non-conducting sheet has a surface charge density $\sigma = 0.4 \mu\text{C/m}^2$ on one side. How far apart are equipotential surface whose potential differ by 100 volt ?

- (1) 8.8 mm (2) 4.4 cm
 (3) 4.4 mm (4) 6.6 mm

198. A point Q lies on the perpendicular bisector of an electric dipole of dipole moment P . If the distance of Q from the dipole is r (much larger than the size of the dipole), then electric field at Q is proportional to

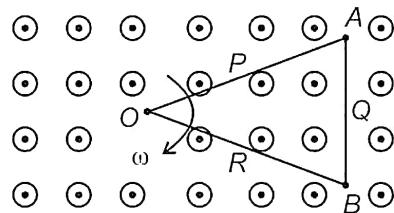
- (1) P and r^{-3}
 - (2) P^{-1} and r^2
 - (3) P and r^2
 - (4) P^2 and r^{-3}

Space for Rough Work

199. For a step up transformer, the turns ratio is 10 and its efficiency is 0.8. The current flowing in the primary coil is 2 A and voltage applied to it is 100 V. Then the voltage and the current flowing in the secondary coil respectively are
- (1) 10 V, 16 A
 - (2) 1 V, 1.6 A
 - (3) 1000 V, 1.6 A
 - (4) 1000 V, 0.16 A

200. Three rods P , Q and R of equal length are joined to form a equilateral triangle of side L . The rods P and Q are made of copper while R is made of wood. This combination is rotated in horizontal plane about an axis passing through one of the corner and perpendicular to plane with angular

speed ω as shown. A constant magnetic field B exist perpendicular to plane.



The magnitude of potential difference between the ends O and B is

- | | |
|------------------------------|------------------------------|
| (1) Zero | (2) $\frac{1}{2}B\omega L^2$ |
| (3) $\frac{3}{4}B\omega L^2$ | (4) $B\omega L^2$ |

□ □ □