

Physics - Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

1. Two positive point charges $q_1 = 16\mu\text{C}$ and $q_2 = 4\mu\text{C}$ are separated in vacuum by a distance of 3.0m. At what point on the line between the charges where the net electric field is zero :-
 - (1) 2m from q_2
 - (2) 1.5m from q_2
 - (3) 2m from q_1
 - (4) 1.5 m from q_1

2. SI unit of frequency is :-
 - (1) newton
 - (2) per second
 - (3) hertz
 - (4) joule

3. A simple oscillator has an amplitude A and time period T. The time required by it to travel from $x = A$ to $x = \frac{A}{2}$ is :-
 - (1) $\frac{T}{2}$
 - (2) $\frac{T}{3}$
 - (3) $\frac{T}{4}$
 - (4) $\frac{T}{6}$

4. A 15 kg mass is accelerated from rest with a force of 100 N. As it moves faster, friction and air resistance create an oppositely directed retarding force given by $F_R = A + Bv$, where $A = 25 \text{ N}$ and $B = 0.5 \text{ N/m/s}$. At what velocity does the acceleration equal to one half of the initial acceleration?
 - (1) 25 ms^{-1}
 - (2) 50 m/s
 - (3) 75 m/s
 - (4) 100 m/s

5. When a sphere is taken to bottom of sea 1 km deep, it contracts by 0.01%. The bulk modulus of elasticity of the material of sphere is :
(Given Density of water = 1g/cm^3)
 - (1) $9.8 \times 10^{10} \text{ N/m}^2$
 - (2) $10.2 \times 10^{10} \text{ N/m}^2$
 - (3) $0.98 \times 10^{10} \text{ N/m}^2$
 - (4) $8.4 \times 10^{10} \text{ N/m}^2$

6. The electric field intensity at a point is $(20\hat{i} + 30\hat{j}) \text{ N/C}$. Considering potential at origin to be zero, the potential at P (2, 2) is:-
 - (1) -100V
 - (2) 20 V
 - (3) 100 V
 - (4) -20 V

7. the displacement 'x' of a particle moving along a straight line at time t is given by $x = a_0 + a_1t + a_2t^2$. The acceleration of the particle is-
 - (1) a_1
 - (2) a_2
 - (3) $2a_2$
 - (4) $3a_2$

8. Phase difference between two waves having same frequency (ν) and same amplitude (A) is $2\pi/3$. If these waves superimpose each other, then resultant amplitude will be-
 - (1) 2A
 - (2) 0
 - (3) A
 - (4) A^2

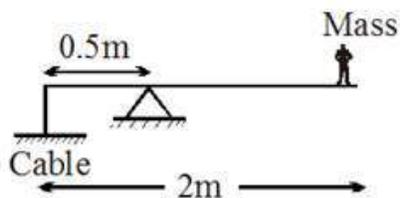
9. A uniform rope of length L is pulled by a constant force F. What is the tension in the rope at a distance x from the end where the force is applied -
 - (1) $\frac{FL}{x}$
 - (2) $\frac{F(L-x)}{L}$
 - (3) $\frac{FL}{L-x}$
 - (4) $\frac{Fx}{L-x}$

10. A spherical ball contracts in volume by 0.01% when subjected to a normal uniform pressure of 100 atmospheres. The bulk modulus of its material in dynes/ cm^2 is-
 - (1) 10×10^{12}
 - (2) 100×10^{12}
 - (3) 1×10^{12}
 - (4) 2.0×10^{11}

11. In the given circuit, the current is :-

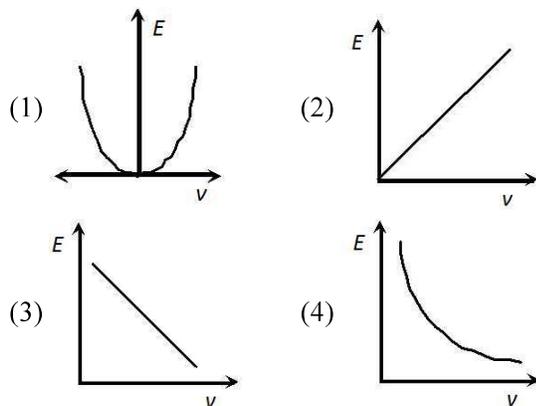
 - (1) 1.0 A from A to C
 - (2) 1.0A from C to A via B
 - (3) 3.0 A from A to C
 - (4) 3.0 A from C to A via B

12. A man of mass 85 kg stands on one end of a uniform board of length 2 m and mass 15 kg. The other end is tied to the floor by a steel cable, and the board is supported from below just 0.5 m from the cable end (see figure).



- (1) The tension in cable is 1000 N
 (2) The tension in cable is 2700 N
 (3) The normal reaction at support is 1700 N
 (4) None of these

13. The graph between E and V is



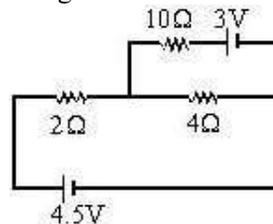
14. The linear and angular acceleration of a particle are 10 m/sec^2 and 5 rad/sec^2 respectively it will be at a distance from the axis of rotation -

- (1) 50 m (2) $\frac{1}{2}$ m
 (3) 1 m (4) 2 m

15. If work done in stretching a wire by 1 mm is 2J, the work necessary for stretching another wire of same material, but with double radius and half length by 1 mm in joule is -

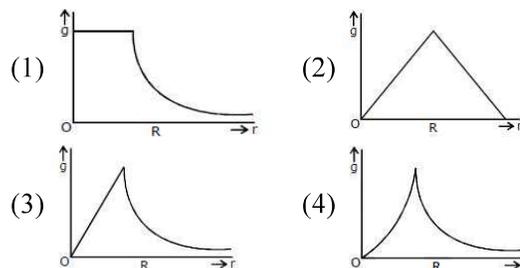
- (1) 1/4 (2) 4
 (3) 8 (4) 16

16. Find the current through the 10Ω resistor shown in figure :-

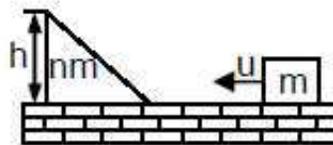


- (1) 2 A (2) 1.5 A
 (3) Zero (4) 1 A

17. Starting from the centre of the Earth having radius R , the variation of g (acceleration due to gravity) is shown by



18. A block of mass m is pushed towards movable wedge of mass nm and height h , with a velocity u . All surface are smooth. The minimum value of u for which the block reach the top of the wedge is :

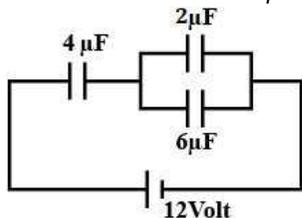


- (1) $\sqrt{2gh}$ (2) $2ngh$
 (3) $\sqrt{2gh(1 + \frac{1}{n})}$ (4) $\sqrt{2gh(1 - \frac{1}{n})}$

19. One gram mole of nitrogen occupies $2 \times 10^4 \text{ cc}$ at a pressure of 10^6 dyne's/cm^2 . The average energy of a nitrogen molecule in erg will be (Avogadro's number = 6×10^{23}).

- (1) 14×10^{-13} (2) 10×10^{-12}
 (3) 10^6 (4) 2×10^6

20. In the circuit shown in the figure, the potential difference across the $4\mu\text{F}$ capacitor is-



- (1) $\frac{8}{3}$ volts (2) 4 volts
 (3) 6 volts (4) 8 volts
21. The height at which the weight of a body becomes $1/16^{\text{th}}$ of its weight on the surface of earth (radius R), is :-
- (1) $3R$ (2) $4R$
 (3) $5R$ (4) $15R$

22. A 0.5 kg ball is thrown up with an initial speed 14 m/s and reaches a maximum height of 8.0 m . How much energy is dissipated by air drag acting on the ball during the ascent?

- (1) 19.6 joules (2) 4.9 joules
 (3) 10 joules (4) 9.8 joules

23. Which of the following statements is correct for any thermodynamic system?

- (1) The internal energy changes in all processes
 (2) Internal energy and entropy are state functions
 (3) The change in entropy can never be zero
 (4) The work done in an adiabatic process is always zero

24. A circular coil placed in a uniform magnetic field. If alternating current flows through this coil then:

- (1) net force will act on coil (2) coil will be stationary
 (3) coil will be rotated (4) none of the above

25. A coil having an area A_0 is placed in a magnetic field which changes from B_0 to $4B_0$ in a time interval t . The magnitude of e.m.f. induced in the coil will be

- (1) $\frac{3A_0B_0}{t}$ (2) $\frac{4A_0B_0}{t}$
 (3) $\frac{3B_0}{A_0t}$ (4) $\frac{4B_0}{A_0t}$

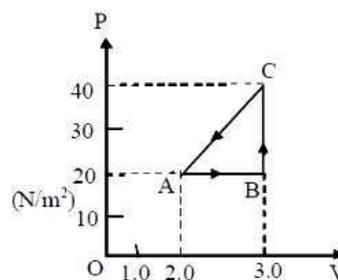
26. When volume changes from V to $2V$ at constant pressure (P) then the change in internal energy will be :-

- (1) PV (2) $3PV$
 (3) $\frac{PV}{\gamma-1}$ (4) $\frac{RV}{\gamma-1}$

27. A diatomic gas with rigid molecules does 10 J of work when expanded at constant pressure. What would be the heat energy absorbed by the gas, in this process?

- (1) 35 J (2) 40 J
 (3) 25 J (4) 30 J

28. In the indicator diagram shown, the work done along path AB is -



- (1) Zero (2) 20 Joule
 (3) - 20 Joule (4) 60 Joule

29. Consider a diatomic gas enclosed in a cylinder with a movable piston. The piston is massless, and the pressure outside is atmospheric pressure. If the piston as well as the cylinder are adiabatic, and the gas undergoes adiabatic expansion such that volume increases slowly.

| | List-I | List-II |
|-----|-------------------------------------|---|
| I | Remains constant | P Molar mass of the gas |
| II | Increases | Q The average change in momentum of molecules colliding with the piston |
| III | Decreases | R The number of collision of molecules per unit time with the walls |
| IV | Cannot be predicted with data given | S The rate of flow of heat energy into the gas |
| | | T The pressure of the gas |
| | | U The average distance between molecules |

- (1) $I \rightarrow P; II \rightarrow U; III \rightarrow R, S; IV \rightarrow S, T$
 (2) $I \rightarrow S; II \rightarrow U; III \rightarrow Q, R, T; IV \rightarrow P$
 (3) $I \rightarrow P; II \rightarrow U; III \rightarrow Q, S, T; IV \rightarrow P$
 (4) $I \rightarrow S; II \rightarrow U; III \rightarrow Q, T; IV \rightarrow P$

30. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves)

- (1) $1 : c$ (2) $1 : c^2$
 (3) $c : 1$ (4) $1 : 1$

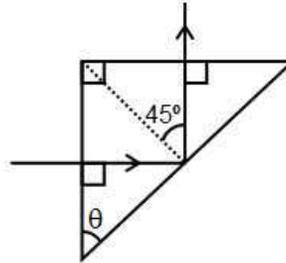
31. A luminous point object is moving along the principal axis of a concave mirror of focal length 12 cm towards it. When its distance from the mirror is 20 cm its velocity is 4 cm/s. The velocity of the image in cm/s at that instant is -

- (1) 6 towards the mirror
 (2) 6 away from the mirror
 (3) 9 away from the mirror
 (4) 9 towards the mirror

32. Light wave enters from medium 1 to medium 2. Its velocity in 2nd medium is double from 1st. For total internal reflection the angle of incidence must be greater than

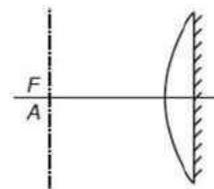
- (1) 30° (2) 60°
 (3) 45° (4) 90°

33. A light ray is incident perpendicularly to one face of a 90° prism and is totally internally reflected at the glass – air interface . If the angle of reflection is 45° , we conclude that the refractive index n



- (1) $n < 1 / \sqrt{2}$
 (2) $n > \sqrt{2}$
 (3) $n > 1 / \sqrt{2}$
 (4) $n < \sqrt{2}$

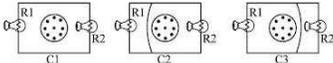
34. The plane surface of plano-convex lens (see figure) with a focal length of 10 cm is silvered. How far from the lens will the image of a point source (in cm) be located? The object is at the focus of the lens.



- (1) 20 cm
 (2) 10 cm
 (3) 15 cm
 (4) 25 cm

Physics - Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

- 36.** Two cars A and B at rest at same point initially. If A starts with uniform velocity of 40 m/sec and B starts in the same direction with constant acceleration of 4m/s^2 , then B will catch A after how much time
- (1) 10 sec (2) 20 sec
(3) 30 sec (4) 35 sec
- 37.** A sphere of mass 40 kg is attracted by a second sphere of mass 60 kg with a force equal to 4g-wt. If $G = 6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$, calculate the distance between them. Acceleration due to gravity = 10 ms^{-2} .
- (1) $8 \times 10^{-3} \text{ cm}$ (2) $6 \times 10^{-3} \text{ cm}$
(3) $8 \times 10^{-5} \text{ cm}$ (4) $6 \times 10^{-5} \text{ cm}$
- 38.** Two conducting spheres, one of radius 6 cm, other 12 cm, each having charge $3 \times 10^{-8} \text{ C}$ are placed far apart. If the spheres are connected by a conducting wire, find the direction of motion of charge
- (1) Bigger sphere to smaller sphere
(2) smaller to bigger sphere
(3) in any direction
(4) information insufficient
- 39.** The peak value of an alternating e.m.f. which is given by $E = E_0 \cos \omega t$ is 10 volts and its frequency is 50 Hz. At time $t = \frac{1}{600}$ s, the instantaneous e.m.f. is
- (1) 10 V (2) $5\sqrt{3} \text{ V}$
(3) 5 V (4) 1V
- 40.** A uniform copper wire of length 1m and cross-sectional area $5 \times 10^{-7} \text{ m}^2$ carries a current of 1A. Assuming that there are 8×10^{28} free electron/ m^3 in copper, how long will an electron take to drift from one end of the wire to the other ?
- (1) $0.8 \times 10^3 \text{ s}$ (2) $1.6 \times 10^3 \text{ s}$
(3) $3.2 \times 10^3 \text{ s}$ (4) $6.4 \times 10^3 \text{ s}$
- 41.** A solenoid is oriented end-on so that its opening is perpendicular to the circuit containing the two light bulbs as drawn in figure C1. For figure C2 and C3, a shorting wire of negligible resistance is added as shown. Assume that the magnetic field from the solenoid, shown coming out of the plane of the page, decreases uniformly with time at the same rate for each circuit. Rank the circuits for the brightness of the bulb labeled R1 from brightest to dimmest.
- 
- (1) $C1 > C3 > C2$
(2) $C1 > C2 = C3$
(3) $C2 > C3 > C1$
(4) $C3 > C1 > C2$
- 42.** Current carrying coil is
- (1) An ideal dipole
(2) A device which produce uniform magnetic field
(3) Monopole
(4) All
- 43.** A circuit has a resistance of 11Ω , an inductive reactance of 25Ω and a capacitive resistance of 18Ω . It is connected to an ac source of 260V and 50Hz. The current through the circuit (in amperes) is
- (1) 11 (2) 15
(3) 18 (4) 20
- 44.** There is a 5Ω resistance in an A.C., circuit. Inductance of 0.1 H is connected with it in series. If equation of A.C. e.m.f. is $5 \sin 50 t$ then the phase difference between current and e.m.f. is-
- (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{6}$
(3) $\frac{\pi}{4}$ (4) 0

45. An astronomical refracting telescope will have large angular magnification and high angular resolution, when it has an objective lens of
- (1) large focal length and large diameter
 - (2) large focal length and small diameter
 - (3) small focal length and large diameter
 - (4) small focal length and small diameter
46. A camera lens is made of glass with index of refraction $n_1 = 1.50$. A thin film of a material with index of refraction $n_2 = 1.4$ is used to coat the lens so that light incident on the lens is minimally reflected. Assume that the light is travelling perpendicular to the lens surface and has wavelength 420 nm in vacuum. What is the possible thickness of the film ?
- (1) 75 nm
 - (2) 50 nm
 - (3) 100 nm
 - (4) 125 nm

47. Match List-I (fundamental Experiment) with List -II (its conclusion) and select the correct option from the choice given below the list:

| | List-I | | List-II |
|-----|----------------------------|-------|-------------------------------------|
| (A) | Franck-Hertz Experiment | (i) | Particle nature of Experiment light |
| (B) | Photo-electric experiment | (ii) | Discrete energy levels of atom |
| (C) | Davison-Germer Experiment. | (iii) | Wave nature of electron |
| | | (iv) | Structure of atom |

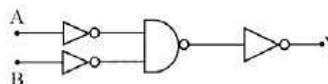
- (1) A \rightarrow ii; B \rightarrow i; C \rightarrow iii
- (2) A \rightarrow iv; B \rightarrow iii; C \rightarrow ii
- (3) A \rightarrow i; B \rightarrow iv; C \rightarrow iii
- (4) A \rightarrow ii; B \rightarrow iv; C \rightarrow iii

48. Which of the following will NOT be observed when a multimeter (operating in resistance measuring mode) probes connected across a component, are just reversed ?
- (1) Multimeter shows NO deflection in both cases i.e. before and after reversing the probes if the chosen component is metal wire.
 - (2) Multimeter shows a deflection, accompanied by a splash of light out of connected component in one direction and NO deflection on reversing the probes if the chosen component is LED.
 - (3) Multimeter shows an equal deflection in both cases i.e. before and after reversing the probes if the chosen component is resistor.
 - (4) Multimeter shows equal deflection in both cases i.e. before and after reversing the probes if the chosen component is capacitor.

49. Radioactive material 'A' has decay constant ' 8λ ' and material 'B' has decay constant ' λ '. Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material 'A' to that 'B' will be $1/e$?

- (1) $\frac{1}{\lambda}$
- (2) $\frac{1}{7\lambda}$
- (3) $\frac{1}{8\lambda}$
- (4) $\frac{1}{9\lambda}$

50. The following arrangement performs the logic function of



- (1) AND
- (2) OR
- (3) NAND
- (4) NOR

Chemistry - Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

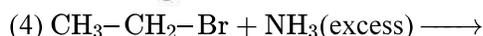
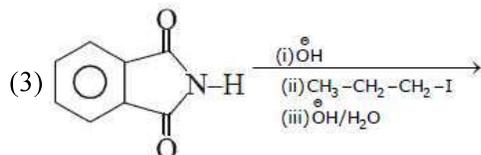
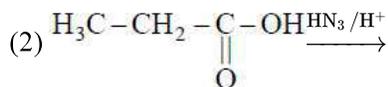
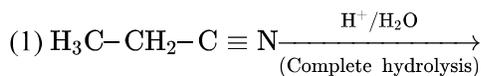
51. Mole fraction of a non-electrolyte in aqueous solution is 0.07. If K_f is $1.86^\circ \text{ mol}^{-1} \text{ kg}$, depression in f.p., ΔT_f , is-
- (1) 0.26°
 - (2) 1.86°
 - (3) 0.13°
 - (4) 7.78°

52. Ionisation energies of element X are given below (in kJ/mol)-
- | | | |
|--------|--------|--------|
| IE_1 | IE_2 | IE_3 |
| 520 | 7,340 | 11,000 |
- If 'X' reacts with different elements which compounds are possible?
- (1) XF
 - (2) X_2O
 - (3) X_3N
 - (4) All of above

53. Which one of the following polymers is not obtained by condensation polymerisation?

- (1) Bakelite (2) Nylon 6
(3) Buna-N (4) Nylon 6, 6

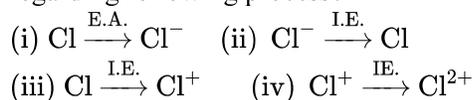
54. Which of the following reaction can not produce 1° amine as major product?



55. A 5.8% (wt./vol.) NaCl solution will exert an osmotic pressure closest to which one of the following?

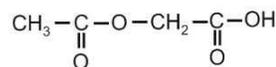
- (1) 5.8% (wt./vol) sucrose solution
(2) 5.8% (wt./vol) glucose solution
(3) 2 M sucrose solution
(4) 1 M glucose solution

56. Which of the following statement is correct regarding following process?



- (1) |I. E. of process (ii)|
= |E. A. of process (i)|
(2) |I. E. of process (iii)|
= |I. E. of process (ii)|
(3) |I. E. of process (iv)|
= |E. A. of process (i)|
(4) |I. E. of process (iv)|
= |I. E. of process (iii)|

57. The IUPAC name of the given compound is -



- (1) 1-Acetoxy acetic acid
(2) 2-acetoxy ethanoic acid
(3) 2-Ethanoyloxy acetic acid
(4) 2-Ethanoyloxy ethanoic acid

58. 200 mL of 1.0 N CH_3COOH are added to 100 mL of 1.0 N NaOH solution. What will be the pH of resulting solution ($\text{pK}_a = 4.74$)?

- (1) 7.0 (2) > 7.0
(3) < 7.0 (4) Zero

59. Strongest bond is-

- (1) C - C (2) C = C
(3) C \equiv C (4) All are equally strong

60. The standard reduction potentials for Cu^{2+}/Cu ; Zn^{2+}/Zn ; Li^+/Li ; Ag^+/Ag and H^+/H_2 are +0.34 V, -0.762 V, -3.05 V, +0.80 V, +0.00 V respectively, Choose the strongest reducing agent among the following -

- (1) Zn (2) H_2
(3) Ag (4) Li

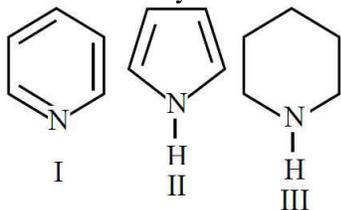
61. Which of the following material conducts electricity?

- (1) diamond
(2) crystalline sodium chloride
(3) barium sulphate
(4) fused KCl

62. Which of the statement is not correct?

- (1) $-\text{NH}_2$ is ortho-para directing group
(2) $-\text{CHO}$ is meta directing group
(3) $:\text{CCl}_2$ is an electrophile
(4) $-\ddot{\text{O}}\text{H}$ is (-M) group

63. Arrange the following amines in the decreasing order of basicity -



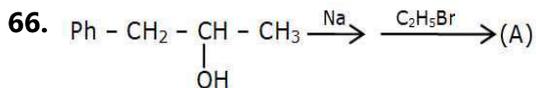
- (1) III > II > I (2) I > II > III
 (3) III > I > II (4) I > III > II

64. Which of the following statements is correct ?

- (1) the rate of reaction generally decreases with passage of time as the concentration of reactants decreases in a zero order reaction.
 (2) The rate of reaction remains same throughout the reaction in a first order reaction.
 (3) The rate of reaction increases with passage of time as the concentration of reactants decreases in a negative order reaction.
 (4) The rate of reaction is independent of temperature change.

65. Nitrogen dioxide cannot be prepared by heating -

- (1) KNO_3 (2) AgNO_3
 (3) $\text{Pb}(\text{NO}_3)_2$ (4) $\text{Cu}(\text{NO}_3)_2$



Product (A) in above reaction is-

- (1) $\text{Ph}-\text{CH}_2-\underset{\text{OEt}}{\text{CH}}-\text{CH}_3$, (inversion)
 (2) $\text{Ph}-\text{CH}_2-\underset{\text{OEt}}{\text{CH}}-\text{CH}_3$, (retention)
 (3) $\text{Ph}-\text{CH}_2-\underset{\text{OEt}}{\text{CH}}-\text{CH}_3$, (racemic)
 (4) $\text{Ph}-\text{CH}=\text{CH}-\text{CH}_3$

67. Silver crystallises in fcc lattice. If the edge length of the cell is 4.077×10^{-3} cm and density is 10.5 cm^{-3} , calculate the atomic mass of silver-

- (1) 112 (2) 108
 (3) 96 (4) 115

68. Which of the following reaction form paramagnetic species?

- (1) $\text{Na}(\text{s}) + \text{NH}_3 (\text{liq.})$ (2) $\text{Na}(\text{s}) + \text{O}_2 (\text{excess})$
 (3) $\text{Na}(\text{s}) + \text{H}_2\text{O}$ (4) $\text{Na}(\text{s}) + \text{H}_2$

69. Match the **column I** with **column II** and Mark the appropriate choice -

| | Column -I | Column -II |
|-----|-----------|------------------------------|
| (A) | | (i) Coupling reaction |
| (B) | | (ii) Balz-Schiemann reaction |
| (C) | | (iii) Gatterman reaction |
| (D) | | (iv) Sandmeyer reaction |

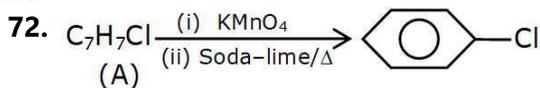
- (1) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i)
 (2) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)
 (3) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)
 (4) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)

70. Peptisation is a process of -

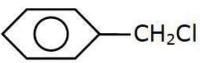
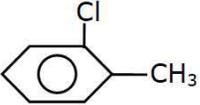
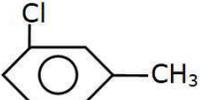
- (1) Precipitating the colloidal particles
 (2) Purifying the colloidal sol
 (3) Dispersing precipitate into colloidal sols
 (4) Movement of colloidal particles in the electrical field

71. Which of the following is an example of interstitial carbide ?

- (1) CaC_2 (2) Fe_3C
 (3) SiC (4) Mg_2C_3



In the above reactions, compound (A) can not be -

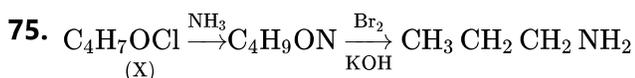
- (1) 
 (2) 
 (3) 
 (4) 

73. Which gas is strongly adsorbed by charcoal ?

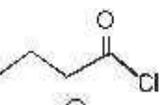
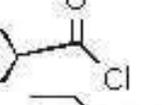
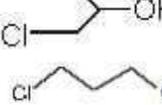
- (1) CO (2) N₂
 (3) H₂ (4) NH₃

74. Which is the correct thermal stability order for H₂E (E = O, S, Se, Te and Po)?

- (1) H₂Po < H₂Te < H₂Se < H₂S < H₂O
 (2) H₂Se < H₂Te < H₂Po < H₂O < H₂S
 (3) H₂S < H₂O < H₂Se < H₂Te < H₂Po
 (4) H₂O < H₂S < H₂Se < H₂Te < H₂Po

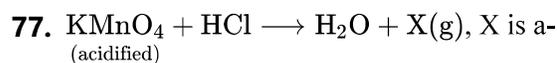


Compound (X) is-

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

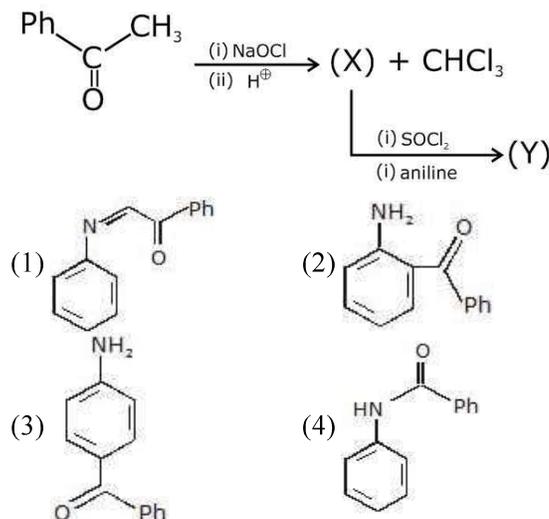
76. For the following reaction, the mass of water produced from 445 g of C₅₇H₁₁₀O₆ is :
 $2C_{57}H_{110}O_6(s) + 163O_2(g) \rightarrow 114CO_2(g) + 110H_2O(l)$

- (1) 495 g (2) 590 g
 (3) 890 g (4) 445 g



- (1) red liquid (2) violet gas
 (3) greenish yellow gas (4) yellow-brown gas

78. The major product 'Y' in the following reaction is-



79. For emission line of atomic hydrogen from n_i = 8 to n, the plot of wave number ($\bar{\nu}$) against $\left(\frac{1}{n^2}\right)$ will be (The Rydberg constant R_H)-

- (1) Linear with intercept -R_H
 (2) Non linear
 (3) Linear with slope R_H
 (4) Linear with slope $-\frac{1}{R_H}$

80. Which of the following is non-ionizable ?

- (1) [Co(NH₃)₃Cl₃] (2) [Co(NH₃)₄Cl₂]Cl
 (3) [Co(NH₃)₅Cl]Cl₃ (4) [Co(NH₃)₆]Cl₂

81. The ratio $\frac{a}{b}$ (the terms a and b van der Waal's constant) has the unit-

- (1) atm lit mol⁻¹ (2) atm dm³ mol⁻¹
 (3) Dyne cm mol⁻¹ (4) All of these

82. Two complexes [Co(NH₃)₅Cl]SO₄ and [Co(NH₃)₅SO₄]Cl can't be distinguished by -

- (1) Reaction with AgNO₃
 (2) Reaction with BaCl₂
 (3) Molar conductance measurement.
 (4) Optical activity

Chemistry - Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

86. The formation of cyanohydrin from a ketone is an example of –
(1) Electrophilic addition (2) Nucleophilic addition
(3) Nucleophilic substitution (4) Electrophilic substitution
87. $\text{CH}_3\text{CH}_2-\text{CH}=\text{CH}_2 \xrightarrow{\text{HBr}/\text{H}_2\text{O}_2} \text{Y} \xrightarrow{\text{C}_2\text{H}_5\text{ONa}} \text{Z}$, Z is –
(1) $\begin{array}{c} \text{CH}_3\text{CHCH}_2-\text{O}-\text{CH}_2\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
(2) $\begin{array}{c} \text{CH}_3\text{CH}-\text{O}-\text{CH}_2-\text{CH}_2\text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$
(3) $\text{CH}_3(\text{CH}_2)_3\text{OCH}_2\text{CH}_3$
(4) $\text{CH}_3(\text{CH}_2)_4\text{OCH}_3$
88. The colour of the coordination compounds depends on the crystal field splitting. What will be the correct order of absorbed wavelength of light in the visible region, for the complexes, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Co}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$?
(1) $[\text{Co}(\text{CN})_6]^{3-} > [\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{H}_2\text{O})_6]^{3+}$
(2) $[\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{H}_2\text{O})_6]^{3+} > [\text{Co}(\text{CN})_6]^{3-}$
(3) $[\text{Co}(\text{H}_2\text{O})_6]^{3+} > [\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{CN})_6]^{3-}$
(4) $[\text{Co}(\text{CN})_6]^{3-} > [\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{H}_2\text{O})_6]^{3+}$
89. Which statement is not correct?
(1) $\text{La}(\text{OH})_3$ is less basic than $\text{Lu}(\text{OH})_3$
(2) In lanthanide series, ionic radius of Ln^{3+} ions decreases
(3) La is actually an element of transition series
(4) Atomic radius of Zr and Hf are same because of lanthanide contraction
90. In the general electronic configuration $(n-2)f^{1-14}(n-1)d^{0-1}ns^2$, if value of $n = 7$ the configuration will be :
(1) Lanthanides (2) Actinides
(3) Transition elements (4) None
91. Molarity of 720 gm of pure water -
(1) 40 M (2) 4M
(3) 55.5 M (4) Can't be determined
92. How many covalent and how many co-ordinate bonds are present in Al_2Cl_6 ?
(1) 6, 2 (2) 7, 0 (3) 4, 4 (4) 8, 0
93. The ionic product of water at 45°C is 4×10^{-14} . What is pH of pure water at this temperature? [Take : $\log 2 = 0.3$]
(1) 6.7 (2) 7
(3) 7.3 (4) 13.4
94. Given :
(i) $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$, $E^\circ = 0.337 \text{ V}$
(ii) $\text{Cu}^{2+} + e^- \rightarrow \text{Cu}^+$, $E^\circ = 0.153 \text{ V}$
Electrode potential, E° for the reaction, $\text{Cu}^+ + e^- \rightarrow \text{Cu}$, will be-
(1) 0.38 V (2) 0.52 V
(3) 0.90 V (4) 0.30 V
95. Consider a chemical reaction $2\text{A} + \text{B} \rightarrow \text{A}_2\text{B}$. The reactant A will decrease at -
(1) The same rate at which B will decrease
(2) Twice the rate at which B will decrease
(3) Half the rate at which B will decrease
(4) All of the above
96. Which of the following is most appropriate crystal to show Frenkel defect?
(1) CsCl (2) NaCl
(3) AgBr (4) CaCl_2
97. A 1-kW radio transmitter operates at a frequency of 880 Hz. How many photons per second does it emit?
(1) 1.71×10^{21} (2) 1.71×10^{33}
(3) 6.02×10^{23} (4) 2.85×10^{26}

98. Which statement for equilibrium constant is true for the reaction $A + B \rightleftharpoons C$?

- (1) Not changes with temperature
- (2) Changes when catalyst is added
- (3) Increases with temperature
- (4) Changes with temperature

99. What is the enthalpy change for the given reaction if enthalpies of formation of Al_2O_3 and Fe_2O_3 are $-1670 \text{ kJ mol}^{-1}$ and -834 kJ mol^{-1} respectively ?



- (1) -836 kJ mol^{-1}
- (2) $+836 \text{ kJ mol}^{-1}$
- (3) -424 kJ mol^{-1}
- (4) $+424 \text{ kJ mol}^{-1}$

100. Which of the following is a redox reaction ?

- (1) $2 \text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$
- (2) $\text{CuSO}_4 + 4\text{NH}_3 \rightarrow [\text{Cu}(\text{NH}_3)_4] \text{SO}_4$
- (3) $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}$
- (4) $\text{Cr}_2\text{O}_7^{2-} + 2\text{OH}^- \rightarrow 2 \text{CrO}_4^{2-} + \text{H}_2\text{O}$

Botany - Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

101. Function of companion cells is :

- (1) Loading of sucrose into sieve elements.
- (2) Providing energy to sieve elements for active transport.
- (3) Providing water to phloem
- (4) Loading of sucrose into sieve elements by passive transport.

102. Root hairs are:-

- (1) Unicellular and formed by cuticle
- (2) Multicellular and formed by epidermal cells
- (3) Multicellular and formed by cuticle
- (4) Unicellular and formed by epidermal cells

103. ICNB stands for:

- (1) International Code of Botanical Nomenclature
- (2) International Code of Nomenclature of Bacteria
- (3) Indian Code of Botanical Nomenclature
- (4) International Congress of Biological Names

104. A cross in which an organism showing a dominant phenotype crossed with the recessive parent in order to know its genotype is called ?

- (1) Dihybrid cross
- (2) Monohybrid cross
- (3) Back cross
- (4) Test cross

105. How many porin molecules constitute aquaporin ?

- (1) 6
- (2) 8
- (3) 4
- (4) 2

106. Match the following -

| Column I | Column II |
|------------------|---------------|
| a. Actinomorphic | (i). Brinjal |
| b. Zygomorphic | (ii). Rose |
| c. Hypogynous | (iii). Cassia |
| d. Perigynous | (iv). Chilli |

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

107. First step in taxonomy is :

- (1) Characterisation of the organism
- (2) Identification of the organism
- (3) Nomenclature of the organism
- (4) Classification of the organism

108. Find out the correct match -

- (1) F_1 resembled either of the two parents - Dominance
- (2) F_1 resembled in between-incomplete dominance
- (3) F_1 resembled both parent - Co-dominance
- (4) All are correct

109.In a chloroplast the highest number of protons are found in:-

- (1) Stroma
- (2) Lumen of thylakoids
- (3) Inter membrane space
- (4) Antennae complex

110.Which of the following is made up of dead cells?

- (1) Xylem parenchyma
- (2) Collenchyma
- (3) Phellem
- (4) Phloem

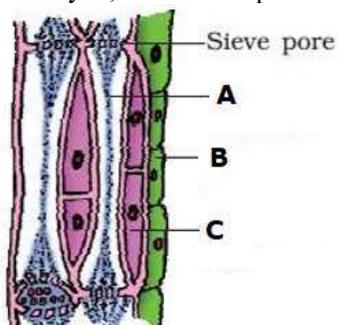
111.Special garden showing collection of living plants is -

- (1) Zoos
- (2) Zoological park
- (3) Botanical Garden
- (4) Museum

112.In Morgan's experiment, what will be percentage of recombination in case of body colour and eye colour?

- (1) 37.2%
- (2) 1.3%
- (3) 98.7%
- (4) 27.3%

113.Identify A, B and C of phloem:



- (1) A = Sieve tube, B = Phloem parenchyma, C = Companion cell
- (2) A = Companion cell, B = Phloem parenchyma, C = Sieve tube
- (3) A = Phloem parenchyma, B = Companion cell, C = Sieve tube
- (4) A = Companion cell, B = Sieve tube, C = Phloem parenchyma

114.Which organelle out of these does not participate in photorespiration ?

- (1) Peroxisomes
- (2) Mitochondria
- (3) Chloroplasts
- (4) Golgi bodies

115.Methanogens belong to:

- (1) Archaeobacteria
- (2) Dinoflagellates
- (3) Slime moulds
- (4) Eubacteria

116.DNA replication in bacteria occurs :

- (1) During S phase
- (2) Within nucleolus
- (3) Prior to fission
- (4) Just before transcription

117.Which of the following elements is responsible for maintaining turgor in cells ?

- (1) Magnesium
- (2) Sodium
- (3) Potassium
- (4) Calcium

118.Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?

- (1) Pseudomonas
- (2) Mycoplasma
- (3) Nostoc
- (4) Bacillus

119.Spliceosomes are not found in cells of

- (1) Plants
- (2) Fungi
- (3) Animals
- (4) Bacteria

120.The last product of anaerobic respiration in animal ?

- (1) CO₂
- (2) Alcohol
- (3) O₂
- (4) Lactic acid

121.Which among the following is **not** a prokaryote?

- (1) Saccharomyces
- (2) Mycobacterium
- (3) Nostoc
- (4) Oscillatoria

122.Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as :

- (1) Nucleosome
- (2) Polysome
- (3) Plastidome
- (4) Polyhedral bodies

123. Study the following statements regarding chemiosmotic hypothesis in mitochondria and select the **correct** ones.

- (i) F_1 headpiece contains the site for the synthesis of ATP from ADP + iP
- (ii) F_0 part forms the channel through which protons cross the inner membrane.
- (iii) For each ATP production, $2H^+$ pass through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

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

124. In which the parthenogenesis is observed –

- (1) Honey bee (2) Silk worm
- (3) Earth worm (4) House fly

125. In mung bean, resistance to yellow mosaic virus and powdery mildew were induced by

- (1) Polyploidy (2) Mutations
- (3) Selection (4) Hybridisation

126. Cucumber and tomato are the examples of

- (1) Day neutral plants (2) Short day plants
- (3) Long day plants (4) Long short day plants

127. Haploid number of chromosomes are found in :-

- (1) Zygote (2) Amoeba
- (3) Queen honeybee (4) Ovum

128. Which one of the following is most appropriately defined-

- (1) Parasite is an organism which always lives inside the body of other organism and may kill it.
- (2) Host is an organism which provides food to another organism.
- (3) Amensalism is a relationship in which one species is benefited whereas the other is unaffected.
- (4) Predator is an organism that catches and kills other organism for food.

129. The egg apparatus is made up of two _____ and one _____ at the _____ end of the embryo sac

- (1) Antipodals, egg cell, micropylar
- (2) Synergids, egg cell, chalazal
- (3) Egg cells, synergids, chalazal
- (4) Synergids, egg cells, micropylar

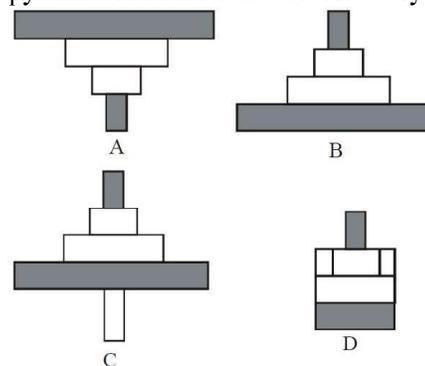
130. Which one of the following is categorized as a parasite in true sense?

- (1) the cuckoo lays its egg in crow's nest
- (2) The female Anopheles bites and sucks blood from humans
- (3) Human foetus developing inside the uterus draws nourishment from the mother
- (4) head louse living on the human scalp as well as laying egg on human hair

131. The word ecosystem was coined by—

- (1) Weaver and Clements (2) Odum
- (3) Daubenmire (4) Tansley

132. Which of the following representations shows the pyramid of number in a forest ecosystem :-



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

133. Match the following columns.

| | Column-I | | Column-II |
|----|----------------------------------|-----|---------------------|
| a. | Dodo | (1) | Rauwolfia |
| b. | Reserpine | (2) | Mauritius |
| c. | Nile Perch in lake Victoria | (3) | Habitat destruction |
| d. | Main cause for biodiversity loss | (4) | Alien species |

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

Botany - Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

136. Select the **correct** statement w.r.t. Mango and coconut

- (1) They develop from monocarpellary superior ovaries
- (2) They develop from multicarpellary inferior ovaries
- (3) They have fibrous epicarp
- (4) They have fleshy edible mesocarp

137. Identify the correct match from the **column I, II and III.**

| Column-I | Column-II | Column-III |
|----------------|------------------------|-------------------------------|
| 1 Dicot Stem | a Polyarch | i Well developed pith |
| 2 Monocot Stem | b Sunflower | ii Less developed pith |
| 3 Monocot root | c Maize | iii Starch sheath |
| 4 Dicot root | d 2 to 4 xylem patches | iv Scattered vascular bundles |

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

138. In a plant, two gene have cumulative influence on the weight of fruit. Each dominant allele add 10g to basic weight of 30 g. In a cross between plant having fruit weighting 50 g each, what percentage of offspring would bear fruit weighting 40 g :-

- (1) 12.5 %
- (2) 25%
- (3) 37.5%
- (4) 50%

139. Identify the **wrong** statement with reference to the gene 'I' that controls ABO blood groups.

- (1) A person will have only two of the three alleles.
- (2) When I^A and I^B are present together, they express same type of sugar
- (3) Allele 'i' does not produce any sugar.
- (4) The gene (I) has three alleles.

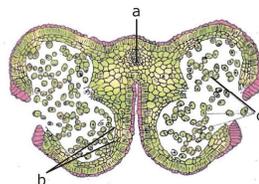
140. Endosperm nucleus is formed by the fusion of

- (1) 2 nuclei
- (2) 3 nuclei
- (3) 4 nuclei
- (4) 5 nuclei

141. In lac operon, the lac mRNA:-

- (1) Has more than one initiation and termination codons
- (2) Forms four different enzymes
- (3) Is not transcribed in the presence of lactose
- (4) Is involved in an anabolic reaction

142. The following in the diagram of T.S. of anther, Identify the parts labelled a, b and c-



- (1) a-Connective tissue, b-Endothecium, c-Pollen grain
- (2) a-Endothecium, b-Connective tissue, c-Pollen grain
- (3) a-Pollen grain, b-Connective tissue, c-Endothecium
- (4) a-Endothecium, b-Pollen grain, c-Connective tissue

143. The last step of DNA fingerprinting is :-

- (1) Blotting
- (2) Autoradiography
- (3) Hybridisation
- (4) Isolation of desired DNA

144. In a Flowering plant, archesporium gives rise to-

- (1) Both wall and the sporogenous cells
- (2) Formation of Epidermis
- (3) Wall and the tapetum
- (4) Only tapetum and sporogenous cells

145. Emerson's enhancement effect and Red drop have been instrumental in the discovery of :-

- (1) Photophosphorylation and non-cyclic electron transport
- (2) Two photosystems operating simultaneously
- (3) Photophosphorylation and cyclic electron transport
- (4) Oxidative phosphorylation

146. The deficiency of which of the following group of minerals inhibits photolysis of water in plants.

- (1) Mg, Mo, S (2) Cl, Ca, Mn
- (3) P, S, Cu (4) Cu, Zn, Mo

147. Select the correct sequence of formation of given intermediates of Krebs' cycle :-

- (1) Succinate → Malate → Fumarate → OAA
- (2) Fumarate → Succinate → Malate → OAA
- (3) Succinate → Fumarate → Malate → OAA
- (4) Malate → Fumarate → Succinate → OAA

148. When does the growth rate of a population following the logistic model equal zero ? The logistic model is given as $dN/dt = rN(1-N/K)$

- (1) When N nears the carrying capacity of the habitat
- (2) When N/K equals zero
- (3) When death rate is greater than birth rate
- (4) When N/K is exactly one

149. About 71% of total global carbon is found in -

- (1) Forests (2) Grasslands
- (3) Agroecosystems (4) Oceans

150. Alexander Von Humbolt described for the first time

- (1) Ecological Biodiversity (2) Laws of limiting factor
- (3) Species area relationships (4) Population Growth equation

Zoology -Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

151. First meiotic division of oocyte is completed in-

- (1) Primary follicle (2) Secondary follicle
- (3) Tertiary follicle (4) Graffian follicle

152. Which of the following is the correct sequence of events in the origin of life?

- I. Formation of protobionts
- II. Synthesis of organic monomers
- III. Synthesis of organic polymers
- IV. Fonnation of DNA-based genetic systems

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

153. Which could be used as a emergency contraceptives

- (1) Implants (2) Tubectomy
- (3) IUD's (4) Vaults

154. Ultimate source of variation is

- (1) Mutation (2) Sexual reproduction
- (3) Genetic drift (4) None of the above.

155. Tailed amphibian is :-

- (1) Ichthyophis (2) Frog
- (3) Salamendra (4) Toad

156. Chances of inheritable and evolutionary changes are more in such species which reproduce by :

- (1) Parthenogenesis (2) Sexual reproduction
- (3) Asexual reproduction (4) Both (A) and (C)

157.Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because :

- (1) There is a positive intrapleural pressure
- (2) Pressure in the lungs is higher than the atmospheric pressure
- (3) There is a negative pressure in the lungs
- (4) There is a negative intrapleural pressure pulling at the lung walls

158.Coloured rock paintings were first done by :

- (1) Cro-magnon man (2) Java ape man
- (3) Peking man (4) Neanderthal man

159.Ileocaecal valve is present in between

- (1) Ileum and large intestine
- (2) Colon and caecum
- (3) Stomach and small intestine
- (4) Stomach and oesophagus

160.Fat is abundant in

- (1) Liver cells (2) Alveolar tissue
- (3) Adipose tissue (4) Lymph glands

161.Which of the following functions are regulated by melatonin hormone of pineal gland?

- (a) Menstrual cycle
- (b) 24 hour rhythm
- (c) Defense capability
- (d) Pigmentation
- (e) Ca^{++} level of blood
- (f) Water and electrolyte balance
- (g) Metabolism

Option :

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

162.A competitive inhibitor of succinic dehydrogenase is

- (1) Malate (2) Cyanide
- (3) Malonate (4) Hg

163.Certain B vitamins are:

- (1) Enzymes (2) Co-enzymes
- (3) Hormone (4) Digestive substance

164.Which one of the following is the **correct** description of a certain part of a normal human skeleton ?

- (1) First vertebra is axis which articulates with the occipital condyles.
- (2) The 9th and 10th pairs of ribs are called the floating ribs.
- (3) Glenoid cavity is a depression to which the thigh bone articulates.
- (4) Parietal bone and the temporal bone of the skull are joined by fibrous joint.

165.Transformation of a young follicle into graafian follicle is controlled by

- (1) Progesterone
- (2) Estrogen
- (3) Follicular stimulating hormone
- (4) Luteinising hormone

166.Match the following regarding digestive system and choose **correct** one ?

| Column – I | Column – II |
|---------------------|------------------------|
| A. Rennin | 1. Fats emulsification |
| B. Bile salts | 2. alkaline fluid |
| C. Brunner's Glands | 3. Hydrochloric acid |
| D. Oxyntic cells | 4. Curdling of milk |

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

167.Gill cover, the operculum is present in -

- (1) Scoliodon (2) Exocoetus
- (3) Pristis (4) Trygon

168.Jaundice is a disease of

- (1) Kidney (2) Liver
- (3) Pancreas (4) Duodenum

169.Identify the cells whose secretion protects the lining of gastro-intestinal tract from various enzymes.

- (1) Oxyntic Cells (2) Duodenal cells
- (3) Chief cells (4) Goblet cells

170.Normal Cardiac output is—

- (1) 15 litres/mt. (2) 5 litres × 72/mt.
- (3) 5 litres/mt. (4) 5/72 litres/mt.

171. Which of the following is the most appropriate in normal circumstances.

- (1) During inspiration the intrapulmonary pressure is less than the atmospheric pressure.
- (2) During expiration the intrapulmonary pressure is less than the atmospheric pressure
- (3) During inspiration the intrapulmonary pressure is more than the atmospheric pressure
- (4) During expiration the intrapulmonary pressure is equal to atmospheric pressure.

172. The cardiac output is defined as the volume of blood

- (1) The volume of blood pumped by both the ventricles per minute
- (2) The volume of blood pumped by each ventricle per minute
- (3) A constant
- (4) Equivalent to ratio of surface area of the body and cardiac output

173. Select the correct match of the digested products in humans given in Column-I with their absorption site and mechanism in Column-II

(1)

| | Column-I | Column-II |
|---|----------------------|------------------------------------|
| A | Cholesterol, maltose | Large intestine, active absorption |

(2)

| | Column-I | Column-II |
|---|------------------|------------------------------------|
| B | Glycine, glucose | Small intestine, active absorption |

(3)

| | Column-I | Column-II |
|---|---------------------------|-------------------------------------|
| C | Fructose, Na ⁺ | Small intestine, passive absorption |

(4)

| | Column-I | Column-II |
|---|-----------------------|--------------------------------|
| D | Glycerol, fatty acids | Duodenum, move as chylomicrons |

174. Integrated pest management (IPM) is based on -

- (1) Biological control of pest
- (2) Mechanical control
- (3) Carefully timed used of pesticides
- (4) All the above

175. A → New viral RNA is produced by infected cells.

B → Viral RNA is introduced into the cell.

C → New viruses are produced

D → Viral DNA is produced by reverse transcription

E → New viruses released from infected cells attacks on TH cell

F → Viral DNA incorporates into host genome

Arrange above mentioned events of viral infection (HIV) into correct order :

(1) B → D → F → C → E → A

(2) D → E → C → A → B → F

(3) E → A → C → B → D → F

(4) B → D → F → A → C → E

176. Choose the correct statement :

(1) Presence of more than one recognition site for one enzyme, within a vector, generate several fragments, which will complicate gene cloning.

(2) Ligation of alien DNA is carried out at a restriction site present in 'ori'.

(3) In pBR 322 one antibiotic resistance gene helps in the selection of transformants, whereas the other helps in cloning.

(4) Rop helps in identification of transformed cells.

177. Commonly used vector for human genome sequencing are:

(1) BAC and YAC (2) Expression Vectors

(3) T/A Cloning Vectors (4) T – DNA

178. Choose the option that is showing the correct sequence of event occurring in each cycle of polymerase chain reaction (PCR).

(1) Denaturation, extension, primer annealing.

(2) Primer annealing, denaturation, extension

(3) Denaturation, primer annealing, extension

(4) Extension, primer annealing, denaturation

179. Some of the characteristics of Bt cotton are :-

- (1) Long fibre and resistance to aphids
- (2) Medium yield, long fibre and resistance to beetle pests
- (3) High yield and production of toxic protein crystals which kill dipteran pests
- (4) High yield and resistance to bollworms

180. Select the **true** statements from the following:

- (A) Insulin from animal source, may develop allergy in some patients.
- (B) C-peptide is not present in mature insulin
- (C) Recombinant therapeutics do not induce unwanted immunological response.
- (D) Insulin can be administered orally to diabetic patients.

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

181. Lipids are arranged within the membrane with ?

- (1) Polar heads towards innerside and the hydrophobic tails towards outside
- (2) Both heads and tails towards outside
- (3) Heads towards outside and tails towards inside
- (4) Both heads and tails towards innerside

182. Which of these is not a function of golgi apparatus ?

- (1) Material packaging (2) Secretion
- (3) Membrane transformation (4) Site of protein synthesis

183. The two sub-units of ribosome remain united at a critical ion level of -

- (1) Calcium (2) Copper
- (3) Manganese (4) Magnesium

184. The checkpoint, where eukaryotes typically arrest the cell cycle if environmental conditions make cell division impossible or if the cell passes into G₀ for an extended period, is the

- (1) G₁ checkpoint (2) G₂ checkpoint
- (3) M checkpoint (4) All of these

185. What is not true about mitosis ?

- (1) It occurs in both sexually and asexually reproducing organisms
- (2) The cell divides only once after one round of DNA replication
- (3) Nucleoli do not reappear at Telophase
- (4) There is no synapsis

Zoology -Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

186. Nerve impulse is generated when the nerve cell undergoes –

- (1) Hyperpolarization (2) Depolarization
- (3) Repolarization (4) Pseudopolarization

187. Which of the following statement is correct for node of Ranvier of nerve -

- (1) Neurilemma is discontinuous
- (2) Myelin sheath is discontinuous
- (3) Both neurilemma & Myelin sheath are discontinuous
- (4) Covered by myelin sheath

188. Which of the following statements is **correct** ?

- (a) In Urochordates like Ascidia, Salpa, Doliolum, Notochord is present in only larval tail.
 - (b) In Cephalochordates like Branchiostoma (Amphioxus or Lancelet) notochord extends from head to tail region is persistent throughout the life.
 - (c) All Chordates are Vertebrates but all vertebrates are not chordates.
 - (d) In Cyclostomata like Petromyzon Scales, Jaw, Cranium, Vertebral column are absent.
- (1) (a), (b), (c) (2) (a) and (b)
 - (3) All, except (d) (4) All of these

189.3 semicircular canals located above utricle lie -

- (1) In a chain-like fashion
- (2) Perpendicular to each other
- (3) In a triangular fashion
- (4) In the same plane

190. Amphibians share with reptiles all of the following characters **except** :

- (1) Cloaca
- (2) External fertilization and Indirect development
- (3) Dioecious and Oviparous
- (4) Cold blooded or poikilotherms

191. Unidirectional transmission of the nerve impulse is maintained by –

- (1) Interneurons
- (2) Myelin sheath
- (3) Synapse
- (4) Membrane polarity

192. Identify the wrong statement with reference to transport of oxygen.

- (1) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin
- (2) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin
- (3) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2
- (4) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

193. Which of the following hormone will be transported to pituitary gland by blood ?

- (1) ADH
- (2) GnRH
- (3) Prolactin
- (4) ACTH

194. Somatostatin inhibits the release of :-

- (1) Prolactin
- (2) Growth Hormone
- (3) Calcitonin
- (4) Gonadotropin

195. Read the given statements carefully.

- (i) Innate immunity is a specific type of defense, that is present at the time of birth.
- (ii) Malignant malaria is caused by Plasmodium falciparum.
- (iii) Malaria could be confirmed by Widal test.
- (iv) Active immunity is slow and takes time to give its full effective response.
- (v) Saliva in the mouth acts as physiological barrier for pathogens.

Which of the above statements are **correct**?

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

196. The male sex accessory ducts include?

- (1) Rete testis, Vasa efferentia, Seminiferous tubules and Seminal vesicles.
- (2) Rete testis, Epididymis, Vas deferens and Urethra
- (3) Rete testis, Vasa efferentia, Epididymis and Vas deferens.
- (4) Vasa efferentia, Vas deferens, Ejaculatory duct and Penis.

197. Match the stages of meiosis in Column-I to their characteristic features in Column-II and select the correct option using the codes given below :

| | Column-I | | Column-II |
|-----|-------------|-------|---------------------------------------|
| (a) | Pachytene | (i) | Pairing of homologous chromosomes |
| (b) | Metaphase-I | (ii) | Terminalization of chiasmata |
| (c) | Diakinesis | (iii) | Crossing over takes place |
| (d) | Zygotene | (iv) | Chromosomes align at equatorial plate |

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

198. Which of the following is true for nucleolus ?

- (1) It is a site for active ribosomal RNA synthesis.
- (2) Larger nucleoli are present in dividing cells
- (3) It takes part in spindle formation
- (4) It is a membrane-bound structure.



199. The term "competent" refers to

- (1) Increasing the competition between cells
- (2) Making cells impermeable for DNA
- (3) Increasing the efficiency with which DNA enters the bacterium through pores in its cell wall
- (4) Making cells permeable for divalent cations

200. Select the correct option to fill up the blanks.

- (i) _____ enzyme is crucial for the immune system to function and its absence is caused by the deletion of a gene.
 - (ii) Insulin consists of _____ and _____ that are linked together by _____.
 - (iii) Transgenic mice are being used to test the safety of the _____.
 - (iv) _____ involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA.
- (1) (i) Adenosine deaminase, (ii) A-chain, B-chain, disulphide bridges. (iii) polio vaccine (iv) RNAi
- (2) (i) RNAi (ii) A-chain, B-chain, disulphide bridges, (iii) adenosine deaminase, (iv) polio vaccine
- (3) (i) Adenosine deaminase (ii) A-chain, B-chain, hydrogen bonds (iii) polio vaccine (iv) RNAi
- (4) (i) RNAi (ii) A-chain, B-chain, noncovalent bridges, (iii) polio vaccine (iv) adenosine deaminase

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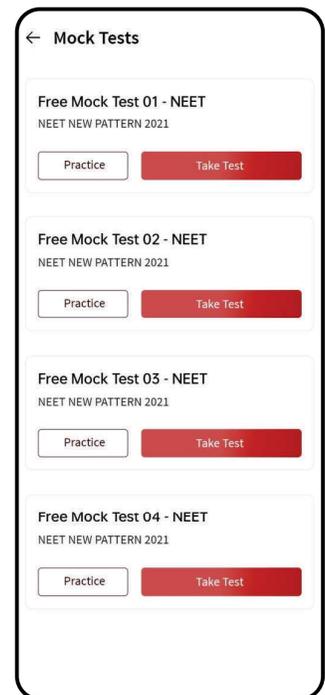
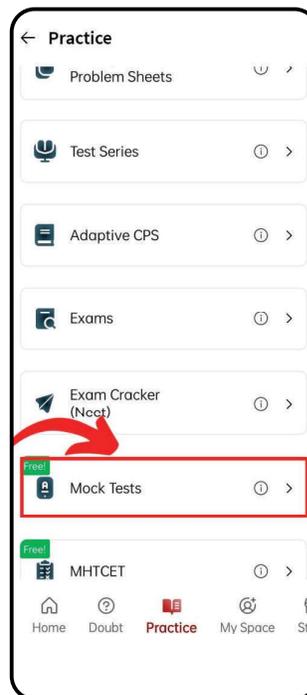
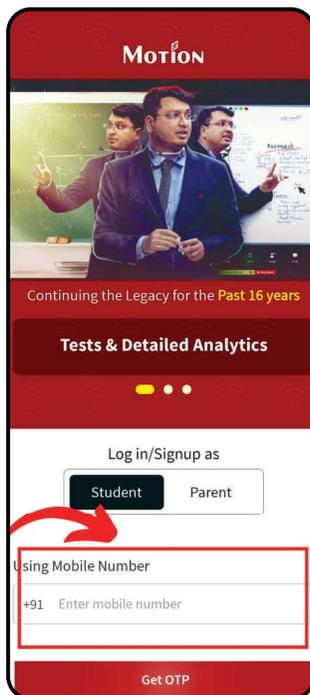
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