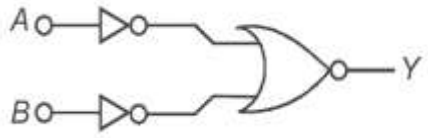
Physics

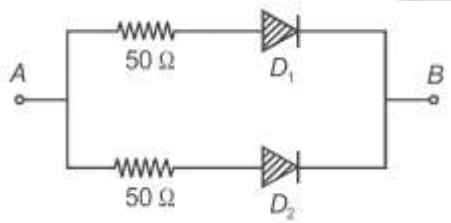
1. **Half- life of radioactive element is 5 min. At the end of 20 min its % quantity is disintegrated.**
   (a) 6.25 (b) 75
   (c) 25 (d) 93.75
2. **Which logic gate is represented by the following logic gates?**



(a) NOR (b) NAND

(c) AND (d) OR

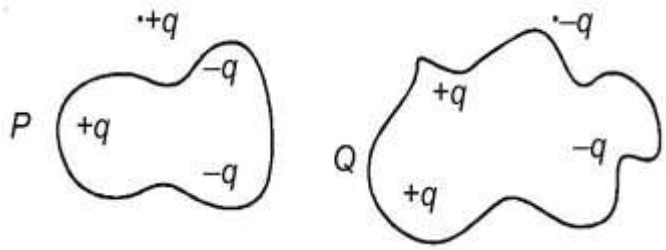
3. **In CE NPN transistor 10^{10} electrons enter the emitter in 10^{-6} s when it is connected to battery. About 5% electrons recombine with holes in the base. The current gain of the transistor is_____ $(e = 1.6 \times 10^{-19} C)$**
   (a) 0.98 (b) 19
   (c) 49 (d) 0.95
4. **For the circuit shown in the figure. The equivalent resistance between point A & B for the two cases (i) $V_A > V_B$, (ii) $V_B > V_A$ respectively is ____ Ω and ____ Ω respectively. (D_1 and D_2 are ideal diodes)**



(a) $25, \infty$ (b) $50, \infty$

(c) $\infty, 25$ (d) 25,25

5. **The amplitude of carrier wave is 12 V. For modulation index of 50%, the amplitude of modulating signal is_____ V.**
   (a) 3 (b) 6
   (c) 12 (d) 9
6. **Height of T.V. tower is h_T. The area of transmission of T.V. waves is $\propto$.**
   (a) h_T^2 (b) $h_T^{1/2}$
   (c) $h_T^{1/3}$ (d) h_T
7. **The shape of wave front at a very large distance from source is _____**
   (a) Circular (b) Spherical
   (c) Cylindrical (d) Plane
8. **The total energy of an electron in the first excited state of H -atom is -3.4 eV, then its potential energy is in this state is ____ eV.**
   (a) 6.8 (b) 3.4
   (c) -6.8 (d) -3.4
9. **Electric field intensity at points in between and outside two thin separated parallel sheets of infinite dimension with like charges of same surface charge density (σ) are ___ and____ respectively.**
   (a) $\sigma/\epsilon_0, \sigma/\epsilon_0$ (b) $0, \sigma/\epsilon_0$
   (c) 0,0 (d) $\sigma/\epsilon_0, 0$
10. **Arrangement of charges are shown in the figure. Flux linked with the closed surface P and Q respectively are ___ and ____**



(a) Zero, zero (b) $\frac{q}{\epsilon_0}, \frac{-q}{\epsilon_0}$

(c) $-q/\epsilon_0, q/\epsilon_0$ (d) q/ϵ_0, zero

11. The dimensional formula of capacitance is ____ Take Q as the dimension formula of charge.

(a) $M^1L^{-2}T^{-2}Q^{-2}$ (b) $M^1L^2T^{-2}Q^{-2}$

(c) $M^1L^{-2}T^2Q^2$ (d) $M^{-1}\ L^{-2}\ T^2Q^2$

12. A uniform electric field is prevailing in X - direction in certain region. The co-ordinates of points P, Q, and R are $(0,0)$, $(2,0)$ and $(0,2)$ respectively. Which of the following alternatives is true for the potentials at these points?

(a) $V_P = V_Q, V_Q > V_Q$ (b) $V_P > V_Q, V_P = V_R$

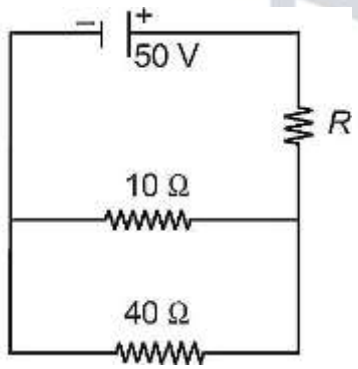
(c) $V_P < V_R, V_Q = V_R$ (d) $V_P = V_Q, V_P > V_R$

13. An electric dipole of dipole moment $\vec{P}$ is placed parallel to the uniform electric field of intensity $\vec{E}$. On rotating it through 180°, the amount of work done is ____

(a) 2PE (b) Zero

(c) PE (d) $-2PE$

14.



In above circuit if current through 10Ω resistor is 2.5 A, value of R is .

(a) 50Ω (b) 40Ω

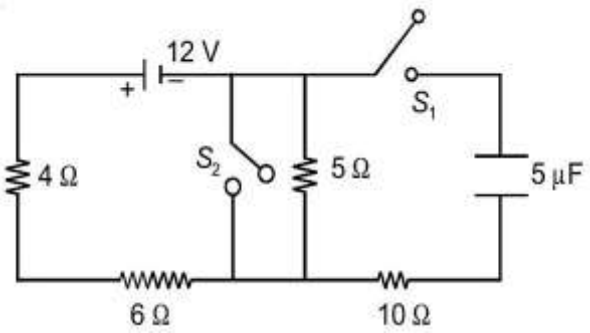
(c) 8Ω (d) 10Ω

15. Brown, Red and Orange coloured bands on a Carbon resistor are followed by silver band. The value of resistor is ____

(a) $320\Omega \pm 5\%$ (b) $12k\Omega \pm 5\%$

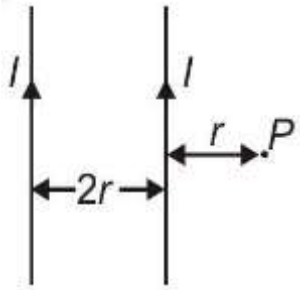
(c) $320\Omega \pm 10\%$ (d) $12k\Omega \pm 10\%$

16. What is the current in the 4Ω resistor when switch S_1 is open and switch S_2 is closed in the given circuit?



(a) 3.0 A (b) 0.8 A
(c) 1.5 A (d) 1.2 A

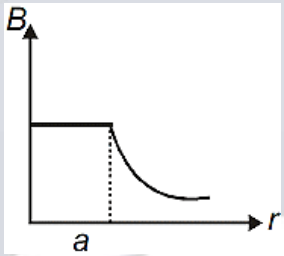
17. Two very long straight wires are set parallel to each other. Each carries a current / in the same direction and the separation between them is 2r. The intensity of magnetic field at point P as shown in figure is___ .

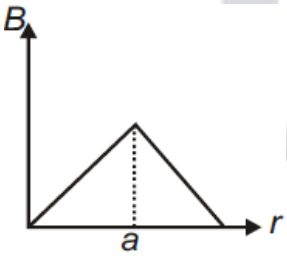


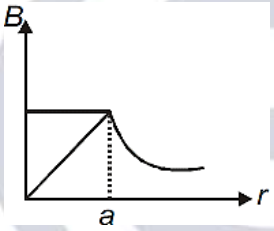
(a) $\frac{3}{8}\frac{\mu_0 I}{\pi r}$ (b) $\frac{2\mu_0 I}{\pi r}$
(c) $\frac{2}{3}\frac{\mu_0 I}{\pi r}$ (d) $\frac{\mu_0 I}{2\pi r}$

18. The magnetic field due to a straight long conductor of uniform cross-section of radius a and carrying a steady current is represented by

(a) 

(b) 

(c) 

(d) 

19. A proton is moving perpendicular to a uniform magnetic field of 2.5 tesla with 2 MeV kinetic energy. The force on proton is ____ N. (Mass of proton $= 1.6 \times 10^{-27}$ kg. Charge of proton $= 1.6 \times 10^{-19}$C)

(a) 8×10^{-12} (b) 8×10^{-11}

(c) 3×10^{-11} (d) 3×10^{-10}

20. A particle of mass m and charge q is incident on XZ plane with velocity v in a direction making angle θ with a uniform magnetic field applied along X -axis. The nature of motion performed by the particle is
(a) Circular (b) Helical
(c) Parabola(d) Straight line

21. Select the dimensional formula of $B^2/2\mu_0$.

(a) $M^1\ L^1\ T^2$ (b) $M^{-1}\ L^1 T^2$

(c) $M^{-1}\ L^{-1}\ T^{-2}$ (d) $M^1\ L^{-1}\ T^{-2}$

22. μ_0 is permeability of vacuum, χ_m is susceptibility then permeability of material is
(a) $\mu = \mu_0 1 + \chi_m$ (b) $\mu = \mu_0(\chi_m - 1)$
(c) $\mu = \mu_0(1 - \chi_m)$ (d) $\mu = \mu_0(1 + \chi_m)$

23. In Raman scattering, Stokes and Antistokes lines respectively represents lines with ___ and___ wavelength.
(a) Low, High (b) High, High
(c) High, Low (d) Low, Low

24. For the astronomical telescope, the focal length of objective lens is f_0 and the eye piece lens is f_e. Then the tube length of the telescope is ____
(a) $L \geq f_0 - f_e$ (b) $L \geq f_0 + f_e$
(c) $L < f_0 + f_e$ (d) $L \leq f_0 - f_e$

25. Time taken by the sunlight to pass through a slab of 4 cm and refractive index 1.5 is ____ s.
(a) 2×10^{10} (b) 2×10^{-8}
(c) 2×10^{8} (d) 2×10^{-10}

26. A convex lens of focal length 12.5 cm is used as a simple microscope. When the image is formed at infinite, Magnification is____ (Near point for the normal vision is 25 cm).
(a) 25 (b) 2.5
(c) 2.0 (d) 1.0

27. In experiment of Davisson-Germer, emitted electron from filament is accelerated through voltage V then de-Broglie wavelength of that electron will be ____ m.
(a) $\frac{2Vem}{\sqrt{h}}$ (b) $\frac{\sqrt{h}}{2Vem}$
(c) $\frac{\sqrt{2Vem}}{h}$ (d) $\frac{h}{\sqrt{2Vem}}$

28. Photons of energy 1 eV and 2.5 eV successively illuminated a metal whose work function is 0.5 eV. The ratio of maximum speeds of emitted electron is
(a) 1:3 (b) 1:2
(c) 3:1 (d) 2:1

29. The number of turns in the coil of an A.C. generator are 100 and its cross-sectional area is $2.5\ m^2$. The coil is revolving in a uniform magnetic field of strength 0.3 T with the uniform angular velocity of $60 rad/s$. The value of maximum value produced is ____ kV.
(a) 1.25 (b) 4.50
(c) 6.75 (d) 2.25

30. If R and L denote resistance and inductance respectively which of the following has dimension of time?
(a) $\sqrt{\frac{L}{R}}$ (b) $\frac{L}{R}$
(c) $\sqrt{\frac{R}{L}}$ (d) $\frac{R}{L}$

31. In an AC circuit, current is 3 A and voltage 210 V and power is 63 W. The power factor is
(a) 0.11 (b) 0.09
(c) 0.08 (d) 0.10

32. For an A.C given by $I = 50\cos(100t + 45°)A$. The value of I_{rms} = _____ A.
(a) Zero (b) $50\sqrt{2}$
(c) 25 (d) $25\sqrt{2}$

33. An A.C voltage $V = 5\cos(1000t)V$ is applied to a L-R series circuit of inductance 3 mH and resistance 4Ω. The value of maximum current in the circuit is ____ A.
(a) 0.8 (b) 1.0
(c) $\frac{5}{7}$ (d) $\frac{5}{\sqrt{7}}$

34. In medicine, to destroy cancer cells ____ rays are used.
(a) Ultraviolet (b) Visible
(c) Gamma (d) Infrared

35. For a radiation of 9 GHz passing through air. The number of waves passing through 1 m length is
(a) 30 (b) 5
(c) 20 (d) 3

36. In Young's double slit experiment, if the distance between two slits is equal to the wavelength of used light. Then the maximum number of bright fringes obtained on the screen will be
(a) Infinite (b) 3
(c) 7 (d) 5

37. If the wavelength of light used is 6000Å. The angular resolution of telescope of objective lens having diameter 10 cm is ____ rad.

(a) 7.52×10^{-6} (b) 6.10×10^{-6}
(c) 6.55×10^{-6} (d) 7.32×10^{-6}

38. In the discharge tube as the density of atom increases, the intensity of spectral lines

(a) Decreases continuously

(b) Increases continuously

(c) Remains constant

(d) None of these

39. The ionization potential of hydrogenic ions P and Q are V_P and V_Q respectively. If $V_Q < V_P$ then radii
(a) $r_P > r_Q$ (b) $r_P < r_Q$
(c) $r_P = r_Q$ (d) None of these

40. In the given nuclear reaction

$$^{9}_{4}\mathbf{Be} + {}^{4}_{2}\mathbf{He} \longrightarrow {}^{12}_{6}\mathbf{C} + \mathbf{X}$$

X represents
(a) Neutron (b) Proton
(c) Positron (d) Electron

Chemistry

41. Which oxidised product is obtained when benzene diazonium chloride reacts with ethanol?
(a) Acetaldehyde (b) Phenol
(c) Benzaldehyde (d) Benzene

42. Which amino acid contain secondary amino group in its structure?
(a) Proline (b) Glycine
(c) Alanine (d) Lysine

43. Which of the following protein is present in silk?
(a) Insulin (b) Keratin
(c) Albumin (d) Myosin

44. Which of the following polymer is condensation as well as cross-linked polymer?
(a) Bakelite (b) Nylon 6,6
(c) Nylon-2, Nylon-6 (d) Dacron

45. Which polymer is used in the preparation of hosepipe?
(a) Orlon (b) Polystyrene
(c) Teflon (d) Neoprene

46. From the following substances, which carbohydrate has the maximum sweetness?
(a) Sucrolose (b) Saccharin
(c) Aspartame (d) Alitame

47. Which type of drug is veronal?

(a) Antihistamine (b) Antifertility

(c) Tranquilizer (d) Antimicrobial

48. In which of the following pair of complexes, the experimental magnetic moment and the geometric shapes are same?

(a) $K[MnO_4]$ and $K_2[NiCl_4]$

(b) $K_2[Ni(CN)_4]$ and $K_4[Ni(CN)_4]$

(c) $K_2[Ni(CN)_4]$ and $[Ni(NH_3)_2Cl_2]$

(d) $K_3[Fe(CN)_6]$ and $K_4[Fe(CN)_6]$

49. A crystalline solid is made up of X and Y atoms, X atoms possesses CCP structure and Y atoms are arranged in tetrahedral voids. If all the atoms situated on a diagonal of one side are removed, what will be the molecular formula of the crystalline solid?

(a) X_3Y_2 (b) X_4Y_3
(c) X_2Y_3 (d) None of these

50. In which crystal system, the length of each edge (edge length) is same?

(a) $BaSO_4$ (b) HgS

(c) $CaSO_4$ (d) ZnO

51. The depression in freezing point for 0.01 m aqueous solution of $K_x[Fe(CN)_6]$ is 0.0744 K . The molal depression constant for solvent is $1.86\ K\ kg\ mol^{-1}$. If the solute undergoes complete dissociation, what is the correct molecular formula for the solute?

(a) $K_2[Fe(CN)_6]$ (b) $K_3[Fe(CN)_6]$
(c) $K[Fe(CN)_6]$ (d) $K_4[Fe(CN)_6]$

52. At certain temperature 1.6% solution of an unknown substance is isotonic with 2.4% solution of Urea. If both the solutions have the same solvent and both the solutions have same density $1gm/cm^3$, what will be the molecular mass of unknown substance in gm/mol.

[Molecular mass of urea $= 60gm/mol$]
(a) 30 (b) 40
(c) 80 (d) 90

53. Which of the following aqueous solution will have the boiling point $102.2°C$? The molal elevation constant for water is $2.2\ K\ kg\ mol^{-1}$.

(a) 1 mCH_3COOH (b) 1 m NaCl
(c) 1 M NaCl (d) 1 m glucose

54. The graph of $\sqrt{C} \rightarrow \Lambda_m$ for an aqueous solution of which substance is not obtained as a straight line?

(a) HCl (b) NaCN
(c) NaCl (d) HCN

55. Which option is incorrect for the working cell?

$$Pt\left|Cl_{2(g)}\right|Cl^-_{(C_1)}\left\|Cl^-_{(C_2)}\right|Cl_{2(g)}\left|Pt\right.$$
(1 bar) (1 bar)

(a) $\Delta G = -ve$ (b) $C_2 > C_1$
(c) $E^\circ_{cell} = 0$ (d) $C_1 > C_2$

56. The pH of the solution ___ during the electrolysis of dilute aqueous solution of $CuSO_4$.

(a) First increases then decreases

(b) Decreases

(c) Remains constant

(d) Increases

57. Which of the following process is for purification of metals?

(a) Froath floatation (b) Leaching

(c) Liquidation (d) Washing

58. Which of the following is the Ore of Cu?

(a) Ciderite (b) Magnetite
(c) Calamine (d) Malachite

59. How many gm of the oxidizing agent gets reduced in the reaction of 65.4 gm of Zn with concentrated nitric acid?

[Atomic mass: $Zn = 65.4, N = 14, H = 1, O = 16 gm mol^{-1}$]

(a) 65.4 (b) 126
(c) 130.8 (d) 252

60. In which of the following acid, the maximum number of hydrogen atoms are joined directly with phosphorous?

(a) Phosphoric acid (b) Phosphorous acid

(c) Pyrophosphoric acid (d) Phosphonic acid

61. The reaction of $(CH_3)_3CONa$ with ____ reagent is the most easy?

(a) C_6H_5Br (b) $(CH_3)_2CHBr$
(c) $(CH_3)_3CBr$ (d) CH_3CH_2Br

62. The organic product of which reaction from the following is used as anaesthetic?

(a) $CS_2 + 3Cl_2 \xrightarrow{\text{Anh. } AlCl_3}$

(b) Chloral $+Ca(OH)_2 \rightarrow$

(c) Chloral + Chlorobenzene $\rightarrow$

(d) $CHCl_3 \xrightarrow{H_2/Ni}$

63. Which of the following compound gives only one monochloro product on its chlorination in presence of sunlight?

(a) n – butane (b) Iso pentane
(c) Neo pentane (d) n - pentane

64. Which products are obtained when phenyl ethanoate reacts in presence of Anh $\cdot AlCl_3$?

(a) o-Ethoxy acetophenone and p-Ethoxy acetophenone

(b) o-Hydroxy acetophenone and p-Hydroxy acetophenone

(c) o-Methyl acetophenone and p-Methyl acetophenone

(d) o-Methoxy acetophenone and p-Methoxy acetophenone

65. How many gram of ethanol is required in the reaction with Na metal in order to give 560 ml. dihydrogen gas at STP?

(a) 11.5 (b) 1.15
(c) 4.6 (d) 2.3

66. The IUPAC name of the product obtained by the oxidation of phenol with the help of chromic acid is

(a) Cyclo hexa-2,4-diene-1,4-diol

(b) Cyclo hexa-2,4-diene-1,4-dione

(c) Cyclo hexa-2,5-diene-1,4-diol

(d) Cyclo hexa-2,5-diene-1,4-dione

67. At 298 K temperature the activation energy for the reaction $x_2 + y_2 \rightarrow 2xy + 20$ kJ is 15 kJ . What will be the activation energy for the reaction $2xy \rightarrow x_2 + y_2$?

(a) -15 kJ (b) +35 kJ
(c) -5 kJ (d) -35 kJ

68. The half-life period for a radioactive substance is 15 minutes. How many grams of this radioactive substance is decayed from 50 gram of substance after one hour?
(a) 37.5 (b) 25
(c) 43.75 (d) 46.875

69. The rate constant value for a reaction is $1.75 \times 10^2\ L^2\ mol^{-2} sec^{-1}$. The half-life period $t_{1/2} \propto$ ___
(a) $[R_0]^{-1}$ (b) $[R_0]^{-2}$
(c) $[R_0]^2$ (d) $[R_0]$

70. The values of slope and intercept in the graph of Freundlich adsorption isotherm at $25^\circ C$ temperature are 0.5 and 0.4771 respectively. What will be the proportion of adsorption at 4 bar pressure?
(a) 12 (b) 6
(c) 24 (d) 3

71. In which emulsion coloured droplets are obtained when oil soluble dye is added to it?
(a) Cod liver oil (b) Cold cream
(c) Hair cream (d) Milk

72. Which of the following is the correct order for the theoretical magnetic moment?

(a) $Cr^{3+} > Mn^{2+} = Fe^{3+}$ (b) $Cr^{3+} = Mn^{2+} < Fe^{3+}$

(c) $Cr^{3+} < Mn^{2+} = Fe^{3+}$ (d) $Cr^{3+} < Mn^{2+} < Fe^{3+}$

73. Which statement is incorrect with reference to inner transition elements?

(a) The oxides of lanthanoids are basic

(b) Pm is radioactive element among actinoids

(c) The values of ionisation enthalpy of actinoids are less than the values of ionisation enthalpy of lanthanoids

(d) Only in the electronic configuration of lanthanoids like Ce, Gd, Lu the electrons are filled in 5d orbitals

74. Which of the following complex ions absorbs the light of minimum wavelength?
(a) $[Co(H_2O)_6]^{3+}$ (b) $[CoF_6]^{3-}$
(c) $[Co(CN)_6]^{3-}$ (d) $[Co(NH_3)_6]^{3+}$

75. Which of the following pairs of complexes whose aqueous solutions gives pale yellow and white precipitates respectively with $0.1M AgNO_3$?

(a) $[Pt(NH_3)_4Br_2]Cl_2$ and $[Pt(NH_3)_4Cl_2]Br_2$

(b) $[Co(NH_3)_5NO_3]Br$ and $[Co(NH_3)_5Br]NO_3$

(c) $[Pt(NH_3)_4Cl_2]Br_2$ and $[Pt(NH_3)_4Br_2]Cl_2$

(d) $[Co(NH_3)_5NO_3]Cl$ and $[Co(NH_3)_5Cl]NO_3$

76. Which of the following is the disproportionation redox reaction?

(a) $2CH_3COOH \xrightarrow{P_2O_5/\Delta}$

(b) $2CH_3CHO \xrightarrow{\text{dil NaOH}}$

(c) $2CH_3COCH_3 \xrightarrow[H_2O]{Mg-Hg}$

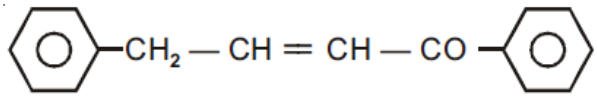
(d) $2HCHO \xrightarrow{50\%NaOH(aq)}$

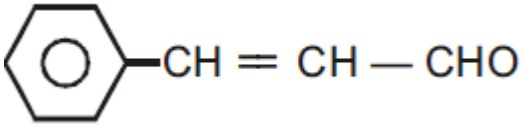
77. Which compound does not give Benedict test?

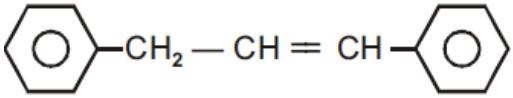
(a) $(CH_3)_3C \cdot CHO$ (b) C_6H_5CHO

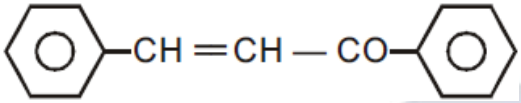
(c) CH_3CHO (d) $(CH_3)_2 \cdot CHCHO$

78. What is the main product obtained by the cross-aldol condensation of benzene carbaldehyde and 1-Phenyl-Ethane - 1-one?

(a) 

(b) 

(c) 

(d) 

79. The main product of which of the following reactions gives tertiary sulphonamide with benzene sulphonyl chloride?

(a) $C_6H_5Cl + 2NH_3 \xrightarrow[473k,\ 60bar]{[Cu_2O]}$

(b) $CH_3CH_2NO_2 \xrightarrow{LiAlH_4}$

(c) $CH_3CH_2NC \xrightarrow{LiAlH_4}$

(d) $CH_3CONH_2 \xrightarrow[\Delta]{Br_2/NaOH}$

80. Which order is improper for amine compounds?

(a) Order of basicity in aq. medium:

$$CH_3 - NH - CH_3 > CH_3NH_2 > CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{N}} - CH_3$$

(b) Order of boiling point:

$$CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{N}} - CH_3 > CH_3 - CH_2 - NH - CH_3 > CH_3 - CH_2 - CH_2 - NH_2$$

(c) Order of basicity in gaseous state:

$$CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{N}} - CH_3 > CH_3 - NH - CH_3 > CH_3NH_2$$

(d) The order of aqueous solubility:

$CH_3 - \underset{\underset{CH_3}{|}}{N} - CH_3 < CH_3 - CH_2 - NH - CH_3 < CH_3 - CH_2 - CH_2 - NH_2$

Mathematics

81. If the length of the subnormal of a curve is constant and if it passes through the origin, then the equation of curve is ___

(a) $x^2 + y^2 = k^2; k \in R$
(b) $y^2 = kx; k \in R$
(c) $x^2 = ky^2; k \in R$
(d) $x^2 - y^2 = k^2; k \in R$

82. The integrating factor of the differential equation $\frac{dy}{dx} = \frac{1}{x+y+2}$ is

(a) e^{x+y+2} (b) e^y
(c) e^{-y} (d) $\log|x + y + 2|$

83. If $\bar{a} + \bar{b} + \bar{c} = \bar{0}$ and $|\bar{a}| = 3, |\bar{b}| = 5, |\bar{c}| = 7$ and $(\bar{a}, \bar{b}) = \alpha$, then $\alpha =$.

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$
(c) $\frac{\pi}{3}$ (d) $\frac{5\pi}{6}$

84. For $A(1, -2, 4), B(5, -1, 7), C(3, 6, -2), D(4, 5, -1)$, the projection of $\overrightarrow{AB}$ on $\overrightarrow{CD}$ is ____

(a) $(2\sqrt{3}, -2\sqrt{3}, 2\sqrt{3})$ (b) $\frac{3}{13}(4,1,3)$
(c) $(1, -1, 1)$ (d) $(2, -2, 2)$

85. The position vector of point A is $(4, 2, -3)$. If p_1 is perpendicular distance of A from XY-plane and p_2 is perpendicular distance from Y-axis, then $p_1 + p_2 =$ ___

(a) 8 (b) 3
(c) 2 (d) 7

86. Plane $ax + by + cz = 1$ intersect axes in A, B, C respectively. If G $\left(\frac{1}{6}, -\frac{1}{3}, 1\right)$ is a centroid of $\triangle$ ABC, then $a + b + 3c =$.

(a) $\frac{4}{3}$ (b) 4
(c) 2 (d) $\frac{5}{6}$

87. The direction angles of the line $x = 4z + 3, y = 2 - 3z$ are α, β and γ, then $\cos\alpha + \cos\beta + \cos\gamma =$ ____

(a) $\frac{2}{\sqrt{26}}$ (b) $\frac{8}{\sqrt{26}}$
(c) 1 (d) 2

88. If the normal of the plane makes an angles $\frac{\pi}{4}, \frac{\pi}{4}$ and $\frac{\pi}{2}$ with positive X -axis, Y -axis and Z -axis respectively and the length of the perpendicular line segment from origin to the plane is $\sqrt{2}$, then the equation of the plane is ____

(a) $x + y + z = \sqrt{2}$ (b) $x + y + z = 1$
(c) $x + y = 2$ (d) $x = \sqrt{2}$

89. If $f: R - \left\{\frac{3}{5}\right\} \to R - \left\{\frac{3}{5}\right\}; f(x) = \frac{3x+1}{5x-3}$, then ___

(a) $f^{-1}(x) = 2f(x)$ (b) $f^{-1}(x) = f(x)$
(c) $f^{1}(x) = -f(x)$ (d) $f^{-1}(x)$ doesnot exists

90. $f: R \to R, f(x) = 3x + 2$

$g: R \to R, g(x) = 6x + 5$

for the given functions $(g \circ f^{-1})(10) =$ _____

(a) 21 (b) 29
(c) 7 (d) $\frac{8}{3}$

91. Relation $S = \{(1,2),(2,1),(2,3)\}$ is defined on the set $\{1,2,3\}$ is .
(a) not transitive (b) symmetric
(c) reflexive (d) equivalence

92. $\tan^{-1}(\cot x) + \cot^{-1}(\tan x) =$_____ (where, $0 < x < \frac{\pi}{2}$)
(a) $\frac{\pi}{2}$ (b) 2x
(c) $\pi - 2x$ (d) $\pi - x$

93. $\cos\left(2\left(\tan^{-1}\frac{1}{5} + \tan^{-1}5\right)\right) =$ ___
(a) $\frac{1}{\sqrt{2}}$ (b) 0
(c) 1 (d) -1

94. For $\triangle ABC$ if $A = \tan^{-1}2, B = \tan^{-1}3$, then $C =$.
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$
(c) $\frac{\pi}{3}$ (d) $\frac{5\pi}{6}$

95. If the area of the triangle with vertices $(2,5),(7,k)$ and $(3,1)$ is 10, then find the value of k.
(a) -5 or 35 (b) 5 or -35
(c) 15 or -5 (d) -5 or -25

96. If $k = p + q + r$, then the value of $\begin{vmatrix} k+r & p & q \\ r & k+p & q \\ r & p & k+q \end{vmatrix}$ is ____
(a) $2k^2$ (b) $2k^3$
(c) k^3 (d) $3k^2$

97. If maximum and minimum values of
$D = \begin{vmatrix} 1 & -\cos\theta & -1 \\ \cos\theta & 1 & -\cos\theta \\ 1 & \cos\theta & 1 \end{vmatrix}$ are p and q
respectively, then the value of $2p + 3q$ is
(a) 16 (b) 6
(c) 14 (d) 8

98. If $A = \begin{bmatrix} 1 & 4 & 4 \\ 4 & 1 & 4 \\ 4 & 4 & 1 \end{bmatrix}$, then $A^2 - 6A =$.
(a) $27I_3$ (b) $5I_3$
(c) $20I_3$ (d) $30I_3$

99. If $\begin{bmatrix} 2 & 3 & 4 \end{bmatrix}\begin{bmatrix} 1 & x & 3 \\ 2 & 4 & 5 \\ 3 & 2 & x \end{bmatrix}\begin{bmatrix} x \\ 2 \\ 0 \end{bmatrix} = 0$, then x .
(a) $\frac{7}{3}$ (b) $\frac{5}{3}$
(c) $-\frac{5}{3}$ (d) $-\frac{7}{3}$

100. $\frac{d}{dx}\left(\sqrt{3}\sin\left(2x + \frac{\pi}{3}\right) + \cos\left(2x + \frac{\pi}{3}\right)\right) =$ _____
(a) $4\cos 2x$ (b) $-4\sin 2x$
(c) $4\sin 2x$ (d) $-4\cos 2x$

101. For the curve $f(x) = (x-5)^2$, applying mean value theorem on $[4,6]$ the tangent at _____ is parallel to the chord joining $A(4,1), B(6,1)$.
(a) (4,6) (b) $\left(\frac{9}{2},\frac{1}{4}\right)$
(c) (0,5) (d) (5,0)

102. Function $f(x) = \begin{cases} (\log_2 2x)^{\log_x 8}; & x \neq 1 \\ (k-1)^3; & x = 1 \end{cases}$ is continuous at $x = 1$, then $k =$_____

(a) $e + 1$ (b) $e^{1/3}$

(c) e^3 (d) $e - 1$

103. $\int \frac{dx}{\cos x\sqrt{1+\cos 2x+\sin 2x}} = +C; \left(0 < x < \frac{\pi}{4}\right)$

(a) $2 + \sqrt{\cot x}$ (b) $\sqrt{\tan x + 1}$

(c) $\sqrt{2 + 2\tan x}$ (d) $\sqrt{2 + 2\cot x}$

104. If $\int \frac{\sin 2x}{\sin 5x \sin 3x} dx = \frac{1}{3}\log|\sin 3x| - \frac{1}{5}\log|f(x)| + C$, then $f(x) =$____

(a) $\sin 5x$ (b) $\sin 4x$

(c) $\sin 2x$ (d) $\sin 6x$

105. The probability distribution of a discrete random variable X is given in the following table:

$X = x$	0	1	2
$P(x)$	$4C^3$	$4C - 13C^2$	$7C - 1$

$C > 0$ then $C =$____

(a) 2 (b) 1

(c) $\frac{1}{4}$ (d) 1 and $-\frac{1}{4}$

106. The probability function of a binomial distribution is $P(x) = \binom{6}{x} p^x q^{6-x}, x = 0, 1, 2, \ldots, 6$. If $2P(2) = 3P(3)$, then $p =$_____

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

(c) $\frac{1}{2}$ (d) $\frac{1}{5}$

107. The mean and standard deviation of random variable X are 10 and 5 respectively, then $E\left(\frac{X-15}{5}\right)^2 =$____

(a) 4 (b) 3

(c) 2 (d) 5

108. The corner points of the feasible region determined by the system of linear constraints are (0,10), $(5, 5)$, $(25, 20)$ and $(0, 30)$. Let $Z = px + qy$, where $p, q > 0$. Condition on p and q so that the maximum of Z occurs at both the points $(25, 20)$ and $(0, 30)$ is_____ .

(a) $5p = 2q$ (b) $2p = 5q$

(c) $p = 2q$ (d) $q = 3p$

109. Two curves $a_i x^2 + b_i y^2 = 1; i = 1, 2$ where, $a_1 \neq a_2, b_1 \neq b_2, a_1, a_2, b_1, b_2 \neq 0$ may intersect orthogonally if_____

(a) $a_1 a_2 = b_1 b_2$ (b) $a_1^{-1} - a_2^{-1} = b_1^{-1} - b_2^{-1}$

(c) $a_1^{-1} + a_2^{-1} = b_1^{-1} + b_2^{-1}$ (d) $a_1 b_2 = a_2 b_1$

110. The sides of two squares are x and y respectively, such that $y = x + x^2$. The rate of change of area of second square with respect to area of first square is _____

(a) $x^2 + 3x - 1$ (b) $2x^2 - 3x + 1$

(c) $2x^2 + 3x + 1$ (d) $1 + 2x$

111. The approximate value of $\sqrt[3]{-0.99}$ is_____.

(a) -0.9967 (b) -0.9976

(c) -1.0033 (d) -1

112. $\int \frac{dx}{\sqrt{x^{10}-x^2}}; x > 1 = +C.$

(a) $\frac{1}{4}\log\left|\sqrt{x^{10} - x^2} + x^2\right|$ (b) $\frac{1}{2}\log|x^{10} - x^2|$

(c) $-\frac{1}{4}\sec^{-1}(x^4)$ (d) $\frac{1}{4}\sec^{-1}(x^4)$

113. $\int e^{\sin x}(x\cos x - \sec x\tan x)dx = \_\_\_\_\_ + C$

$0 < x < \frac{\pi}{2}$.

(a) $e^{\sin x}(x - \sec x)$ (b) $e^{\sin x}(\sec x - x)$

(c) $e^{\sin x}x\cos x$ (d) $e^{\sin x}(x + \sec x)$

114. $\int \sin(11x) \cdot \sin^9 x dx = \quad + C.$

(a) $\frac{\sin(10x)\cdot\sin^{10} x}{10}$ (b) $\frac{\sin^{11} x}{11}$

(c) $\frac{\sin(9x)\cdot\sin^9 x}{9}$ (d) $\frac{\cos(10x)\cdot\cos^{10} x}{10}$

115. $\int_{-\log 3}^{\log 3} \cot^{-1}\left(\frac{e^x-1}{e^x+1}\right) dx =$

(a) $\frac{\pi}{2}\log 3$ (b) $\pi\log 3$

(c) 0 (d) $\pi\log 9$

116. $\int_0^{100\pi} |\cos x| dx = \_\_\_\_\_$

(a) 200 (b) 100

(c) 50 (d) 0

117. $\int_0^{\pi/2} (x - [\sin x])dx = \_\_\_\_$

(where $[x]$ = greatest integer not greater than x).

(a) $\frac{\pi^2}{8} - 2$ (b) $\frac{\pi^2}{4} - 1$

(c) $\frac{\pi^2}{8} - 1$ (d) $\frac{\pi^2}{8}$

118. **Area bounded between two latus-rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1; a > b$ is ____**

(where, e is eccentricity of the ellipse)

(a) $2b(be + a\sin^{-1} e)$ (b) $8b(be + a\sin^{-1} e)$

(c) $b(be + a\sin^{-1} e)$ (d) $4b(be + a\sin^{-1} e)$

119. **The area of the region bounded by the curves $f(x) = \sin \pi x$ and X-axis is_____ where $x \in [-1, 2]$.**

(a) 8π (b) $\frac{8}{\pi}$

(c) $\frac{6}{\pi}$ (d) 6π

120. **The order and degree of the differential equation**

$\left(\frac{d^2y}{dx^2}\right)^3 + 3\frac{dy}{dx} = \sqrt{x}; x > 0$ **are ___ respectively.**

(a) 2 and 6 (b) 3 and 2

(c) 2 and 3 (d) 2 and degree is undefined

Biology

121. **Assertion A: In Bt cotton B. thuringiensis produces a toxic insecticidal crystalline protein which destroys bollworms.**

Reason R: B. thuringiensis produces this toxic protein in an inactive form, but when an insect ingests this inactive protein, it is converted into active form of toxin due to the alkaline pH of gut which solubilises the crystals, which is responsible for the death of bollworm.

(a) A is correct and R is wrong

(b) A is wrong and R is correct

(c) A and R both are correct but R is not the explanation of A

(d) A and R both are correct and R is the correct explanation of A

122. How many number of barr body will be present in female suffering from Turner's syndrome?

(a) Zero (b) One

(c) Two (d) Three

123. What does ' R ' indicate in EcoRI?

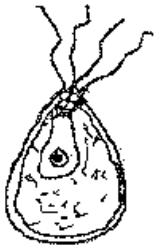
(a) Enzyme isolated from species of bacteria

(b) Genus of bacteria

(c) Sequence of enzyme

(d) Species of bacteria

124. Which is the motile zoospore of Chlamydomonas in the given figure?

(a) 

(b) 

(c) 

(d) 

125. Which is the correct order for the development of embryo sac?

(a) Megaspore → Megaspore mother cell → Embryo sac

(b) Megaspore → Embryo sac → Megasporangium

(c) Megaspore mother cell → Embryo sac → Megaspores

(d) Megaspore mother cell → Megaspore → Embryo sac

126. Which of the following statement is correct for pituitary gland?

(i) Melenocyte stimulating hormone secretes from intermediate lobe of pituitary gland

(ii) The pituitary gland is located below the hypothalamus

(iii) Oxytocin produces from posterior lobe of pituitary gland

(iv) Somatotropic hormone secretes from intermediate lobe of pituitary gland.

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

127. Which is not the symptom of Cushing's syndrome, out of the following?

(a) Increased blood sugar level (b) Decrease in weight

(c) Rise in blood pressure (d) Rise in blood volume

128. Which of the following sentence is correct for cranial nerve?

(a) It is only connected with parasympathetic path

(b) It is associated with sympathetic pathway

(c) Originates from spinal cord

(d) It transports both motor and sensory impulses

129. The person is suffering from which disease having the symptoms like aging and tremor?

(a) Sciatica (b) Diabetes

(c) Parkinson's (d) Multiple sclerosis

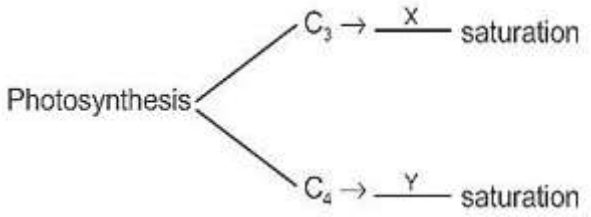
130. Match the column-I and II, choose the correct option

	Column I		Column II
P	Silicon	(i)	In structure of coenzymes
Q	Nickel	(ii)	Required for nitrogen fixation in leguminous plants
R	Sulphur	(iii)	As a component of cell walls
S	Cobalt	(iv)	Required for iron absorption

(a) P(iii), Q(iv), R(ii)S(i) (b) P (ii), Q (iv), R(ii) S(i)

(c) P (iii), Q (iv), R(i)S(ii) (d) P(ii), Q(iii), R(i)S(iv)

131. CO_2 concentration factor affecting photosynthesis process, which statement is correct for C_3 and C_4 plant?



(a) $\begin{matrix} X & = 450ML^{-1} \\ Y & = 350ML^{-1} \end{matrix}$ (b) $\begin{matrix} X & = 360ML^{-1} \\ Y & = 350ML^{-1} \end{matrix}$

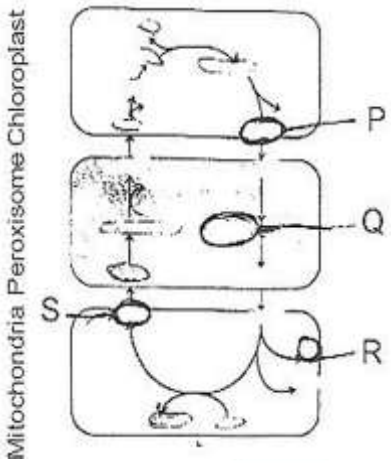
(c) $\begin{matrix} X & = 450ML^{-1} \\ Y & = 360ML^{-1} \end{matrix}$ (d) $\begin{matrix} X & = 350ML^{-1} \\ Y & = 450ML^{-1} \end{matrix}$

132. If 4 molecules of glucose are synthesized during photosynthesis, how many ATP molecules are released and how many molecules of ATP are utilized respectively?

(a) 8 ATP, 72 ATP (b) 2 ATP, 18 ATP

(c) 8 ATP, 36 ATP (d) 4 ATP, 36 ATP

133. In the given figure, what are the substances labelled as P, Q, R and S ?



(a) P-PGA, Q-Glyoxylate, R-NH3, S-Serine

(b) P-Glycolate, Q-Glyoxylate, R-NH3, S-Serine

(c) P-Glycolate, Q-Glycerate, R- CO_2, S-Serine

(d) P-RuBP, Q-Glycerate, R- CO_2, S-Serine

134. How many ATP molecules are synthesized in complete aerobic respiration of dipeptide molecule during Amphibolic pathway?

(a) 30 ATP (b) 60 ATP

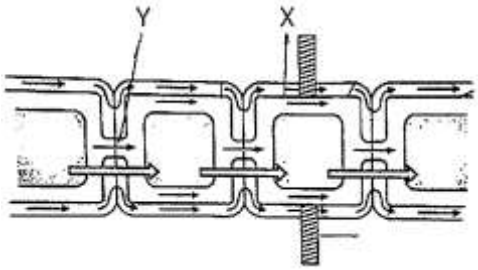
(c) 15 ATP (d) 36 ATP

135. What is the end product of Glycolysis process?

(a) CH_3CH_2OH (b) $CH_3CO \cdot COOH$

(c) $CH_3HCOH - COOH$ (d) CH_3CH_2COOH

136. What indicate X, Y in the given diagram?



(a) X-Cell surface membrane Y-Plasmodesma

(b) X-Plasmodesma Y-Tonoplast

(c) X-Cell surface membrane Y-Cytoplasm

(d) X-Plasmodesma Y-Cell surface membrane

137. In a garden, the gardner cut the apical bud of Laws onia (Mehandi) because _____

(a) The length should be limited in Laws onia

(b) Due to the cutting of apical bud the effect of Auxins decreases and lateral bud grows and forms dense appearance that is why it can give a definite shape

(c) Other apical bud grows quickly due to cut of apical bud

(d) Due to the cutting of apical bud effect of Ethylene decreases and plant grows rapidly

138. When spermatogonia accumulates large amount of nutrient and chromatin material and increase in size, now it is known as _____

(a) Spermatids (b) Spermatogonium

(c) Sperm (d) Primary spermatocytes

139. Alkaptonuria (aa) is which type of error?

(a) Lethal mutation (b) Metabolism error

(c) Error in number of chromosome (d) Induced error

140. Due to ____ therapy changes would be heritable.

(a) Magnetic therapy

(b) Somatic cell gene therapy

(c) Germ line gene therapy

(d) Chemotherapy

141. Human insulin contains how many amino acids on B chain?

(a) 51 (b) 21

(c) 30 (d) 31

142. Statement-A: A plant Pentadiplandra brazzeana produces a protein called brazzein.

Statement-B: This protein is a low caloric sweetner, i.e. it is used in the treatment of diabetes

(a) A and B both are correct but B is not the explanation of A

(b) A and B both are correct B is the correct explanation of A

(c) A is correct and B is wrong

(d) A is wrong and B is correct

143. Out of the following which is reabsorbed in selective reabsorption?
(a) Urea (b) Creatine
(c) Uric acid (d) Amino acid

144. Frog excretes ____ whereas tadpole excretes____
(a) Ammonia, Urea (b) Urea, Ammonia
(c) Urea, Uric acid (d) Uric acid, Ammonia

145. The functional unit of myofibril is made up of

(a) Complete A-band

(b) Complete I-band

(c) Complete I-band and two half A-band

(d) Complete A-band and two half I-band

146. Which of the following paired bone is present in the skull?
(a) Frontal bones (b) Parital bones
(c) Occipital bone (d) Sphenoid bone

147. In hydroseric succession, which stage comes just before sedge medow stage?

(a) Rooted submerged stage (b) Phytoplankton stage

(c) Reed swamp stage (d) Climax stage

148. The energy which is present in the biomass of plant is known as____

(a) Gross primary productivity

(b) Net productivity

(c) Secondary productivity

(d) Net primary productivity

149. Match the column-I and II choose the correct option

Column-I	Column - II
(a) Kaziranga National Park	(i) Uttar Pradesh (Uttarakhand)
(b) Tandoba National Park	(ii) Gujarat
(c) Corbett National Park	(iii) Maharashtra
(d) Gir National Park	(iv) Assam

(a) $(a-iv)(b-ii)(c-i)(d-ii)$

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

(c) $(a-iv)\ (b-ii)(c-ii)(d-i)$

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

150. What is searched from the patient's blood in ELISA method for the detection of AIDS?

(a) Antigen (b) Antibody
(c) No. of WBC (d) No. of RBC

151. What is intrinstic factor-X-activator complex?

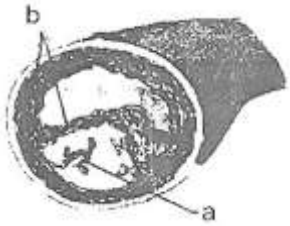
(a) XII + FSF + Glycolipid + Ca^{2+}

(b) IX + AHF + Glycolipid + Ca^{2+}

(c) XII + FSF + Phospholipid + Ca^{2+}

(d) IX + AHG + Phospholipid + Ca^{2+}

152. Mention the names of a and b in the given figure



(a) Cholesterol crystals, smooth muscle cells

(b) Fat, smooth muscle cells

(c) Lumen of vessel, ulcer

(d) Endothelium, fat

153. CO_2, pH and O_2 levels in the blood is detected by which receptors?

(a) Baro receptors

(b) Chemo receptors

(c) Sensory receptors

(d) Baro receptors & Chemo receptors

154. Which structure gives us ability to speech?

(a) Epiglottis (b) Vocal cord
(c) Larynx (d) Trachea

155. The largest salivary gland present in human ___

(a) Submandibular gland (b) Sublingual gland
(c) Parotid gland (d) Gastric gland

156. Match the Column-I and II choose the correct option.

Column -I	Column - II

(a) Secretin	(i) Stimulates gastric gland to release gastric juice
(b) Cholecystokinin	(ii) Stimulates gall bladder to release bile juice
(c) Gastrin	(iii) With coeffect of pancreozymin stimulates secretion of pancreatic juice and intestinal juice
(d) Enterogastrone	(iv) Inhibits gastric juice secretion and stops stomach churning

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

(b) $(a-iii)\ (b-iv)(c-i)(d-ii)$

(c) $(a-ii)(b-ii)(c-i)(d-iv)$

(d) $(a-i)(b-ii)(c-ii)(d-iv)$

157. Blood stained clothing of Abraham Lincoln has been analysed for evidence of which genetic disorder?

(a) Marfan's syndrome (b) Diabetes

(c) Alzheimer's disease (d) Cardiovascular disease

158. Which is the correct sequence of ancestors in the path of primates evolution?

(a) Crossopterygian → Cotylosaur → Therapsid → Labyrinthodont → Insectivors → Primates

(b) Labyrinthodont → Cotylosaur → Therapsid → Crossopterygian → Insectivors → Primates

(c) Crossopterygian → Labyrinthodont → Cotylosaur → Therapsid → Insectivors → Primates

(d) Crossopterygian → Therapsid → Cotylosaur → Labyrinthodont → Insectivors → Primates

159. The human genome contains ____a___ _ billion nucleotide bases. The average gene consists of __b___ bases. Which option is correct for a & b?

(a) $a = 3, b = 3000$ (b) $a = 5, b = 3000$

(c) $a = 3, b = 2000$ (d) $a = 4, b = 3000$

160. In some viruses the flow of genetic information is in reverse direction. It was brought to light by _____

(a) F.H.C. Crick

(b) H.M. Temin and D. Baltimore

(c) Avery, McCarty and Macleod

(d) Erwin Chargaff