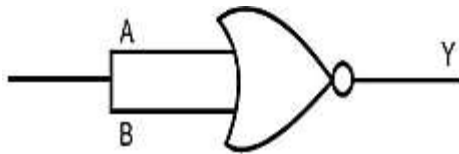


Physics

- The angular spread of central maximum, in diffraction pattern, does not depend on.....
 (a) Frequency of light
 (b) Wavelength of light
 (c) Width of slit
 (d) The distance between the slit and source
- The ratio of resolving power of telescope, when lights of wave lengths $4400\text{\AA}$ and $5500\text{\AA}$ are used, is
 (a) 5: 4 (b) 9: 1
 (c) 4: 5 (d) 16: 25
- In Young's experiment fourth bright fringe produced by light of $5000\text{\AA}$ superposes on the fifth bright fringe of an unknown wavelength. the unknown wavelength is..... $\text{\AA}$
 (a) 8000 (b) 5000
 (c) 6000 (d) 4000
- In X-ray tube the potential difference between the anode and the cathode is 20 kV and the current flowing is 1.6 mA. The number of electrons striking the anode in 1 s is.....
 (Charge of an electron = $1.6 \times 10^{-19}\text{C}$)
 (a) 6.25×10^{18} (b) 10^{16}
 (c) 1.25×10^{16} (d) 10^{14}
- If the kinetic energy of the electron in the hydrogen atom is $\frac{e^2}{8\pi\epsilon_0 r}$, then its potential energy is.....
 (a) $\frac{-e^2}{8\pi\epsilon_0 r}$ (b) $\frac{e^2}{8\pi\epsilon_0 r}$
 (c) $\frac{-e^2}{4\pi\epsilon_0 r}$ (d) $\frac{e^2}{4\pi\epsilon_0 r}$
- The wavelength of the first line of Lyman series is λ . The wavelength of the first line in Paschen series is
 λ .
 (a) $\frac{5}{27}$ (b) $\frac{7}{108}$
 (c) $\frac{27}{5}$ (d) $\frac{108}{7}$
- For a radioactive element, $\tau = \dots\dots\dots \tau^{\frac{1}{2}}$
 (a) 1.44 (b) 144
 (c) 693 (d) 0.693
- For the following nuclear disintegration process

$${}^{238}_{92}\text{U} \rightarrow {}^{206}_{82}\text{Pb} + x[{}^4_2\text{He}] + 6[{}^0_{-1}\text{e}]$$

 the value of x is
 (a) 10 (b) 4
 (c) 6 (d) 8
- If the radii of ${}^{64}_{30}\text{Zn}$ and ${}^{27}_{13}\text{Al}$ nuclei are R_1 and R_2 respectively then $\frac{R_1}{R_2} \dots\dots\dots$
 (a) $\frac{27}{64}$ (b) $\frac{3}{4}$
 (c) $\frac{4}{3}$ (d) $\frac{64}{27}$
- For PN junction, the intensity of electric field is $1 \times 10^6 \text{ V/m}$ and the width of depletion region is $5000\text{\AA}$. The value of potential barrier = V.
 (a) 5 (b) 0.5
 (c) 0.005 (d) 0.05
- The logic circuit shown in the figure represents characteristics of which logic gate?



- (a) NOT (b) NAND
(c) OR (d) NOR

12. For PN junction, the width of space charge region is approximately..... μm .

- (a) 0.005 (b) 5
(c) 6 (d) 0.5

13. A modulating signal of frequency 5 kHz and peak voltage of 8 V is used to modulate a carrier of frequency 10 MHz and peak voltage 10 V. Then the amplitude of USB is _____ V.

- (a) 5 (b) 2
(c) 4 (d) 3

14. The propagation of radio waves with frequency 2 MHz to 30 MHz is due to

- (a) Sky wave (b) Ground wave
(c) Optical fibre (d) Space wave

15. When two spheres having $4Q$ and $-2Q$ charge are placed at a certain distance, the force acting between them is F . Now they are connected by a conducting wire and again separated from each other. Now they are kept at a distance half of the previous one. The force acting between them is _____

- (a) $\frac{F}{8}$ (b) $\frac{F}{2}$
(c) $\frac{F}{4}$ (d) F

16. Charge of $1\mu\text{C}$ each is placed on the five corners of a regular hexagon of side 1 m. The electric field at its centre is N/C.

- (a) 10^{-6} K (b) $\frac{6}{5} \times 10^{-6}$ K
(c) 5×10^{-6} K (d) $\frac{5}{6} \times 10^{-6}$ K

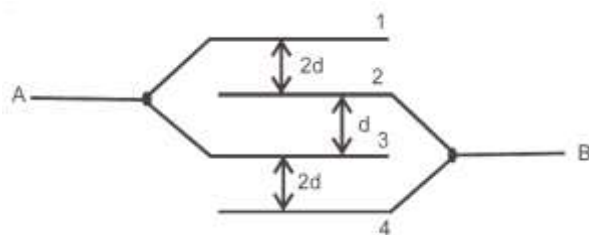
17. An electric dipole is placed in a nonuniform electric field, then _____

- (a) Torque acting on it is always zero
(b) The resultant force acting on the dipole may be zero
(c) Torque acting on it may be zero
(d) The resultant force acting on the dipole is always zero

18. The unit of Intensity of polarization is.....

- (a) $\frac{\text{m}^2}{\text{C}}$ (b) $\frac{\text{C}^2}{\text{m}}$
(c) $\frac{\text{C}^2}{\text{m}^2}$ (d) $\frac{\text{C}}{\text{m}^2}$

19. In the figure area of each plate is A and the distance between consecutive plates is as shown in the figure. What is the effective capacitance between points A & B.



- (a) $\frac{4 A \epsilon_0}{d}$ (b) $\frac{2 A \epsilon_0}{d}$
(c) $\frac{3 A \epsilon_0}{d}$ (d) $\frac{A \epsilon_0}{d}$

20. A moving positive charge approaches a negative charge. What will happen to the potential energy of the system?

- (a) May increase or decrease (b) Will increase
(c) Will decrease (d) Will remain constant

21. The heat produced per unit time, on passing electric current through a conductor at a given temperature, is directly proportional to the.....

- (a) Reciprocal of electric current
(b) Square of electric current
(c) Reciprocal of square of electric current
(d) Electric current

22. A carbon resistor has three bands as brown, black and green in order, what will be the range of resistance it offers?

- (a) $7 \times 10^5 \Omega$ ____ $13 \times 10^5 \Omega$
(b) $9 \times 10^5 \Omega$ ____ $11 \times 10^5 \Omega$
(c) $8 \times 10^5 \Omega$ ____ $12 \times 10^5 \Omega$
(d) None of these

23. In the network shown in the figure the equivalent resistance between points X & Y will be Ω . Value of each resistance is 2Ω .



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

24. Shunt wire should be.....

- (a) Thick and short (b) Thin and long
(c) Thin and short (d) Thick and long

25. The dimensional formula of effective torsional constant of spring is.....

- (a) $M^0 L^0 T^0$ (b) $M^1 L^2 T^{-2}$
(c) $M^1 L^2 T^{-2} A^{-2}$ (d) $M^1 L^2 T^{-3}$

26. There are 50 turns per cm length in a very long solenoid. It carries a current of 2.5 A. The magnetic field at its centre on the axis is..... T.

- (a) $4\pi \times 10^{-3}$ (b) $2\pi \times 10^{-3}$
(c) $6\pi \times 10^{-3}$ (d) $5\pi \times 10^{-3}$

27. The gyromagnetic ratio of an electron = _____ specific charge of an electron.

- (a) 4 (b) $\frac{1}{2}$
(c) 2 (d) 1

28. Alnico is an alloy of _____

- (a) Al, As, P, Pt (b) Al, Ni, As, P
(c) Al, Ni, Cu, Co (d) Al, Ni, Cu, P

29. The focal length of a thin lens made from the material of refractive index 1.5 is 15 cm. When it is placed in a liquid of refractive index $\frac{4}{3}$, its focal length will be _____ cm.

- (a) 60 (b) 78.23
(c) 50 (d) 80.31
30. Time taken by the sunlight to pass through a slab of 4 cm and refractive index 1.5 is.....sec.
(a) 2×10^{11} (b) 2×10^{-10}
(c) 2×10^{-11} (d) 2×10^{-8}
31. If the tube length of astronomical telescope is 96 cm and magnifying power is 15 for normal setting then the focal length of the objective is ____ cm.
(a) 92 (b) 105
(c) 90 (d) 100
32. Photons of energy 2 eV and 2.5 eV successively illuminate a metal whose work function is 0.5 eV. The ratio of maximum speed of emitted electron is.....
(a) $2:\sqrt{3}$ (b) 1:2
(c) 2:1 (d) $\sqrt{3}:2$
33. To increase de Broglie wavelength of an electron from 0.5×10^{-10} m to 10^{-10} m, its energy should be
(a) Decreased to fourth part (b) Doubled
(c) Halved (d) Increased to 4 times
34. A wheel of radius 2 m having 8 conducting concentric spokes is rotating about its geometrical axis with an angular velocity of 10 rad/s in a uniform magnetic field of 0.2 T perpendicular to its plane. The value of induced emf between the rim of the wheel and center is V
(a) 8 (b) 4
(c) 6 (d) 2
35. A coil of surface area 200 cm^2 having 25 turns is held perpendicular to the magnetic field of intensity $0.02 \frac{\text{Wb}}{\text{m}^2}$. The resistance of the coil is 1Ω . If it is removed from the magnetic field in 1 s, the induced charge in the coil is..... C.
(a) 0.001 (b) 0.1
(c) 0.01 (d) 1
36. The dimensional formula of JWL is Take Q as the dimension of charge.
(a) $M^1 L^2 T^1 Q^{-2}$ (b) $M^1 L^2 T^{-1} Q^{-2}$
(c) $M^1 L^{-2} T^{-1} Q^{-2}$ (d) $M^{-1} L^2 T^{-1} Q^{-2}$
37. If in an A.C., L-C series circuit $X_C > X_L$. Hence potential.....
(a) Lags behind the current by π in phase
(b) Leads the current by $\frac{\pi}{2}$ in phase
(c) Leads the current by π in phase
(d) Lags behind the current by $\frac{\pi}{2}$ in phase
38. In L-C-R, A.C. series circuit, $L = 9\text{H}$, $R = 10\Omega$ & $C = 100\mu\text{F}$. Hence Q-factor of the circuit is ____
(a) 30 (b) 35
(c) 45 (d) 25
39. The dimensional formula of $\sqrt{\mu_r \epsilon_r}$ is
(a) $M^0 L^2 T^{-2} A^0$ (b) $M^0 L^0 T^0 A^0$
(c) $M^1 L^1 T^{-2} A^0$ (d) $M^1 L^{-1} T^{-2} A^{-1}$
40. At large distances from source $\vec{E}$ and $\vec{B}$ are in phase and the decrease in their magnitude is comparatively slower with distance r as per
(a) r^2 (b) r^{-3}
(c) r (d) r^{-1}

Chemistry

41. Which of the following complex ion is the most stable?

- (a) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ (b) $[\text{CoF}_6]^{3-}$
(d) $[\text{CoCl}_6]^{3-}$ (c) $[\text{Co}(\text{NH}_3)_6]^{3+}$

42. The primary valency and secondary valency of central metal ion and the no. of total ions produced in aqueous solution for $\text{K}[\text{Co}(\text{OX})_2(\text{NH}_3)_2]$ complex respectively is _____

- (a) 3,6,1 (b) 3,6,2
(c) 4,4,2 (d) 3,4,2

43. Which of the following complex possess meridional isomer?

- (a) $[\text{Co}(\text{NH}_3)_5\text{Cl}]$ (b) $[\text{Co}(\text{NH}_3)_2\text{Cl}_4]$
(c) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$ (d) $[\text{Co}(\text{NH}_3)_3\text{Cl}]$

44. Which of the following compound undergoes aldol condensation?

- (a) Acetaldehyde (b) Trimethyl acetaldehyde
(c) Trichloro acetaldehyde (d) Formaldehyde

45. Benzoyl chloride + Sodium benzoate $\xrightarrow{\Delta}$ _____

- (a) Benzoic anhydride (b) Benzyl benzoate
(c) Benzyl alcohol (d) Benzaldehyde

46. $\text{P} \xrightarrow{\text{KMnO}_4} \text{Q} \xrightarrow[\Delta]{\text{Soda lime}} \text{R} \xrightarrow[\text{An. AlCl}_3]{\text{CH}_3\text{Cl}} \text{S}$

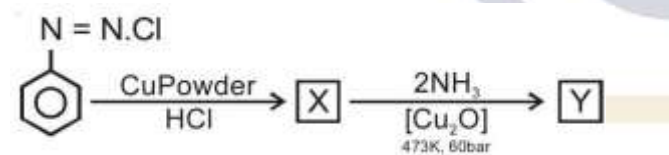
If P and S are toluene, Q & R are _____ and _____ respectively

- (a) Benzene, Benzoic acid
(b) Benzoic acid, Benzene
(c) Benzaldehyde, Sodium benzoate
(d) Benzaldehyde, benzoic acid

47. Type of Hybridisation of N and C – N – C bond angle in $(\text{CH}_3)_3\text{N}$ are _____ and _____ respectively.

- (a) sp^2 , 117.5° (b) sp^3 , $109^\circ 28'$
(c) sp^2 , 120° (d) sp^3 , 108°

48. Identify X and Y in following reaction.



- (a) , (b) ,

- (c) , (d) ,

49. Why glucose is called gluco-pyranose?

- (a) Glucose is a cyclic compound containing six carbon atoms
 (b) Glucose is ketohexose
 (c) Glucose is a cyclic compound containing five carbon atoms and one oxygen atom
 (d) Glucose is aldohexose

50. Which protein present in muscles is insoluble in water?

- (a) Myosin (b) Albumin
 (c) Insulin (d) Carotene

51. Giving 'T' symbol for true statement and 'F' symbol for false statement, select suitable option from the given options for following statements.

(i) Cytosine base is the derivative of pyrimidine

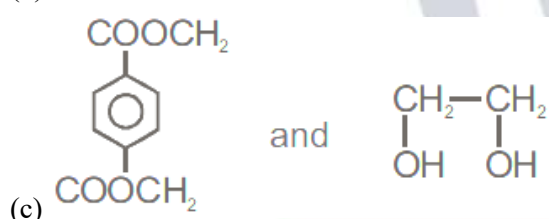
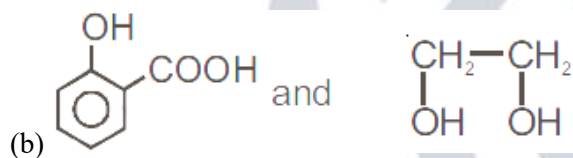
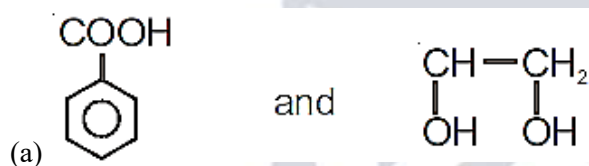
(ii) β - D Ribose sugar is present in DNA.

(iii) The message for the synthesis of a specific protein is present in RNA.

(iv) DNA is responsible for maintaining the identity of different species of organisms for one century

- (a) FFTF (b) FTFF
 (c) FFFT (d) TFFT

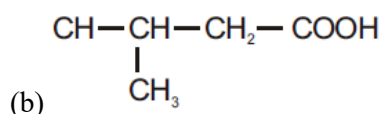
52. Terylene is a condensation polymer of ____ and ____



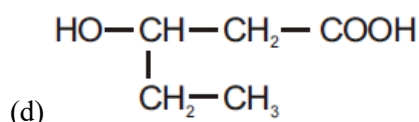
(d) None of these

53. Which of the following acid has property of flexibility?

(a) $\text{HOOC} - (\text{CH}_2)_2 - \text{COOH}$



(c) $\text{HOOC} - (\text{CH}_2)_4 - \text{COOH}$



54. What is cellulose diacetate?

- (a) Synthetic polymer (b) Natural polymer
(c) Plasticizer (d) Semisynthetic polymer

55. What is the packing efficiency of arrangement in a body centred unit cell?

- (a) 64.00% (b) 68.00%
(c) 74.00% (d) 53.26%

56. Which one of the following compounds show both Schottky and Frenkel defects?

- (a) KCl (b) AgI
(c) AgBr (d) AgCl

57. Calculate Van't Hoff factor (i) for an aqueous solution of $K_3[Fe(CN)_6]$ having a degree of dissociation (α) equal to 0.778.

- (a) 2.334 (b) 0.222
(c) 3.334 (d) 4.334

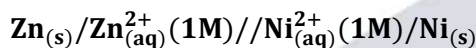
58. If molality of a solution is 0.05 and elevation in boiling point is 0.16 K then, what is the molal elevation constant of the solvent?

- (a) 2.3 (b) 2.2
(c) 1.6 (d) 3.2

59. The value of which of the following unit of concentration will not change with the change in temperature?

- (a) Formality (b) Normality
(c) Molality (d) Molarity

60.



Which is incorrect for the above given cell?

- (a) Daniel cell
(b) Galvanic cell
(c) Voltaic cell
(d) Electrochemical cell

61. If one mole electrons is passed through the solutions of $AlCl_3$, $AgNO_3$ and $MgSO_4$, in what ratio Al, Ag and Mg will be deposited at the electrodes?

- (a) 3: 2: 1 (b) 1: 2: 3
(c) 2: 6: 3 (d) 3: 6: 2

62. At which temperature, ceramic materials behave as super conductors?

- (a) 150 K (b) 200 K
(c) 15 K (d) 0 K

63. Which of the following mineral of Iron is in the form of carbonate?

- (a) Iron Pyrites (b) Magnetite
(c) Siderite (d) Haematite

64. Which of the following hydride is the most stable?

- (a) AsH_3 (b) NH_3
(c) SbH_3 (d) PH_3

65. In which of the following pair of oxyacid of phosphorous, oxidation states of P are not the same?

- (a) $H_4P_2O_7$ and H_3PO_3
(b) $H_4P_2O_7$ and $H_5P_3O_{10}$
(c) H_3PO_4 and $H_5P_3O_{10}$
(d) H_3PO_4 and $H_4P_2O_7$

66. Which of the following order of acidic strength is correct?

- (a) $HClO_4 > HClO_3 > HClO_2 > HClO$
(b) $HClO_2 > HClO > HClO_4 > HClO$
(c) $HClO_4 > HClO_2 > HClO_3 > HClO$
(d) $HClO > HClO_2 > HClO_3 > HClO_4$

67. 1, 2 - dichloro ethane is which type of halide?

- (a) Allylic halide (b) Alkylidene halide
(c) Vicinal halide (d) Geminal halide

68. Polarimeter is used to determine _____ of compounds.

- (a) D and L configuration
(b) d and l configuration
(c) R and S configuration
(d) Both D and L as well as d & l configuration

69. Which of the following group of compounds are extinguisher, antiseptic, insecticide and anesthetic respectively?

- (a) CCl_4 , CHI_3 , CHCl_3 , DDT
(b) CCl_4 , CHI_3 , DDT, CHCl_3
(c) DDT, CHCl_3 , CCl_4 , CHI_3
(d) CHCl_3 , CHI_3 , DDT, CCl_4

70. Which of the following alcohol has the highest boiling point?

- (a) Butan - 1 - ol (b) Propan - 2 - ol
(c) 2 - Methyl propan - 2 - ol (d) Butan - 2 - ol

71. Which of the major product obtained by hydrolysis of compound formed by reaction between formaldehyde and ethyl magnesium bromide?

- (a) 2 - Methyl - propan - 2 - ol (b) Propan - 1 - ol
(c) Propan - 2 - ol (d) Ethan - 1 - ol

72. Give the IUPAC name for methyl salicylate.

- (a) Methyl - 3 - hydroxy benzoate
(b) Methyl - 2 - hydroxy benzoate
(c) 2' - hydroxy benzoic acid
(d) Methoxy benzoic acid

73. Instantaneous rate of reaction for the reaction $3\text{A} + 2\text{B} \rightarrow 5\text{C}$ is _____

- (a) $+\frac{1}{3}\frac{d[\text{A}]}{dt} = -\frac{1}{2}\frac{d[\text{B}]}{dt} = -\frac{1}{5}\frac{d[\text{C}]}{dt}$
(b) $-\frac{1}{3}\frac{d[\text{A}]}{dt} = +\frac{1}{2}\frac{d[\text{B}]}{dt} = -\frac{1}{5}\frac{d[\text{C}]}{dt}$
(c) $-\frac{1}{3}\frac{d[\text{A}]}{dt} = -\frac{1}{2}\frac{d[\text{B}]}{dt} = +\frac{1}{5}\frac{d[\text{C}]}{dt}$
(d) $+\frac{1}{3}\frac{d[\text{A}]}{dt} = -\frac{1}{2}\frac{d[\text{B}]}{dt} = +\frac{1}{5}\frac{d[\text{C}]}{dt}$

74. In a reaction $A \rightarrow B$, if the concentration of reactant is increased by 9 times then rate of reaction increases 3 times. What is the order of reaction?

- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$
(c) 3 (d) 2

75. Which statement is incorrect for collision theory?

- (a) The reactant experiencing fruitful collisions are converted to products
(b) There must be certain minimum energy for the reactant experiencing collision
(c) The collision of the reactant molecules should be from any direction
(d) The collision between in the reacting molecules is essential

76. The formation of association of colloidal particles by addition of electrolyte to form an insoluble precipitate is called _____

- (a) Micelle (b) Coagulation
(c) Emulsification (d) Flocculation

77. Which of the following reaction is used to prepare colloidal sol by double decomposition?

- (a) $\text{FeCl}_3 + 3\text{H}_2\text{O} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{HCl}$
(b) $\text{SO}_2 + 2\text{H}_2\text{S} \rightarrow 3\text{S} + 2\text{H}_2\text{O}$
(c) $2\text{AuCl}_3 + 3\text{HCHO} + 3\text{H}_2\text{O} \rightarrow 2\text{Au} + 3\text{HCOOH} + 6\text{HCl}$
(d) $\text{As}_2\text{O}_3 + 3\text{H}_2\text{S} \rightarrow \text{As}_2\text{S}_3 + 3\text{H}_2\text{O}$

78. Which of the following pair has similar magnetic moment?

- (a) $\text{Ni}^{2+}, \text{Co}^{2+}$ (b) $\text{Fe}^{2+}, \text{Mn}^{2+}$
(c) $\text{Fe}^{3+}, \text{Mn}^{2+}$ (d) $\text{Cr}^{3+}, \text{Mn}^{3+}$

79. Element A and B do not form an alloy because

- (a) Both have similar electronic configuration in valence shell
(b) Both are the members of same group
(c) Radius of A is 115 pm while radius of B is 187 pm
(d) Both elements have similar crystal structures

80. What is the correct order for energy of d orbitals splitting in Tetra Chlorido Nickelate (II) complex ion?

- (a) $d_{x^2-y^2} > d_{z^2} > d_{xy} \cong d_{yz} \cong d_{z^2}$
(b) $d_{xy} \cong d_{yz} \cong d_{zx} > d_{x^2-y^2} \cong d_{z^2}$
(c) $d_{xy} \cong d_{yz} \cong d_{xy} \cong d_{x^2-y^2} \cong d_{z^2}$
(d) $d_{xy} \cong d_{yz} \cong d_{xy} < d_{x^2-y^2} \cong d_{z^2}$

Mathematics

81. If the rate of change of area of rhombus with respect to its side is equal to the side of rhombus, then the angles of rhombus are.....

- (a) $\frac{\pi}{3}$ and $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ and $\frac{5\pi}{6}$
(c) $\frac{\pi}{4}$ and $\frac{3\pi}{4}$ (d) $\frac{5\pi}{12}$ and $\frac{7\pi}{12}$

82. The approximate value of 5^{201} is....., where, $(\log_e 5 = 1.6095)$

- (a) 25.4125 (b) 25.5025
(c) 25.2525 (d) 25.4024

83. $f(x) = \frac{x}{\log x^e}$ is increasing on the interval _____ where $x \in \mathbb{R}^+ - \{1\}$

- (a) $(-e, \infty)$ (b) $(0, \infty) - \{1\}$
(c) $\left(\frac{1}{e}, 1\right) \cup (1, \infty)$ (d) $\left(\frac{1}{e}, \infty\right)$

84. $\int (2 + \log x)(ex)^x dx = \text{_____} + C; x > 1$

- (a) $(ex)^x$ (b) $(ex)^{-x}$
(c) x^x (d) e^{x^x}

85. $\int e^{\sqrt{x}} dx = \dots + C; x > 0$

- (a) $2(\sqrt{x} - 1)e^{\sqrt{x}}$ (b) $2(1 - \sqrt{x})e^{\sqrt{x}}$
(c) $(1 - \sqrt{x})e^{\sqrt{x}}$ (d) $(\sqrt{x} - 1)e^{\sqrt{x}}$

86. If $\int \frac{\sin x}{\sin(x-\alpha)} dx = px - q \log |\sin(x-\alpha)| + C$, then $pq = \dots$

- (a) $-\frac{1}{2} \sin 2\alpha$ (b) $\frac{1}{2} \sin 2\alpha$
(c) $\sin 2\alpha$ (d) $-\sin 2\alpha$

87.

$\int_1^3 \left(\frac{x^2+1}{4x}\right)^{-1} dx = \dots$

- (a) $\log 5$ (b) $\log 25$
(c) $\frac{1}{2} \log 5$ (d) $\log 100$

88. If $\int_1^K (2x - 3) = 12$, then $K = \dots$

- (a) -2 and 5 (b) 2
(c) 5 (d) -5

89. $\int_{-\pi/2}^{\pi/2} \frac{\cos^2 2x}{1+25^x} dx = \dots$

- (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$
(c) $-\frac{\pi}{2}$ (d) $-\frac{\pi}{4}$

90. The area bounded by curve $y = \sin 2x$ $x = 0$ to $x = \pi$ and X-axis is _____

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

91. Area bounded by the ellipse $2x^2 + 3y^2 = 1$ is

- (a) $\frac{\pi}{6}$ (b) 6π
(c) $\frac{\pi}{\sqrt{6}}$ (d) $\sqrt{6}\pi$

92. The integrating factor (I.F.) of differential equation $\frac{dy}{dx}(1+x) - xy = 1-x$ is

- (a) $(1+x)e^x$ (b) $(1+x)e^{-x}$
(c) $(x-1)e^{-x}$ (d) $(1-x)e^{-x}$

93. If the general solution of some differential equation is $y = a_1(a_2 + a_3) \cdot \cos(x + a_4) - a_5 \cdot e^{x+a_6}$ then order of differential equation is _____

- (a) 6 (b) 4
(c) 5 (d) 3

94. If the length of the subnormal at any point of the curve is constant, then the eccentricity of this curve is _____

- (a) $e = \sqrt{2}$ (b) $0 < e < 1$
(c) $e > 1$ (d) $e = 1$

95. If $|\vec{x}| = |\vec{y}| = |\vec{x} + \vec{y}| = 1$, then $|\vec{x} - \vec{y}| = \dots$

- (a) $\sqrt{2}$ (b) 1
(c) $\sqrt{3}$ (d) 3

96. If $\vec{x}$ is a vector in the direction of $(2, -2, 1)$ of magnitude 6 and $\vec{y}$ is a vector in the direction of

(1, 1, -1) of magnitude $\sqrt{3}$, then $|\bar{x} + 2\bar{y}| = \dots\dots\dots$

- (a) 40 (b) $\sqrt{17}$
(c) $\sqrt{35}$ (d) $2\sqrt{10}$

97. The angle between two adjacent sides $\bar{a}$ and $\bar{b}$ of parallelogram is $\frac{\pi}{6}$. If $\bar{a} = (2, -2, 1)$ and $\bar{b} = 2|\bar{a}|$, then area of this parallelogram is.....

- (a) 9 (b) $\frac{9}{2}$
(c) 18 (d) $\frac{3}{4}$

98. The perpendicular distance from the point of intersection of line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z}{-1}$ and plane $2x - y + z = 0$ to the Z-axis is.....

- (a) 1 (b) 2
(c) $\sqrt{5}$ (d) None of these

99. The measure of the angle between the line $\bar{r} = (2, -3, 1) + k(2, 2, 1); k \in \mathbb{R}$ and the plane $2x - 2y + z + 7 = 0$ is.....

- (a) $\cos^{-1} \frac{1}{9}$ (b) $\sin^{-1} \frac{1}{3}$
(c) $\tan^{-1} \frac{1}{4\sqrt{5}}$ (d) $\frac{\pi}{2}$

100. The image of the point A(1, 2, 3) relative to the plane π is B(3, 6, -1), the equation of plane π is

- (a) $x + 2y + 3z - 1 = 0$
(b) $x - 2y + 2z - 8 = 0$
(c) $x + 2y - 2z + 8 = 0$
(d) $x + 2y - 2z - 8 = 0$

101. $f: \mathbb{R} \rightarrow \mathbb{R}, f(x) = x^2 + 3x + 4$ is

- (a) one-one and onto (b) many-one and not onto
(c) one-one and not onto (d) not one-one and onto

102. If $a * b = \frac{ab}{10}; a, b \in \mathbb{Q}^+$, then $(5 * 8)^{-1} = \dots\dots\dots$

- (a) 4 (b) 10
(c) $\frac{1}{25}$ (d) 25

103. If $f: \mathbb{N} \rightarrow \mathbb{N}, f(x) = x + 3$, then $f^{-1}(x) = \dots\dots\dots$

- (a) $x + 3$ (b) $x - 3$
(c) does not exist (d) $3 - x$

104.

$\sin^2(\sin^{-1} \frac{1}{2}) + \tan^2(\sec^{-1} 2) + \cot^2(\operatorname{cosec}^{-1} 4) = \dots\dots\dots$

- (a) $\frac{73}{4}$ (b) $\frac{89}{4}$
(c) $\frac{37}{2}$ (d) 19

105. $\tan(\cos^{-1} \frac{4}{5} + \tan^{-1} \frac{2}{3}) = \dots\dots\dots$

- (a) $\frac{3}{17}$ (b) $\frac{17}{4}$
(c) $\frac{17}{6}$ (d) $\frac{6}{17}$

106. $\cos(\cot^{-1}(\operatorname{cosec}(\cos^{-1} a))) = \dots\dots\dots$ (Where, $0 < a < 1$)

- (a) $\frac{1}{\sqrt{2-a^2}}$ (b) $\sqrt{2-a^2}$
(c) $\sqrt{3-a^2}$ (d) $\frac{1}{\sqrt{2+a^2}}$

107. $\begin{vmatrix} \sin^2 \theta & \cos^2 \theta \\ -\cos^2 \theta & \sin^2 \theta \end{vmatrix} = \dots\dots\dots$
 (a) $\cos 2\theta$ (b) $\frac{1}{2}(1 - \sin^2 2\theta)$
 (c) $\frac{1}{2}(1 + \cos^2 2\theta)$ (d) $\frac{1}{2}\sin^2 2\theta$
108. If $\begin{vmatrix} 1! & 2! & 3! \\ 2! & 3! & 4! \\ 3! & 4! & 5! \end{vmatrix} = 2016 K$, then $K = \dots\dots\dots$
 (a) 24 (b) $\frac{1}{24}$
 (c) 84 (d) $\frac{1}{84}$
109. If $\begin{vmatrix} 1+x & 1 & 1 \\ 1+y & 1+2y & 1 \\ 1+x & 1+z & 1+3z \end{vmatrix} = 10 Kxyz \left(3 + \frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)$ then $K = \dots\dots\dots$ (Where $xyz \neq 0$; $3 + \frac{1}{x} + \frac{1}{y} + \frac{1}{z} \neq 0$).
 (a) $\frac{1}{5}$ (b) 5
 (c) 2 (d) 1
110. If the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is $\frac{1}{5} \begin{bmatrix} -3 & 2 & 2 \\ 2 & -3 & \alpha \\ 2 & 2 & -3 \end{bmatrix}$ then, $\alpha =$
 (a) 3 (b) 2
 (c) 4 (d) -2
111. Matrix $A_r = \begin{bmatrix} r & r-1 \\ r-1 & r \end{bmatrix}$; $r = 1, 2, 3, \dots\dots$. If $\sum_{r=1}^{100} |A_r| = (\sqrt{10})^K$, then $K = \dots\dots\dots$
 ($|A_r| = \det(A_r)$).
 (a) 2 (b) 4
 (c) 6 (d) 8
112. $\frac{d}{dx} (3\cos(\pi/6 + x^0) - 4\cos^3(\pi/6 + x^0)) = \dots\dots\dots$
 (a) $\cos(3x^0)$ (b) $\frac{\pi}{60} \cos(3x^0)$
 (c) $\frac{\pi}{60} \sin(3x^0)$ (d) $\frac{-\pi}{60} \sin(3x^0)$
113. If $f(x) = 1 + x + x^2 + \dots + x^{1000}$, then $f'(-1) = \dots\dots\dots$
 (a) -50 (b) -100
 (c) -500 (d) 500500
114. Applying mean value theorem on $f(x) = \log x$; $x \in [1, e]$ the value of $e = \dots\dots\dots$
 (a) $\log(e-1)$ (b) $1-e$
 (c) $e-1$ (d) 2
115. If $\int \sin^{13} x \cos^3 x dx = A \sin^{14} x + B \sin^{16} x + C$, then $A + B = \dots\dots\dots$
 (a) $\frac{1}{110}$ (b) $\frac{15}{112}$
 (c) $\frac{17}{112}$ (d) $\frac{1}{112}$
116. If $\int \frac{1+\cos x}{\cos x - \cos^2 x} dx = \log |\sec x + \tan x| - 2f'(x) + C$, then $f(x) = \dots\dots\dots$
 (a) $2\cot\left(\frac{x}{2}\right)$ (b) $-2\cot\left(\frac{x}{2}\right)$
 (c) $2\log \left| \sin \frac{x}{2} \right|$ (d) $-2\log \left| \sin \frac{x}{2} \right|$
117. The probability that an event A occurs in a single trial of an experiment is 0.6. In the first three independent trials of the experiment, the probability that A occurs at least once is
 (a) 0.930 (b) 0.925
 (c) 0.936 (d) 0.927
118. If $6P(A) = 8P(B) = 14P(A \cap B) = 1$, then $P\left(\frac{A}{B}\right) = \dots\dots\dots$
 (a) $\frac{3}{7}$ (b) $\frac{3}{5}$
 (c) $\frac{4}{7}$ (d) $\frac{2}{5}$
119. The mean and variance of a random variable X having a binomial distribution are 6 and 3 respectively. The probability of variable X less than 2 is $\dots\dots\dots$

- (a) $\frac{13}{2048}$ (b) $\frac{15}{4096}$
(c) $\frac{13}{4096}$ (d) $\frac{25}{2048}$

120. The coordinates of the corner points of the bounded feasible region are (10, 0), (2, 4), (1, 5) and (0, 8). The maximum of objective function $z = 60x + 10y$ is

- (a) 700 (b) 600
(c) 800 (d) 110

Biology

121. Which option is correct for the ATP molecules produced through oxidative phosphorylation of NADH, produced through breakdown of 12 molecules of pyruvic acid in Krebs cycle?

- (a) 36 (b) 48
(c) 144 (d) 12

122. Which is the correct option for the following statements A and R ?

Statement-A: With the help of DNA fingerprint it is easy & quick to trace the criminal

Statement-B: The process of DNA finger printing starts from isolation of DNA from blood sample or cell sample

- (a) Statement A and R are correct and R is explanation of Statement A
(b) Statement A is correct. Statement R is wrong.
(c) Statement A and R are correct and R is not explanation of Statement A
(d) Statement A and R both are wrong.

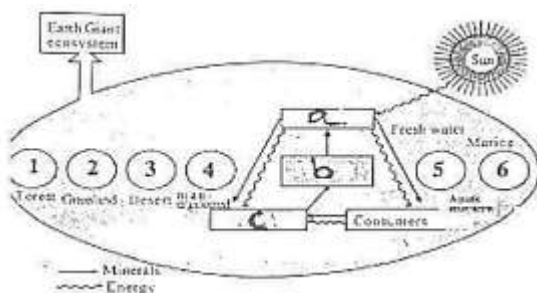
123. Choose the right option showing the correct reason, responsible for forming plaques at the injured regions of an artery.

- (a) High blood pressure
(b) Smoking
(c) Consumption of high fat food
(d) All of the given

124. Select the number of amino-acids contained in human insulin.

- (a) 21 (b) 51
(c) 31 (d) 41

125. Choose the correct option for the label 'a', 'b' and 'c' in the diagram, with reference to types of ecosystem.



- (a) a = nutrients, b = producer, c = second order consumer
(b) a = decomposers, b = non-living components, c = nutrients

(c) a = producer, b = nutrients, c = decomposers

(d) a = nutrients, b = producer, c = consumer

126. Which of the figure indicates 'acidophils' from the following options?



- (a) Y (b) X
(c) Z (d) W

127. In mRNA strand having specific number of genetic codes, if the 23rd genetic code UUA is replaced by UAA, what will be the change found in synthesized polypeptide chain?

- (a) Amino acid on 23rd place will be change in polypeptide chain
(b) Protein synthesis will stop after 22nd amino acid
(c) There will be no change in polypeptide chain
(d) None amongst these

128. In reference to the self- pollination which of the following option is correct?

- (a) In sunflower the pollen is released after the stigma becomes receptive
(b) In malva genetic mechanism prevents self- pollens from fertilizing the ovule
(c) In palms stigma becomes receptive after the release of pollens
(d) In castor flowers are bisexual and they show self- pollination.

129. In context to their mode of reproduction, which option is different than rest of the examples?

- (a) Asparagus (b) Sweet potato
(c) Dahlia (d) Ginger

130. Which option is correct for the statement's 'X', 'Y' and 'Z' given below:

Statement-X: A forest in a tropical region like Equadar has up to 10 times as many species of vascular plants as a forest of equal area in temperate region

Statement-Y: Temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years.

Statement-Z: In tropical area, productivity is high

- (a) Statement 'X' is right and statement 'Y' and 'Z' are wrong.
(b) Statement 'X', 'Y' and 'Z' are all right.
(c) Statement 'Y' and 'Z' are right and statement 'X' is wrong
(d) Statement 'X', 'Y' and 'Z' are all wrong.

131. When the value of water potential decreases related to water potential pressure?

- (a) When the value of Ψ_P is positive

- (b) When the value of ΨP is 0
- (c) When the value of ΨP is negative
- (d) When the value of ΨP is constant

132. With reference to Biotechnology and its applications, choose the incorrect statement from the options:

- (a) Genetically modified plants can produce toxic or allergic metabolites
- (b) Change in genetic constitution under natural environmental pressure
- (c) To stop the exploitation and to recompensate the damages, it is necessary to form strict rules to curb biopiracy
- (d) Biotechnology may pose unforeseen risks to the environment, including risk to biodiversity.

133. Which of the following option is correct for correctly matched pairs for Column I and Column II.

Column I	Column II
(i) ρ - cells	(a) It stimulates glycogenolysis
(ii) β - cells	(b) It secretes somatostatin
(iii) α - cells	(c) Increases cellular glucose uptake and utilisation
	(d) Rise in blood pressure and blood volume

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

134. Choose the option which have correct sentence (statement).

- (a) Propliopithecus lived about 40 million years ago and was having long arms
- (b) Ramapithecus lived 12 to 14 million years ago and their dentition was more identical to dentition of man.
- (c) Aegyptopithecus similar to propliopithecus and it is more identical to man than Ape.
- (d) Dryopithecus lived about 20 million years ago and their hindlimbs was shorter than forelimbs

135. What is correct for chylomicron?

- (a) It is Glycerol converted into finely fat globule
- (b) It is unit formed by the union of Fructose with carrier molecules
- (c) It is fatty acid converted into very small fat globules
- (d) Small fat globules in the form of cholesterol

136. When sugar level in blood reduces and stored sugar is not available then in which form protein and lipid will enter respiration process respectively?

- (a) Pyruvic acid; Acetyl CoA
- (b) Glycerol; Fatty acid

(c) Amino acid; Fatty acid and Glycerol

(d) Fatty acid; Glycerol, Amino acid

137. Which of the following option shows correctly matched pairs?

(a) The pre-motor area of frontal lobe > controls involuntary movement and autonomous nervous system

(b) Lateral temporal lobe > voluntary movement

(c) Middle parietal lobe > centres for hearing and sight

(d) Posterior occipital lobe > with cold, temperature and pain

138. A normal son of Haemophilic father marries a daughter of haemophilic father. State the possibility of first- born daughter child.

(a) 100% (b) 25%

(c) 0% (d) 50%

139. Formual for human vertabral column is ____

(a) C₇ T₁₂ L₅ S₅ C₄ (b) C₇ T₁₀ L₅ S₇ C₄

(c) C₄ T₁₂ L₅ S₅ C₇ (d) C₇ T₁₀ L₇ S₅ C₄

140. Which option is correct for the induced movement in plants?

(a) Cilary movement - Chlamydomonas

(b) Circumnutation - Spiral growth of the shoot in climbers

(c) Negative geotropism - Stem

(d) Amoebic movement - Plasmodia of Slime molds

141. Which of the following options shows correctly matched pairs for the given column-A and column-B?

Column-A

Column-B

(a) ethmoid

(i) bone of pelvic girdle

(b) lachrymal

(ii) bone of skull

(c) clavicle

(iii) bone of face

(d) ischium

(iv) collar bone

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

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

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

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

142. Which hormones is not associated with menstrual cycle?

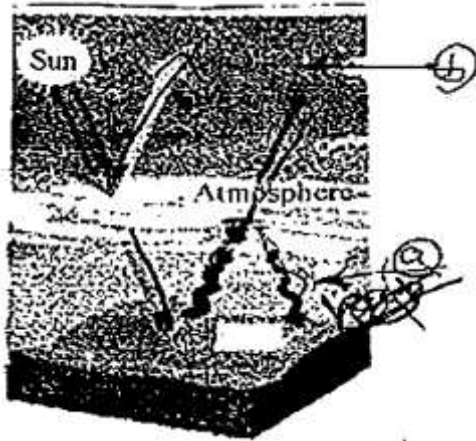
(a) Melatonin

(b) Progesterone

(c) Estrogen

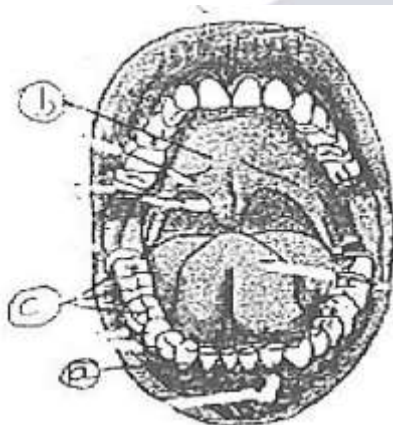
(d) Relaxin

143. Choose the correct option for the label 'a' and 'b' in the diagram given below:



- (a) $a = \text{CO}_2$, $b = \text{heat}$
- (b) $a = \text{heat}$, $b = \text{CO}_2$
- (c) $a = \text{heat}$, $b = \text{green house gases}$
- (d) $a = \text{earth}$, $b = \text{CO}_2$

144. Which option is correct for the region labelled as 'a', 'b' and 'c' in the given diagram?



- (a) $a = \text{Incisors}$; $b = \text{Hard Palate}$; $c = \text{Premolar}$
- (b) $a = \text{Incisors}$; $b = \text{Soft Palate}$; $c = \text{Premolar}$
- (c) $a = \text{Canine}$; $b = \text{Hard Palate}$; $c = \text{Molar}$
- (d) $a = \text{Canine}$; $b = \text{Soft Palate}$; $c = \text{Molars}$

145. Sequence of genes on a specific DNA segment is ABCDEFGHI. If the middle three genes get inverted and first three genes get tandemised duplication, then in newly formed DNA segment gene sequence will be

- | | |
|-------------------|-----------------|
| (a) ABCCCBAGHIDEF | (b) ABCABCFEDGH |
| (c) ABCABCEFGHI | (d) ABCCBAFEDGH |

146. How many types and in what ratio the gametes are produced by a dihybrid heterozygous parents in Mendel's experiment"

- (a) 4 types, 9: 3: 3: 1 ratio
- (b) 3 types, 1:2:1 ratio
- (c) 2 types, 3: 1 ratio
- (d) 4 types, 1: 1: 1: 1 ratio

147. Match the following

Column-I

- (i) *B. thuringiensis*
- (ii) *P. brazzeana*
- (iii) C-peptide
- (iv) Gene-therapy

Column-II

- (a) treatment for diabetes
- (b) cancer
- (c) cry protein
- (d) human insulin

Choose the right option showing correct matching

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

148. Following are the steps, following in Recombinant DNA Technology:

- (i) Amplification
- (ii) Downstream processing
- (iii) Isolation
- (iv) Obtaining the foreign gene product
- (v) Insertion

Choose the correct option showing the correct sequence of steps involved in Recombinant DNA Technology

- (a) (ii) → (iv) → (vi) → (i) → (v) → (iii)
- (b) (iii) → (v) → (i) → (ii) → (iv) → (vi)
- (c) (iv) → (ii) → (i) → (vi) → (iii) → (v)
- (d) (iii) → (v) → (i) → (vi) → (iv) → (ii)

149. Which option is correct for the given statement X, Y and Z.

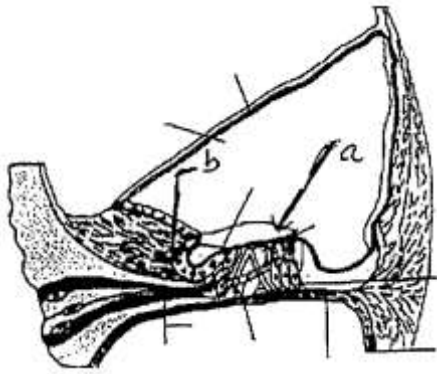
Statement-X: The descending limb of Henle's loop is permeable for water but nearly impermeable to salts

Statement-Y: The ascending limb of Henle's loop is impermeable to water but permeable to electrolytes and transports them actively or passively.

Statement-Z: In descending limb of Henle's loop the filtrate is hypertonic to blood plasma.

- (a) Statements X, Y and Z are correct and statement X is not correct explanation of statement Z
- (b) Statement X and Y are correct and Statement Z is wrong
- (c) Statement X, Y and Z are correct and Statement Z is correct explanation of Statement X
- (d) Statement X and Y are wrong and Statement Z is correct

150. What does 'a' and 'b' indicates in the given diagram?



- (a) a = Basilar membrane; b = Hair cells
- (b) a = Basilar membrane; b = Border cell
- (c) a = Reissner's membrane; b = Outer hair cells
- (d) a = Tectorial membrane; b = Border cell

151. Cytokinin was first discovered as kinetin from 'a', which a modified form of 'b'

- (a) a = eggs of herring fish; b = guanine
- (b) a = sperms of herring fish; b = adenine
- (c) a = coconut milk; b = adenine
- (d) a = maize seed; b = thymine

152. Choose the correct option for the given statement X and Y.

Statement-X: Out of total CO_2 produced only 10% of CO_2 is transported in form of H_2CO_3 by blood plasma.

Statement-Y: pH of blood plasma is higher than its normal level due to formation of H_2CO_3 during transport of CO_3 .

- (a) Statement X and statement Y are true
- (b) Statement X and Statement Y are wrong
- (c) Statement X is correct and Statement Y is wrong
- (d) Statement X is wrong and Y is correct

153. Where does the process of Oogenesis get completed in human?

- (a) In Oviduct (b) In ovarian follicle
- (c) In uterus (d) In the cervix of uterus

154. Choose the right option showing correct matching:

- (a) Tadpole - ammonotelic, Mammals - Ureotelic, Birds - Uricotelic
- (b) Aquatic insect - ammonotelic, Mammal Uricotelic - Land snail - Uretelic
- (c) Land snail - ammonotelic, Terrestrial Amphibians - Ureotelic - Mammal - Uricotelic
- (d) Terrestrial Amphibian - Ammonotelic, Birds Uricotelic, Mammal - Ureotelic

155. Select the right option matching column I and column II correctly.

Column-I		Column-II
(i) Hormonal pills	(a)	Fusion of gametes is prevented
(ii) Spermicides	(b)	vasectomy
(iii) Condoms	(c)	natural method and almost nil side effects
(iv) Sterilization	(d)	inhibit O ₂ uptake and kill sperms
(V) Interruption-coitus interruptus	(e)	prevents the release of ovum from the ovary

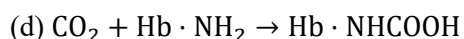
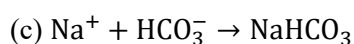
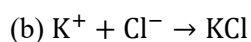
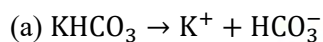
(a) (i-d) (ii-e) (iii-c) (iv-b) (v-a)

(b) (i-c) (ii-b) (iii-a) (iv-d) (v-e)

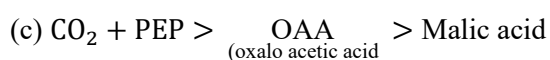
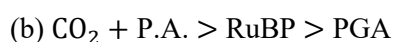
(c) (i-e) (ii-d) (iii-a) (iv-b) (v-c)

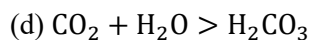
(d) (i-a) (ii-d) (iii-b) (iv-c) (v-e)

156. From the following options choose the chemical reaction which does not occur in chloride shift.



157. Which option indicate correct chronology of the reactions during photosynthesis, taking place in mesophyll cells of C₄ plant?





158. Which option is correct for the correctly matched pairs of the following mineral ions and their importance?

Mineral ions	Importance
(i) Chlorine	(a) For germination of pollen grain
(ii) Boron	(b) For synthesis of nucleic acid
(iii) Zinc	(c) For cell-division
(iv) Magnesium	(d) For the synthesis of Auzin

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

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

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

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

159. Sequential order of nucleotides on template strand forming m-RNA synthesizing specific protein is given below. Based on it select the sequential t-RNA anticodon entering in the process of protein synthesis.

Template - TAC, GAC, AAC, CAC, TTA, ATT.

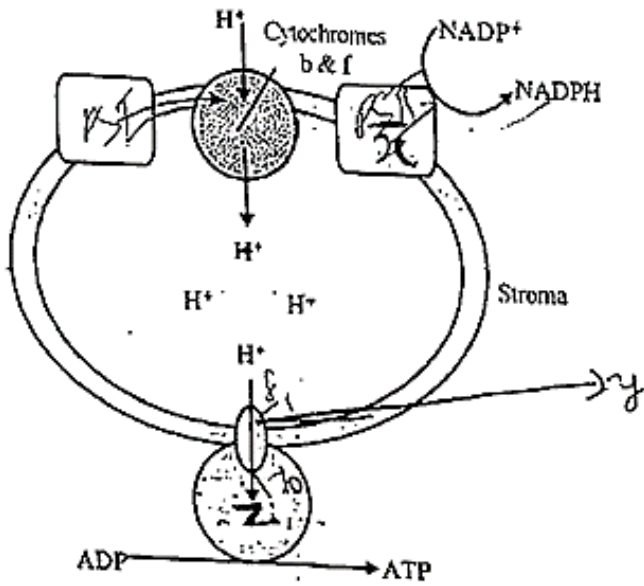
(a) AUG, CUG, UUG, GUG, AAU, UAA

(b) UAC, GAC, AAC, CAC, UUA, AUU

(c) TAC, GAC, AAC, CAC, TTA, ATT

(d) None

160. Which option is correct for the labelled region 'x', 'y' and 'z' in the given diagram?



- (a) $x = \text{PS I}$, $y = \text{Cytochrome}$, $z = F_0$
- (b) $x = \text{PS I}$, $y = F_0$, $z = F_1$
- (c) $x = \text{PS II}$, $y = F_1$, $z = F_0$
- (d) $x = \text{PS II}$, $y = \text{Stroma}$, $z = F_1$