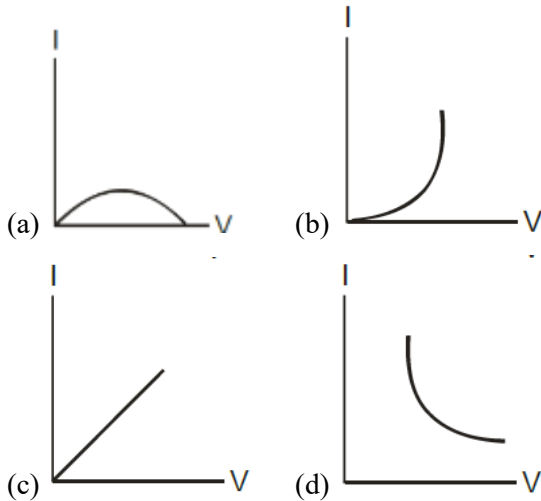


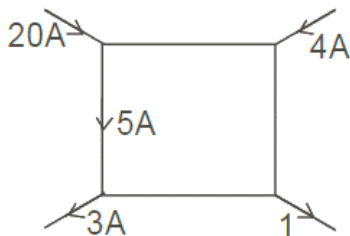
Physics

1. A substance of mass 49.53 g occupies 1.5 cm^3 of volume. The density of the substance (in gcm^3) with correct number of significant figures is
 (a) 3.302 (b) 3.300
 (c) 3.3 (d) 3.30
2. A car moving with a velocity of 20 ms^{-1} is stopped in a distance of 40 m. If the same car is travelling at double the velocity, the distance travelled by it for same retardation is
 (a) 640 m (b) 320 m
 (c) 1280 m (d) 160 m
3. The angle between velocity and acceleration of a particle describing uniform circular motion is
 (a) 45° (b) 60°
 (c) 90° (d) 180°
4. If $\vec{A} = 2\hat{i} + 3\hat{j} + 8\hat{k}$ is perpendicular to $\vec{B} = 4\hat{j} - 4\hat{i} + \alpha\hat{k}$, then the value of ' α ' is
 (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$
 (c) 1 (d) -1
5. A body of mass 50 kg, is suspended using a spring balance inside a lift at rest. If the lift starts falling freely, the reading of the spring balance is
 (a) = 50 kg (b) > 50 kg
 (c) < 50 kg (d) = 0
6. A motor pump lifts 6 tons of water from a well of depth 25 m to the first floor of height 35 m from the ground floor in 20 minutes. The power of the pump (in kW) is [$g=10 \text{ ms}^{-2}$]
 (a) 3 (b) 6
 (c) 1.5 (d) 12
7. Two balls are thrown simultaneously in air. The acceleration of the centre of mass of the two balls when in air
 (a) depends on the masses of the two balls
 (b) depends on the speeds of the two balls
 (c) is equal to g (Acceleration due to gravity)
 (d) depends on the direction of motion of the two balls
8. The value of acceleration due to gravity at a depth of 1600 km is equal to [Radius of earth = 6400 km]
 (a) 9.8 ms^{-2} (b) 19.6 ms^{-2}
 (c) 4.9 ms^{-2} (d) 7.35 ms^{-2}
9. 'Young's modulus is defined as the ratio of
 (a) tensile stress and longitudinal strain
 (b) hydraulic stress and hydraulic strain
 (c) shearing stress and shearing strain
 (d) bulk stress and longitudinal strain
10. 'Hydraulic lift' works on the basis of
 (a) Stoke's law (b) Toricelli's law
 (c) Pascal's law (d) Bernoulli's law
11. The S.I. unit of specific heat capacity is
 (a) $\text{Jmol}^{-1} \text{ K}^{-1}$ (b) $\text{Jkg}^{-1} \text{ K}^{-1}$
 (c) JK^{-1} (d) J kg

12. For which combination of working temperatures, the efficiency of 'Carnot's engine' is the least?
 - (a) 60 K, 40 K
 - (b) 40 K, 20 K
 - (c) 80 K, 60 K
 - (d) 100 K, 80 K
13. The mean energy of a molecule of an ideal gas is
 - (a) $2KT$
 - (b) $\frac{3}{2}KT$
 - (c) KT
 - (d) $\frac{1}{2}KT$
14. Two simple pendulums A and B are made to oscillate simultaneously and it is found that A completes 10 oscillations in 20sec and B completes 8 oscillations in 10sec. The ratio of the lengths of A and B is
 - (a) $\frac{8}{5}$
 - (b) $\frac{64}{25}$
 - (c) $\frac{5}{4}$
 - (d) $\frac{25}{64}$
15. The waves set up in a closed pipe are
 - (a) Transverse and progressive
 - (b) Longitudinal and stationary
 - (c) Transverse and stationary
 - (d) Longitudinal and progressive
16. Two spheres of electric charges $+2nC$ and $-8nC$ are placed at a distance 'd' apart. If they are allowed to touch each other, what is the new distance between them to get a repulsive force of same magnitude as before?
 - (a) $\frac{4d}{3}$
 - (b) $\frac{3d}{4}$
 - (c) d
 - (d) $\frac{d}{2}$
17. Three-point charges of $+2q$, $+2q$ and $-4q$ are placed at the corner A, B and C of an equilateral triangle ABC of side 'x'. The magnitude of the electric dipole moment of this system is
 - (a) $2qx$
 - (b) $2\sqrt{3}qx$
 - (c) $3\sqrt{2}qx$
 - (d) $3qx$
18. 4×10^{10} electrons are removed from a neutral metal sphere of diameter 20 cm placed in air. The magnitude of the electric field (in NC-1) at a distance of 20 cm from its centre is
 - (a) 5760
 - (b) 1440
 - (c) 640
 - (d) zero
19. Two-point charges $A = +3nC$ and $B = 1nC$ are placed 5 cm apart in air. The work done to move charge B towards A by 1 cm is
 - (a) $1.35 \times 10^{-7} J$
 - (b) $2.7 \times 10^{-7} J$
 - (c) $2.0 \times 10^{-7} J$
 - (d) $12.1 \times 10^{-7} J$
20. A system of 2 capacitor of capacitance $2\mu F$ and $4\mu F$ is connected in series across a potential difference of 6 V. The electric charge and energy stored in the system are
 - (a) $10\mu C$ and $30\mu J$
 - (b) $36\mu C$ and $108\mu J$
 - (c) $8\mu C$ and $24\mu J$
 - (d) $1\mu C$ and $2\mu J$
21. The minimum value of effective capacitance that can be obtained by combining 3 capacitors of capacitances 1pF, 2pF and 4pF is
 - (a) $\frac{4}{7}pF$
 - (b) 1pF
 - (c) $\frac{7}{4}pF$
 - (d) 2pF
22. A cylindrical conductor of diameter 0.1 mm carries a current of 90 mA. The current density (in Am^{-2}) is ($\pi \approx 3$)
 - (a) 1.2×10^7
 - (b) 2.4×10^7
 - (c) 3×10^6
 - (d) 6×10^6
23. A piece of copper is to be shaped into a conducting wire of maximum resistance. The suitable length and diameter are ____ and ____ respectively.
 - (a) L and d
 - (b) 2 L and d
 - (c) $L/2$ and 2 d
 - (d) L and $d/2$
24. Of the following graphs, the one that correctly represents the I – V characteristics of a 'Ohmic device' is

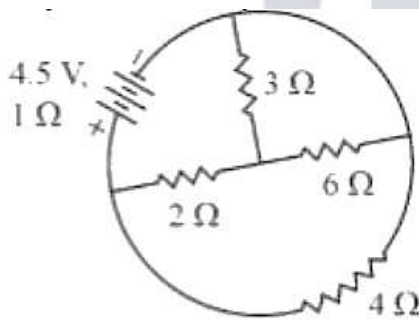


25. The value of I in the figure shown below is



- (a) 8 A (b) 21 A
(c) 19 A (d) 4 A

26. The power dissipated in 3Ω resistance in the following circuit is



- (a) -261 kJ (b) $+103 \text{ kJ}$
(c) $+261 \text{ kJ}$ (d) -103 kJ

27. In metre bridge experiment, with a standard resistance in the right gap and a resistance coil dipped in water (in a beaker) in the left gap, the balancing length obtained is 'l'. If the temperature of water is increased, the new balancing length is

- (a) $> l$ (b) $< l$
(c) $= l$ (d) $= 0$

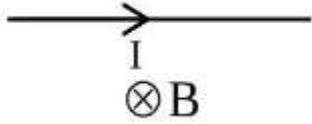
28. A proton, a deuteron and an α - particle are projected perpendicular to the direction of a uniform magnetic field with same kinetic energy. The ratio of the radii of the circular paths described by them is

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

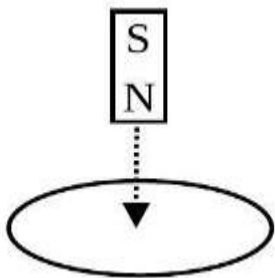
29. A galvanometer of resistance 50Ω is connected to a battery of 3 V along with a resistance of 2950Ω in series shows full-scale deflection of 30 divisions. The additional series resistance required to reduce the deflection to 20 divisions is

- (a) 1500Ω (b) 4440Ω
(c) 7400Ω (d) 2950Ω

30. The magnetic field at the center of a current carrying loop of radius 0.1 m is $5\sqrt{5}$ times that at a point along its axis. The distance of this point from the centre of the loop is
 (a) 0.2 m (b) 0.1 m
 (c) 0.05 m (d) 0.25 m
31. A straight wire of length 50 cm carrying a current of 2.5 A is suspended in mid-air by a uniform magnetic field of 0.5 T (as shown in figure). The mass of the wire is ($g = 10 \text{ ms}^{-2}$)



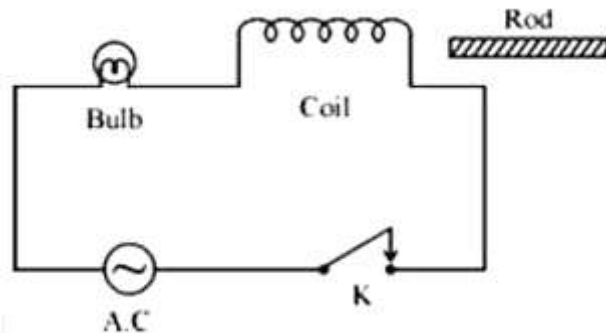
- (a) 62.5gm (b) 250gm
 (c) 125gm (d) $\text{Cu}_2\text{O} + \text{FeS}$
32. Which of the following properties is 'False' for a bar magnet?
 (a) Its poles cannot be separated
 (b) It points in North-South direction when suspended
 (c) It's like poles repel and unlike poles attract.
 (d) It doesn't produce magnetic field
33. A magnetic dipole of magnetic moment $6 \times 10^{-2} \text{ Am}^2$ and moment of inertia $12 \times 10^{-6} \text{ kgm}^2$ performs oscillation in a magnetic field of $2 \times 10^{-2} \text{ T}$. The time taken by the dipole to complete 20 oscillations is ($\pi \approx 3$)
 (a) 36 s (b) 6 s
 (c) 12 s (d) 18 s
34. The susceptibility of a ferromagnetic substance
 (a) $\gg 1$ (b) > 1
 (c) < 1 (d) zero
35. A bar magnet is allowed to fall vertically through a copper coil placed in a horizontal plane. The magnet falls with a net acceleration



- (a) = g (b) $> g$
 (c) $< g$ (d) zero
36. The working of magnetic braking of trains is based on
 (a) Alternating current
 (b) Eddy current
 (c) Steady current
 (d) Pulsating current
37. A jet plane of wing span 20 m is travelling towards west at a speed of 400 ms^{-1} . If the earth's total magnetic field is $4 \times 10^{-4} \text{ T}$ and the dip angle is 30° , at that place, the voltage difference developed across the ends of the wing is

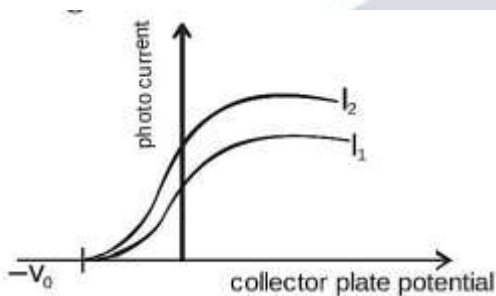
- (a) 1.6 V (b) 3.2 V
(c) 0.8 V (d) 6.4 V

38. In the (A)(C) circuit shown, keeping 'K' pressed, if an iron rod is inserted into the coil, the bulb in the circuit,



- (a) Glows more brightly
(b) Glows less brightly
(c) Glows with same brightness (as before the rod is inserted)
(d) Gets damaged
39. The output of a step down transformer is measured to be 48 V when connected to a 12w bulb (b) The value of peak current is
(a) $\frac{1}{\sqrt{2}}$ A (b) $\sqrt{2}$ A
(c) $\frac{1}{2\sqrt{2}}$ A (d) $\frac{1}{4}$ A
40. A coil of inductive reactance $1/\sqrt{3}\Omega$ and resistance 1Ω is connected to a 200 V, 50 Hz (A)(C) supply. The time lag between maximum voltage and current is
(a) $\frac{1}{300}$ s (b) $\frac{1}{600}$ s
(c) $\frac{1}{500}$ s (d) $\frac{1}{200}$ s
41. If $\vec{E}$ and $\vec{B}$ represent electric and magnetic field vectors of an electromagnetic wave, the direction of propagation of the wave is along
(a) $\vec{E}$ (b) $\vec{B}$
(c) $\vec{E} \times \vec{B}$ (d) $\vec{B} \times \vec{E}$
42. According to Cartesian sign convention, in ray optics
(a) all distances are taken positive
(b) all distances are taken negative
(c) all distances in the direction of incident ray are taken positive
(d) all distances in the direction of incident ray are taken negative
43. A linear object of height 10 cm is kept in front of a concave mirror of radius of curvature 15 cm, at a distance of 10 cm. The image formed is
(a) magnified
(b) magnified and inverted
(c) diminished and erect
(d) diminished and inverted

44. During scattering of light, the amount of scattering is inversely proportional to of wavelength of light,
 (a) cube (b) square
 (c) fourth power (d) half
45. In Young's double-slit experiment if yellow light is replaced by blue light, the interference fringes become
 (a) wider (b) narrower
 (c) brighter (d) darker
46. According to Huygens' principle, during refraction of light from air to a denser medium
 (a) Wavelength and speed decrease
 (b) Wavelength and speed increase
 (c) Wavelength increases but speed decreases
 (d) Wavelength decreases but speed increases
47. In a system of two crossed polarisers, it is found that the intensity of light from the second polariser is half from that of first polariser. The angle between their pass axes is
 (a) 45° (b) 60°
 (c) 30° (d) 0°
48. From the following graph of photo current against collector plate potential, for two different intensities of light I_1 and I_2 , one can conclude



- (a) $I_1 = I_2$ (b) $I_1 > I_2$
 (c) $I_1 < I_2$ (d) Comparison is not possible
49. A particle is dropped from a height 'H'. The de'Broglie wavelength of the particle depends on height as
 (a) H (b) H^0
 (c) $H^{1/2}$ (d) $H^{-1/2}$
50. The scientist who is credited with the discovery of 'nucleus' in an atom is
 (a) J.J. Thomson (b) Rutherford
 (c) Niels Bohr (d) Balmer
51. The energy (in eV) required to excite an electron from $n = 2$ to $n = 4$ state in hydrogen atom is
 (a) +2.55 (b) -3.4
 (c) -0.85 (d) +4.25
52. In a nuclear reactor the function of the Moderator is to decrease
 (a) Number of neutrons
 (b) Speed neutrons
 (c) Escape of neutrons
 (d) Temperature of the reactor
53. The particles emitted in the decay of ${}_{92}^{238}\text{U}$ to ${}_{92}^{234}\text{U}$
 (a) 1α and 2β (b) 1α only
 (c) 1α and 1β (d) 2α and 2β
54. The mass defect of ${}_2^4\text{He}$ is 0.03μ . The binding energy per nucleon of helium (in MeV) is
 (a) 27.93 (b) 6.9825
 (c) 2.793 (d) 69.825

55. The energy gap in case of which of the following is less than 3eV ?

- (a) copper (b) Iron
(c) Zener diode (d) Germanium

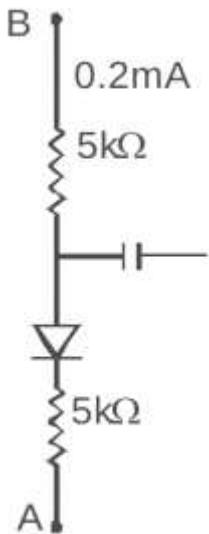
56. Which of the following semi-conducting devices is used as a voltage regulator?

- (a) Photo diode (b) LASER diode
(c) Zener diode (d) Solar cell

57. In the three parts of a transistor, 'Emitter is of

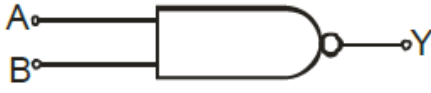
- (a) Moderate size and heavily doped
(b) Large size and lightly doped
(c) Thin size and heavily doped
(d) Large size and moderately doped

58. In the figure shown, if the diode forward voltage drop is 0.2 V, the voltage difference between A and B is



- (a) 1.3 V (b) 2.2 V
(c) 0 (d) 0.5 V

59. Which of the following logic gates is considered as 'universal'?

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

60. A basic communication system consists of

(A) Transmitter (B) Information source

(C) User of information (D) Channel

(e) Receive

- (a) A, B, C, D and E (b) B, A, D, E and C
(c) B, D, A, C and E (d) B, E, A, D and C

Chemistry

61. If 3.01×10^{20} molecules are removed from 98mg of H_2SO_4 , then number of moles of H_2SO_4 left are
 (a) 0.1×10^{-3} mol (b) 0.5×10^{-3} mol
 (c) 1.66×10^{-3} mol (d) 9.95×10^{-2} mol
62. The correct set of quantum number for the unpaired electrons of chlorine atom is
 (a) $2, 0, 0, +\frac{1}{2}$ (b) $2, 1, -1, +\frac{1}{2}$
 (c) $3, 1, 1, \pm\frac{1}{2}$ (d) $3, 0, 0, \pm\frac{1}{2}$
63. The electro negativities of C, N, Si and P are in the order of
 (a) $\text{P} < \text{Si} < \text{C} < \text{N}$ (b) $\text{Si} < \text{P} < \text{N} < \text{C}$
 (c) $\text{Si} < \text{P} < \text{C} < \text{N}$ (d) $\text{P} < \text{Si} < \text{N} < \text{C}$
64. Which of the following structure of a molecule is expected to have three bond pairs and one lone pair of electrons?
 (a) Tetrahedral (b) Trigonal Planar
 (c) Pyramidal (d) Octahedral
65. Which of the following is the correct electron dot structure of N_2O molecule?
 (a) $:\text{N} = \text{N} = \ddot{\text{O}}:$ (b) $:\text{N} = \overset{+}{\text{N}} - \ddot{\text{O}}:$
 (c) $:\ddot{\text{N}} = \text{N} = \ddot{\text{O}}:$ (d) $:\ddot{\text{N}} - \text{N} = \ddot{\text{O}}:$
66. The pressure of real gases is less than that of ideal gas because of
 (a) Intermolecular attraction
 (b) Finite size of particles
 (c) Increase in the number of collisions
 (d) Increase in the kinetic energy of the molecules
67. A reaction has both ΔH and ΔS -ve. The rate of reaction
 (a) increases with increase in temperature
 (b) increases with decrease in temperature
 (c) remains unaffected by change in temperature
 (d) cannot be predicted for change in temperature
68. The equilibrium constant for the reaction $\text{N}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2\text{NO}_{(g)}$ is 4×10^{-4} at 2000 K. In presence of a catalyst the equilibrium is attained ten times faster. Therefore, the equilibrium constant in presence of catalyst of 2000 K is
 (a) 40×10^{-4} (b) 4×10^{-2}
 (c) 4×10^{-3} (d) 4×10^{-4}
69. The reaction quotient ' Q_c ' is useful in predicting the direction of the reaction. Which of the following is incorrect?
 (a) If $Q_c > K_c$, the reverse reaction is favoured
 (b) If $Q_c < K_c$, the forward reaction is favoured
 (c) If $Q_c = K_c$, no reaction occur
 (d) If $Q_c > K_c$, forward reaction is favoured

70. $3\text{ClO}^-_{(\text{aq})} \rightarrow \text{ClO}^- + 2\text{Cl}^-$ is an example of

- (a) Oxidation reaction
- (b) Reduction reaction
- (c) Disproportionation reaction
- (d) Decomposition reaction

71. In the manufacture of hydrogen from water gas ($\text{CO} + \text{H}_2$), which of the following is correct statement?

- (a) CO is oxidized to CO_2 with steam in the presence of a catalyst followed by absorption of CO_2 in alkali.
- (b) CO and H_2 are separated based on difference in their densities.
- (c) Hydrogen is isolated by diffusion
- (d) H_2 is removed by occlusion with pd

72. Plaster of Paris is represented as

- (a) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
- (c) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- (d) CaSO_4

73. Addition of mineral acid to an aqueous solution of Borax, the following compound is formed

- (a) Boron hydride
- (b) Orthoboric acid
- (c) Meta boric acid
- (d) Pyroboric acid

74. Identify the correct statement in the following:

- (a) n-butane and isobutane are functional isomers
- (b) Dimethyl ether and ethanol are chain isomers
- (c) Propan-1-ol and propan-2-ol are position isomers
- (d) Ethanoic acid and methyl methanoate are position isomers

75. In which of the following, haemolytic bond fission takes place?

- (a) Alkaline hydrolysis of ethyl chloride
- (b) Addition of HBr to double bond
- (c) Free radical chlorination of methane
- (d) Nitration of Benzene

76. For the preparation of Alkanes, aqueous solution of sodium or potassium salt of carboxylic acid is subjected to

- (a) Hydrolysis
- (b) Oxidation
- (c) Hydrogenation
- (d) Electrolysis

77. Which one of the following is not a common component of photo-chemical smog?

- (a) Ozone
- (b) Acrolein
- (c) Peroxy acetyl nitrate
- (d) Chloroflouro carbons

78. Which of the following crystal has unit cell such that $a \neq b \neq c$ and $\alpha \neq \beta \neq 90^\circ$?

- (a) $\text{K}_2\text{Cr}_2\text{O}_7$
- (b) NaNO_3
- (c) KNO_3
- (d) K_2SO_4

79. The correct statement regarding defect in solids is

- (a) Frenkel defect is usually favoured by a very small difference in the sizes of cations and anions.
- (b) Frenkel defect is a dislocation defect.
- (c) Trapping of proton in the lattice leads to the formation of F-centers.
- (d) Schottky defect has no effect on the physical properties of solids.

80. In a face centred cubic arrangement of A and B atoms in which 'A' atoms are at the corners of the unit cell and 'B' atoms are at the face centers. One of the 'A' atom is missing from one corner in unit cell. The simplest formula of compound is

- (a) $A_7 B_{24}$ (b) $A_7 B_8$
(c) AB_3 (d) $A_7 B_3$

81. Which of the following aqueous solution has highest freezing point?

- (a) 0.1 molal $Al_2(SO_4)_3$ (b) 0.1 molal $BaCl_2$
(c) 0.1 molal $AlCl_3$ (d) 0.1 molal NH_4Cl

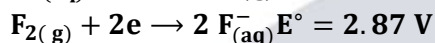
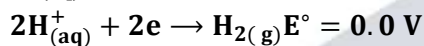
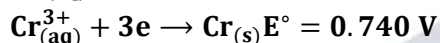
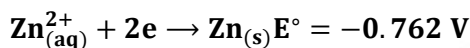
82. The Vant Hoff's factor 'i' accounts for

- (a) extent of solubility of solute
(b) extent of dissociation of solute
(c) Extent of dissolution of solute
(d) Extent of mobility of solute

83. When the pure solvent diffuses out of the solution through the semi-permeable membrane then the process is called

- (a) Osmosis (b) Reverse osmosis
(c) Sorption (d) Dialysis

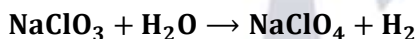
84. The standard reduction potential at 298 K for the following half cell reaction



Which of the following is strongest reducing agent?

- (a) $Zn_{(s)}$ (b) $Cr_{(s)}$
(c) $H_{2(g)}$ (d) $F_{2(g)}$

85. By passing electric current, $NaClO_3$ is converted into $NaClO_4$ according to the following equation



How many moles of $NaClO_4$ will be formed when three Faradays of charge is passed through $NaClO_3$?

- (a) 0.75 (b) 1.0
(c) 1.5 (d) 3.0

86. In the electrolysis of aqueous sodium chloride solution, which of the half -cell reaction will occur at anode?

- (a) $Na_{(aq)}^+ + e^- \rightarrow Na_{(s)} E^\circ = -2.71 \text{ volts}$
(b) $2H_2O_{(l)} \rightarrow O_2 + 4H^+ + 4e^- E_{cell}^\circ = 1.23 \text{ volts}$
(c) $H_{(aq)}^+ + e^- \rightarrow \frac{1}{2} H_2 E_{cell}^\circ = 0.00 \text{ volts}$
(d) $Cl_{(aq)}^- \rightarrow \frac{1}{2} Cl_2 + e^- E_{cell}^\circ = 1.36 \text{ volts}$

87. Which of the following statement is in accordance with the Arrhenius equation?

- (a) Rate of a reaction increases with increase in temperature
(b) Rate of a reaction increases with decrease in activation energy
(c) Rate constant decreases exponentially with increase in temperature
(d) Rate of reaction does not change with increase in activation energy

88. Which of the following statement is incorrect?

- (a) The rate law for any reaction cannot be determined experimentally

- (b) Complex reactions have fractional order.
- (c) Biomolecular reactions involve simultaneous collision between two species
- (d) Molecularity is only applicable for elementary reaction.

89. For a reaction $\frac{1}{2} A \rightarrow 2 B$ rate of disappearance of A is related to rate of appearance of B by the expression

- (a) $\frac{-d[A]}{dt} = 4 \frac{d[B]}{dt}$ (b) $\frac{-d[A]}{dt} = \frac{1}{4} \frac{d[B]}{dt}$
- (c) $\frac{-d[A]}{dt} = \frac{1}{2} \frac{d[B]}{dt}$ (d) $\frac{-d[A]}{dt} = \frac{d[B]}{dt}$

90. The process which is responsible for the formation of delta at a place where rivers meet the sea is

- (a) Coagulation (b) Colloid formation
- (c) Emulsification (d) Peptization

91. Hydrogenation of vegetable oils in presence of finely divided Nickel as catalyst. The reaction is

- (a) Heterogeneous catalysis
- (b) Homogeneous catalysis
- (c) Enzyme catalysed reaction
- (d) Liquid catalysed reaction

92. Which of the following is not a favourable condition for physical adsorption?

- (a) High temperature
- (b) High pressure
- (c) Higher critical temperature of adsorbate
- (d) Low temperature

93. The metal extracted by leaching with a cyanide

- (a) Al (b) Ag
- (c) Cu (d) Na

94. Extraction of chlorine from brine solution is based on

- (a) Oxidation (b) Chlorination
- (c) Reduction (d) Acidification

95. Which of the following element forms $p_\pi - p_\pi$ bond with itself?

- (a) N (b) P
- (c) Se (d) Te

96. Which one of the following metallic oxide exhibit amphoteric nature?

- (a) CaO (b) Na_2O
- (c) BaO (d) Al_2O_3

97. Select wrong chemical reaction among the following :

- (a) $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$
- (b) $8NH_3 + 3Cl_2 \rightarrow 6NH_4Cl + N_2$
- (c) $2NaOH + Cl_2 \rightarrow 2NaCl + H_2 + O_2$
- (d) $2Ca(OH)_2 + 2Cl_2 \rightarrow Ca(OCl)_2 + CaCl_2 + 2H_2O$

98. Which one of the following noble gas has an unusual property of diffusing through the materials such as rubber, glass or plastic?

- (a) Ne (b) Ar
- (c) Kr (d) He

99. The magnetic nature of elements depends on the presence of unpaired electrons. Identify the configuration of transition elements which shows highest magnetic moment?

- (a) $3d^7$ (b) $3d^5$
- (c) $3d^8$ (d) $3d^2$

100. Which of the following statement is wrong regarding Lanthanoids?

- (a) Ln (III) compounds are generally colourless.
- (b) Ln (III) compounds are predominantly ionic in character
- (c) The ionic size of Ln(III) ions decreases with increasing atomic number

(d) Ln (III) hydroxides are mainly basic in nature.

101. Square planar complex of the type M_{AXBL} (where A, B, X and L are unidentate ligands) shows following set of isomers

- (a) Two cis and one trans
- (b) Two trans and one cis
- (c) Two cis and two trans
- (d) Three cis and one trans

102. According to crystal field theory, the M - L bond in a complex is

- (a) Purely ionic
- (b) purely covalent
- (c) Purely co-ordinate
- (d) Partially covalent

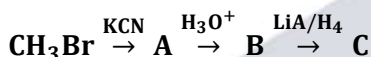
103. The co-ordination number and the oxidation state of the element ' M ' in the complex $[M(en)_2(C_2O_4)]NO_2$ {where (en) is ethan-1, 2 - diamine } are respectively

- (a) 6 and 3
- (b) 6 and 2
- (c) 4 and 2
- (d) 4 and 3

104. Toluene reacts with halogen in presence of Iron (III) chloride giving ortho and para halo compounds. The reaction is

- (a) Electrophilic elimination reaction
- (b) Electrophilic substitution reaction
- (c) Free radical addition reaction
- (d) Nucleophilic substitution reaction

105. In the following sequence of reactions



The end product C is

- (a) Acetone
- (b) Methane
- (c) Acetaldehyde
- (d) Ethyl Alcohol

106. Which of the following order is true regarding the acidic nature of phenol?

- (a) Phenol > O-cresol > O-nitrophenol
- (b) O-cresol < phenol < O-nitrophenol
- (c) Phenol < O-cresol > O-nitrophenol
- (d) Phenol < O-cresol > O-nitrophenol

107. Which of the following reagent cannot be used to oxidize primary alcohols to aldehydes?

- (a) CrO_3 in anhydrous medium
- (b) $KMnO_4$ in acidic medium
- (c) Pyridinium chloro chromate
- (d) Heating in presence of Cu at 573 K

108. Cannizzaro's reaction is an example of auto oxidation

- (a) It is a typical reaction of aliphatic aldehyde
- (b) It is a reaction answered only by aromatic aldehydes
- (c) It is a reaction answered by all aldehydes.
- (d) It is a reaction answered by only aldehydes containing α -hydrogen.

109. Lower members of aliphatic carboxylic acid are soluble in water. This is due to

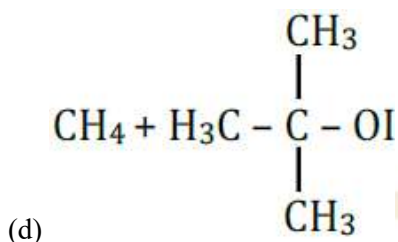
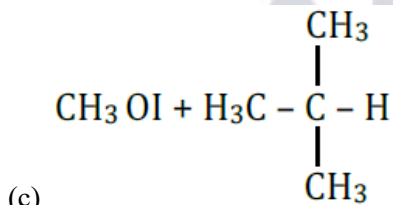
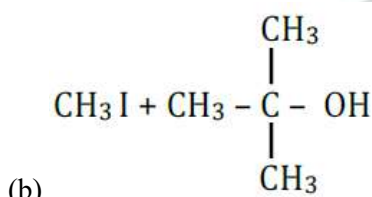
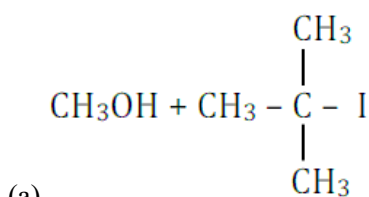
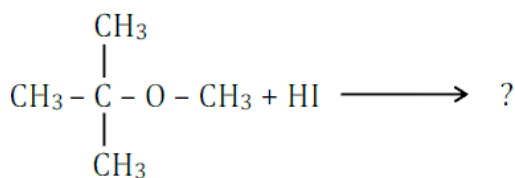
- (a) Formation of hydrogen bonds with water.
- (b) Van der-Waals interaction with water molecules
- (c) Water is non electrolyte

(d) Due to London forces

110. The correct order of increasing basic nature for the bases NH_3 , CH_3NH_2 and $(\text{CH}_3)_2\text{NH}$ in aqueous solutions

- (a) $\text{CH}_3\text{NH}_2 < \text{NH}_3 < (\text{CH}_3)_2\text{NH}$
- (b) $(\text{CH}_3)_2\text{NH} < \text{NH}_3 < \text{CH}_3\text{NH}_2$
- (c) $\text{NH}_3 < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$
- (d) $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} < \text{NH}_3$

111. The product formed during the following reaction are



112. Reduction of ketones cannot be carried out with which of the following reagents?

- (a) Sodium borohydride or Lithium Aluminum hydride
- (b) Zinc amalgam and concentrated HCl
- (c) Hydrazine and KOH in ethylene glycol
- (d) Hydrogen in presence of palladium in Barium sulphate and quinoline

113. Gabriel phthalimide synthesis is used in the preparation of primary amine from phthalimide, which of the following reagent is not used during the process?

- (a) KOH
- (b) NaOH
- (c) HCl
- (d) Alkyl Halides

114. The Glycosidic linkage present in sucrose is between

- (a) C - 1 of α -glucose and C - 2 of β -fructose
- (b) C-1 of α -glucose and C - 4 of α -glucose
- (c) C - 1 of β -galactose and C - 4 of α -glucose
- (d) C - 1 of α -glucose and C - 4 of β -fructose

115. Hormones are secreted by ductless glands of human body. Iodine containing hormone is

- (a) Insulin
- (b) Thyroxine
- (c) Testosterone
- (d) Adrenaline

116. Pick the wrong statement from the following:

- (a) Sources of Vitamin B1 are yeast, milk, green vegetables and cereals
- (b) Deficiency of Vitamin B6 (pyridoxine) results in convulsions
- (c) Consumption of citrus fruits and green leafy vegetables in food prevents scurvy
- (d) Deficiency of vitamin D causes xerophthalmia

117. The monomer used in Novolac, a polymer used in paints

- (a) Phenol and Formaldehyde
- (b) Melamine and Formaldehyde
- (c) Butadiene and Styrene
- (d) Butadiene and Acrylo Nitrile

118. Which of the following is not a biodegradable polymer?

- (a) Polyhydroxy butyrate - CO- β hydroxy valerate
- (b) pHBV
- (c) Nylon 2-Nylon-6
- (d) Glyptol

119. Bactericidal antibiotics among the following is

- (a) Ofloxacin
- (b) Erythromycin
- (c) Tetracycline
- (d) Chloramphenicol

120. Pick the correct statement among the following:

- (a) Cetyl trimethyl ammonium bromide is a popular cationic detergent used in air conditioner
- (b) Non-ionic detergents is formed when polyethylene glycol reacts with adipic acid
- (c) Sodium dodecyl benzene sulphonate used in tooth paste is a cationic detergent.
- (d) None of thses

Mathematics

121. If A and B are finite sets and $A \subset B$, then-

- (a) $n(A \cup B) = n(A)$
- (b) $n(A \cap B) = n(B)$
- (c) $n(A \cup B) = n(B)$
- (d) $n(A \cap B) = \phi$

122. The value of $\cos^2 45^\circ - \sin^2 15^\circ$ is -

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

123. $3 + 5 + 7 + \dots$ to n term is -

- (a) $n(n+2)$ (b) $n(n-2)$
(c) n^2 (d) $(n+1)^2$

124. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least positive integral value of m is -

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

125. If $|x-2| \leq 1$, then -

- (a) $x \in [1,3]$ (b) $x \in (1,3)$
(c) $x \in [-1,3]$ (d) $x \in [-1,3)$

126. If ${}^nC_{12} = {}^nC_8$ then n is equal to -

- (a) 26 (b) 12
(c) 6 (d) 20

127. The total number of terms in the expansion of $(x+a)^{47} - (x-a)^{47}$ after simplification is -

- (a) 24 (b) 47
(c) 48 (d) 96

128. Equation of line passing through the point $(1, 2)$ and perpendicular to the line $y = 3x - 1$ is :-

- (a) $x + 3y - 7 = 0$ (b) $x + 3y + 7 = 0$
(c) $x + 3y = 0$ (d) $x - 3y = 0$

129. The eccentricity of the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$ is -

- (a) $\frac{2\sqrt{5}}{6}$ (b) $\frac{2\sqrt{5}}{4}$
(c) $\frac{2\sqrt{13}}{6}$ (d) $\frac{2\sqrt{13}}{4}$

130. The perpendicular distance of the point $P(6, 7, 8)$ from XY -plane is -

- (a) 8 (b) 7
(c) 6 (d) 5

131. The value of $\lim_{\theta \rightarrow 0} \frac{1 - \cos 4\theta}{1 - \cos 6\theta}$ is -

- (a) $4/9$ (b) $9/4$
(c) $9/3$ (d) $3/4$

132. The contrapositive statement of the statement "If x is prime number, then x is odd" is -

- (a) If x is not a prime number, then x is not odd
(b) If x is a prime number, then x is not odd
(c) If x is not a prime number, then x is odd
(d) If x is not odd, then x is not a prime number

133. If coefficient of variation is 60 and standard deviation is 24, then Arithmetic mean is -

- (a) 40 (b) $7/20$
(c) $20/7$ (d) $1/40$

134. The range of the function $f(x) = \sqrt{9 - x^2}$ is -

- (a) $(0,3)$ (b) $[0,3]$
(c) $(0,3]$ (d) $[0,3)$

135. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = x^4$, then -

- (a) f is one-one and onto
(b) f may be one-one and onto
(c) f is one-one but not onto
(d) f is neither one-one nor onto

136. The range of $\sec^{-1} x$ is -

- (a) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ (b) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$
(c) $[0, \pi]$ (d) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$

137. If $\tan^{-1} x + \tan^{-1} y = \frac{4\pi}{5}$, then $\cot^{-1} x + \cot^{-1} y$ is equal to -
 (a) π (b) $\frac{\pi}{5}$
 (c) $\frac{2\pi}{5}$ (d) $\frac{3\pi}{5}$
138. If $f(x) = 8x^3$, $g(x) = x^{1/3}$, Then fog (x) is -
 (a) $8x$ (b) 8^3x
 (c) $(8x)^{1/3}$ (d) $8x^3$
139. If $A = \frac{1}{\pi} \begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}(\frac{x}{\pi}) \\ \sin^{-1}(\frac{x}{\pi}) & \cot^{-1}(\pi x) \end{bmatrix}$, $B = \begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}(\frac{x}{\pi}) \\ \sin^{-1}(\frac{x}{\pi}) & -\tan^{-1}(\pi x) \end{bmatrix}$ then $A - B$ is equal to -
 (a) I (b) 0
 (c) $2I$ (d) None of these
140. If a matrix A is both symmetric and skew symmetric, then -
 (a) A is diagonal matrix (b) A is zero matrix
 (c) A is scalar matrix (d) A is square matrix
141. If $2 \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$, then the value of x and y are -
 (a) $x = 3, y = 3$ (b) $x = -3, y = 3$
 (c) $x = 3, y = -3$ (d) $x = -3, y = -3$
142. Binary operation * on $R - \{-1\}$ defined by $a * b = \frac{a}{b+1}$ is -
 (a) * is associative and commutative
 (b) * is associative but not commutative
 (c) * is neither associative nor commutative
 (d) * is commutative but not associative
143. If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$ then x is equal to -
 (a) 2 (b) 4
 (c) 8 (d) $\pm 2\sqrt{2}$
144. If A is a square matrix of order 3×3 , then $|KA|$ is equal to -
 (a) $K|A|$ (b) $K^2|A|$
 (c) $K^3|A|$ (d) $3K|A|$
145. The area of triangle with vertices $(K, 0)$, $(4, 0)$, $(0, 2)$ is 4 square units, then value of K is -
 (a) 0 or 8 (b) 0 or -8
 (c) 0 (d) 8
146. Let $\Delta = \begin{vmatrix} Ax & x^2 & 1 \\ By & y^2 & 1 \\ Cz & z^2 & 1 \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} A & B & C \\ x & y & z \\ zy & zx & xy \end{vmatrix}$ then
 (a) $\Delta_1 = -\Delta$ (b) $\Delta_1 = \Delta$
 (c) $\Delta_1 \neq \Delta$ (d) $\Delta_1 = 2\Delta$
147. If $f(x) = \begin{cases} Kx^2 & \text{if } x \leq 2 \\ 3 & \text{if } x > 2 \end{cases}$ is continuous at $x = 2$, then the value of K is -
 (a) 3 (b) 4
 (c) $\frac{3}{4}$ (d) $\frac{4}{3}$
148. The value of C in Mean value theorem for the function $f(x) = x^2$ in $[2, 4]$ is -
 (a) 3 (b) 2
 (c) 4 (d) $\frac{7}{2}$
149. The point on the curve $y^2 = x$ where the tangent makes an angle of $\pi/4$ with X-axis is -
 (a) $(\frac{1}{2}, \frac{1}{4})$ (b) $(\frac{1}{4}, \frac{1}{2})$
 (c) $(4, 2)$ (d) $(1, 1)$

150. The function $f(x) = x^2 + 2x - 5$ is strictly increasing in the interval -

- (a) $(-1, \infty)$ (b) $(-\infty, -1)$
(c) $[-1, \infty)$ (d) $(-1, \infty]$

151. The rate of change of a sphere with respect to its surface area when the radius is 4 cm is -

- (a) $4 \text{ cm}^3/\text{cm}^2$ (b) $2 \text{ cm}^3/\text{cm}^2$
(c) $6 \text{ cm}^3/\text{cm}^2$ (d) $8 \text{ cm}^3/\text{cm}^2$

152. If $y = \tan^{-1} \left(\frac{\sin x + \cos x}{\cos x - \sin x} \right)$, then $\frac{dy}{dx}$ is equal to -

- (a) $\frac{1}{2}$ (b) $\pi/4$
(c) 0 (d) 1

153. If $y = \begin{vmatrix} f(x) & g(x) & h(x) \\ 1 & m & n \\ a & b & c \end{vmatrix}$, then $\frac{dy}{dx}$ is equal to -

- (a) $\begin{vmatrix} f'(x) & g'(x) & h'(x) \\ 1 & m & n \\ a & b & c \end{vmatrix}$
(b) $\begin{vmatrix} f'(x) & g'(x) & h'(x) \\ a & b & c \\ 1 & m & n \end{vmatrix}$
(c) $\begin{vmatrix} f'(x) & 1 & a \\ g'(x) & m & b \\ h'(x) & n & c \end{vmatrix}$
(d) $\begin{vmatrix} 1 & m & n \\ a & b & c \\ f'(x) & g'(x) & h'(x) \end{vmatrix}$

154. If $\sin x = \frac{2t}{1+t^2}$, $\tan y = \frac{2t}{1-t^2}$ then $\frac{dy}{dx}$ is equal to -

- (a) 1 (b) 0
(c) -1 (d) 2

155. The derivative of $\cos^{-1}(2x^2 - 1)$ w.r.t $\cos^{-1} x$ is -

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

156. If $y = \log(\log x)$ then $\frac{d^2y}{dx^2}$ is equal to -

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

157. $\int \frac{(x+3)e^x}{(x+4)^2} dx$ is equal to -

- (a) $\frac{1}{(x+4)^2} + C$ (b) $\frac{e^x}{(x+4)^2} + C$
(c) $\frac{e^x}{(x+4)} + C$ (d) $\frac{e^x}{(x+3)} + C$

158. $\int \frac{\cos 2x - \cos 2\theta}{\cos x - \cos \theta} dx$ is equal to -

- (a) $2(\sin x + x \cos \theta) + C$
(b) $2(\sin x - x \cos \theta) + C$
(c) $2(\sin x + 2x \cos \theta) + C$
(d) $2(\sin x - 2x \cos \theta) + C$

159. $\int \sqrt{x^2 + 2x + 5} dx$ is equal to -

- (a) $\frac{1}{2}(x+1)\sqrt{x^2 + 2x + 5} + 2\log|x+1 + \sqrt{x^2 + 2x + 5}| + C$
(b) $(x+1)\sqrt{x^2 + 2x + 5} + 2\log|x+1 + \sqrt{x^2 + 2x + 5}| + C$
(c) $(x+1)\sqrt{x^2 + 2x + 5} - 2\log|x+1 + \sqrt{x^2 + 2x + 5}| + C$
(d) $(x+1)\sqrt{x^2 + 2x + 5} + \frac{1}{2}\log|x+1 + \sqrt{x^2 + 2x + 5}| + C$

160. $\int_0^{\pi/2} \frac{\tan^7 x}{\cot^7 x + \tan^7 x} dx$ is equal to -

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

161. $\int_{-5}^5 |x + 2| dx$ is equal to -

- (a) 29 (b) 28
(c) 27 (d) 30

162. $\int_{-\pi/2}^{\pi/2} \frac{dx}{e^{\sin x} + 1}$ is equal to -

- (a) 0 (b) 1
(c) $-\frac{\pi}{2}$ (d) $\frac{\pi}{2}$

163. $\int_0^{\pi/2} \frac{1}{a^2 \sin^2 x + b^2 \cos^2 x} dx$ is equal to -

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

164. The area of the region bounded by the curve $y = x^2$ and the line $y = 16$ is -

- (a) $\frac{32}{3}$ sq. units (b) $\frac{256}{3}$ sq. units
(c) $\frac{64}{3}$ sq. units (d) $\frac{128}{3}$ sq. units

165. Area of the region bounded by the curve $y = \cos x$, $x = 0$ and $x = \pi$ is -

- (a) 2 sq. units (b) 4 sq. units
(c) 3 sq. units (d) 1 sq. unit

166. The degree of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^2 = \frac{d^2y}{dx^2}$ is -

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

167. General solution of differential equation $\frac{dy}{dx} + y = 1$ ($y \neq 1$) is -

- (a) $\log \left| \frac{1}{1-y} \right| = x + C$
(b) $\log |1 - y| = x + C$
(c) $\log |1 + y| = x + C$
(d) $\log \left| \frac{1}{1-y} \right| = -x + C$

168. The integrating factor of the differential equation $x \cdot \frac{dy}{dx} + 2y = x^2$ is ($x \neq 0$) -

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

169. If $\vec{a} = 2\hat{i} + \lambda\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$ are orthogonal, then value of λ is -

- (a) 0 (b) 1
(c) $\frac{3}{2}$ (d) $-\frac{5}{2}$

170. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$, then the value of $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$ is equal to -

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

171. If $\vec{a}$ and $\vec{b}$ are unit vectors, the angle between $\vec{a}$ and $\vec{b}$ for $\sqrt{3}\vec{a} - \vec{b}$ to be unit vector is -

- (a) 30° (b) 45°
(c) 60° (d) 90°

172. Reflexion of the point (α, β, γ) in XY plane is -

- (a) $(\alpha, \beta, 0)$ (b) $(0, 0, \gamma)$
(c) $(-\alpha, -\beta, \gamma)$ (d) $(\alpha, \beta, -\gamma)$

173. The plane $2x - 3y + 6z - 11 = 0$ makes an angle $\sin^{-1}(\alpha)$ with X-axis. The value of α is equal to -

- (a) $\frac{\sqrt{3}}{2}$ (b) $\frac{2}{7}$
(c) $\frac{\sqrt{2}}{3}$ (d) $\frac{3}{7}$

174. The distance of the point $(-2, 4, -5)$ from the line $\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6}$ is -

- (a) $\frac{\sqrt{37}}{10}$ (b) $\sqrt{\frac{37}{10}}$
(c) $\frac{37}{\sqrt{10}}$ (d) $\frac{37}{10}$

175. A box has 100 pens of which 10 are defective. The probability that out of a sample of 5 pens drawn one by one with replacement and at most one is defective is -

- (a) $\frac{9}{10}$ (b) $\frac{1}{2} \left(\frac{9}{10} \right)^4$
(c) $\left(\frac{9}{10} \right)^5 + \frac{1}{2} \left(\frac{9}{10} \right)^4$ (d) $\frac{1}{2} \left(\frac{9}{10} \right)^5$

176. Two events A and B will be independent if -

- (a) A and B are mutually exclusive
(b) $P(A' \cap B') = (1 - P(A))(1 - P(B))$
(c) $P(A) = P(B)$
(d) $P(A) + P(B) = 1$

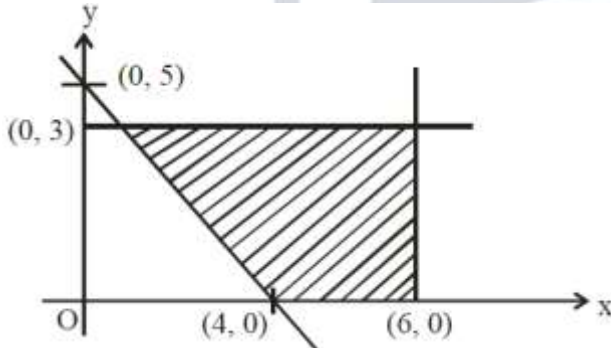
177. The probability distribution of X is

X	0	1	2	3
P(X)	0.3	k	2k	2k

The value of k is -

- (a) 0.14 (b) 0.3
(c) 0.7 (d) 1

178. The shaded region in the figure is the solution set of the in equations -



- (a) $5x + 4y \geq 20, x \leq 6, y \geq 3, x \geq 0, y \geq 0$
(b) $5x + 4y \leq 20, x \leq 6, y \leq 3, x \geq 0, y \geq 0$
(c) $5x + 4y \geq 20, x \leq 6, y \leq 3, x \geq 0, y \geq 0$
(d) $5x + 4y \geq 20, x \geq 6, y \leq 3, x \geq 0, y \geq 0$

179. If an LPP admits optimal solution at two consecutive vertices of a feasible region, then -

- (a) The required optimal solution is at the midpoint of the line joining two points
(b) The optimal solution occurs at every point on the line joining these two points
(c) The LPP under consideration is not solvable
(d) The LPP under consideration must be reconstructed

180. $\int_{0.2}^{3.5} [x] dx$ equal to -

- (a) 4 (b) 4.5
(c) 3.5 (d) 3

Biology

181. Identify the 'order' from the following:

- (a) Carnivora (b) Muscidae
(c) Insecta (d) Panthera

182. Which of the following options show the characters of mycoplasma?

- (a) Smallest living cell without cell wall survive with oxygen
(b) Smallest living cell with cell wall survive with oxygen
(c) Smallest living cell without cell wall survive without oxygen
(d) Smallest living cell with cell wall survive without oxygen

183. Which class of Algae reproduces asexually by non-motile spores and sexually by non-motile gametes?

- (a) Rhodophyceae (b) Phaeophyceae
(c) Chlorophyceae (d) Cyanophyceae

184. Which of the following plants produce zygomorphic flowers?

- (a) Hibiscus (b) Canna
(c) Gulmohar (d) Mustard

185. The secondary wall material Suberin is deposited on the walls of

- (a) Pericycle of stem and endodermis of root
(b) Phellem of stem and endodermis of root
(c) Epidermis of stem and endodermis of root
(d) Phellogen and phelloderm

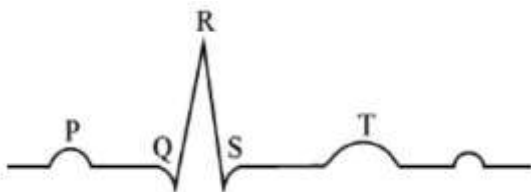
186. The type of epithelium found in the fallopian tube which functions to move particles or mucous in specific direction is:

- (a) Squamous epithelium
(b) Cuboidal epithelium
(c) Ciliated epithelium
(d) Columnar epithelium

187. Which one of the following is not included under endomembrane system?

- (a) Endoplasmic reticulum
(b) Mitochondria
(c) Lysosome
(d) Vacuole

188. In the following diagrammatic representation of a standard ECG the 'T' represents



- (a) Depolarisation of Atria
(b) Depolarisation of Ventricles
(c) Repolarisation of Atria
(d) Repolarisation of Ventricles

189. Which of the following is not a characteristic of facilitated transport?

- (a) Uphill transport
(b) Highly selective

- (c) Requires special membrane proteins
(d) Transport saturates

190. Identify the elements whose deficiency causes both necrosis and chlorosis

- (a) Mg, K (b) Mo, Ca
(c) Fe, Mn (d) Cu, Co

191. The outcome of Calvin cycle includes:

- (a) 6CO_2 , 18ATP, 12NADPH
(b) One glucose, 18 ATP, 12 NADPH
(c) 6CO_2 , 18ATP, 12NADPH
(d) One glucose, 18 ADP, 12 NADP

192. The number of ATP molecules utilised for the breakdown of one molecule of glucose during glycolysis is:

- (a) 4 (b) 2
(c) 6 (d) 8

193. Match the enzymes of Column-I with the functions of Column-II. Choose the correct option:

Column-I	Column-II
1. Enterokinase	p. digests milk proteins
2. Rennin	q. digests carbohydrates
3. Amylase	r. activates try
4. Lipase	s. acts on nucleic acids
	t. breakdown fats

- (a) 1-r, 2-p, 3-q, 4-t (b) 1-r, 2-p, 3-t, 4-q
(c) 1-s, 2-p, 3-t, 4-q (d) 1-s, 2-q, 3-p, 4-t

194. The volume of air inspired or expired by a healthy man per minute is:

- (a) 1000ml – 1100ml
(b) 2500ml – 3000ml
(c) 6000ml – 8000ml
(d) 400ml – 500ml

195. The blood cell that secretes histamine, serotonin and heparin is:

- (a) Neutrophil (b) T-lymphocyte
(c) Killer cell (d) Basophil

196. The hormones involved in maintaining calcium balance in the human body are:

- (a) PTH and TCT (b) PTH and LTH
(c) TCT and FSH (d) MSH and ACTH

197. Amoeba is immortal because:

- (a) it is multicellular
(b) it is microscopic
(c) it reproduces by sexual method only
(d) parental body is distributed among the off springs during binary fission

198. Which of the following is not a pre-fertilization event in higher organisms?
(a) Gametogenesis (b) Gamete transfer
(c) Meiosis (d) Cleavage
199. If a tetraploid plant contains 48 chromosomes in its nucellus, then number of chromosomes in the egg cell and in a synergid respectively:
(a) 48 and 48 (b) 24 and 24
(c) 24 and 48 (d) 48 and 24
200. Pollen grains are generally spherical, measuring about:
(a) 25-50 micrometers (b) 25-50 millimeters
(c) 25-50 nanometers (d) 25-50 centimeters
201. Which of the following characters is not required for autogamy?
(a) Flowers require synchrony in pollen
(b) Anthers and stigma should lie close release and stigma maturation to each other
(c) Flowers should be bisexual
(d) Required pollination agents
202. Which one of the following character favours the process of normal spermatogenesis in human male?
(a) Descent of testes into scrotum
(b) Testes remain in the abdominal cavity
(c) Infection by mumps virus during
(d) Increased scrotal temperature childhood
203. Accessory ducts of reproductive system of human female include:
(a) Oviduct, uterus & vagina
(b) Oviduct, ovaries & ovarian ligaments
(c) Oviduct, ovaries & mammary glands
(d) Ovaries, uterus & vagina
204. In human females, the number of primary follicles left in each ovary at puberty is:
(a) 3000 – 30,000 (b) 30,000 – 60,000
(c) 60,000 – 80,000 (d) 1,50,000 – 1,60,000
205. Implantation is influenced by
(a) FSH (b) LH
(c) Progesterone (d) Relaxin
206. In India the action plans for family planning were initiated in the year:
(a) 1972 (b) 1947
(c) 1951 (d) 1950
207. The inner cell mass of blastocyst becomes:
(a) extraembryonic membranes
(b) differentiated into embryo proper
(c) chorionic villi
(d) placenta
208. Example for autosomal hyper aneuploidy is:
(a) Down's syndrome
(b) Klinefelter's syndrome
(c) Turner's syndrome
(d) Haemophilia
209. In dihybrid cross, when F_1 plants ($RrYy$) are self hybridised, the ratio of segregation of yellow and green in F_2 is :
(a) 1:2:1 (b) 3: 1
(c) 9: 3: 3: 1 (d) 1: 1: 1: 1
210. Replacement of which one of the following nucleotides in the Hb^A gene causes sickle cell anaemia?
(a) A to T (b) T to A
(c) U to A (d) C to G

211. The type of sex determination in honey bee is:

- (a) Haplo-diploidy (b) Haploidy
(c) Diploidy (d) ZZ-ZW

212. Match the number of nucleotides of genome of Column-I with the organisms of Column-II. Choose the correct option given below:

Column-I	Column-II
1. 5386 nucleotides	p. E. Coli
2. 48502bp	q. man
3. 4.6×10^6 bp	r. Drosophila
4. 3.3×10^9 bp	s. $\phi \times 174$ bacteriophage
	t. bacteriophage - lambda

- (a) 1-s, 2-q, 3-p, 4-t (b) 1-s, 2-p, 3-q, 4-r
(c) 1-s, 2-t, 3-p, 4-q (d) 1-r, 2-t, 3-s, 4-p

213. The average length of hnRNA in humans is,

- (a) 3000 bases (b) 2.4 million bases
(c) 1500 bases (d) 500 bases

214. If E. coli is allowed to grow for 40 minutes in a medium containing N^{15} , then the number of N^{14}/N^{14} containing DNA would be:

- (a) zero (b) 20
(c) 10 (d) 2

215. Polymerisation of DNA nucleotides during the synthesis of lagging strand occurs in:

- (a) 3' → 5' direction
(b) 5' → 3' direction
(c) Any direction
(d) promotor to terminator direction

216. In lac-operon concept of gene expression, allolactose acts as,

- (a) repressor (b) inducer
(c) co-repressor (d) co-enzyme

217. The anticodon found on the t-RNA for tryptophan amino acid is.

- (a) ACC (b) UGG
(c) UCC (d) CUU

218. Which one of the following is the identifiable character of Neanderthal man?

- (a) brain capacity 650 cc-800 cc
(b) developed pre-historic cave art
(c) lived before 2 million years ago
(d) buried their dead

219. Identify the plants that are dominant during Jurassic period

- (a) Angiosperms and Bryophytes
(b) Sphenopsida and Ginkgos
(c) Ferns, Conifers and Cycads
(d) Monocotyledons and Arborescent lycopods

220. In humans, common cold is caused by:

- (a) Retrovirus (b) Baculovirus
- (c) Rhinovirus (d) Rhabdovirus

221. Which of the following vector-borne diseases caused by Aedes mosquitoes?

- (a) Ascariasis and Filariasis
- (b) Malaria and Sleeping sickness
- (c) Dengue and Chikungunya
- (d) Kala azar and Filariasis

222. Morphine is obtained from the:

- (a) Inflorescence of Cannabis
- (b) Leaves of Erythroxylum
- (c) Latex of Poppy plant
- (d) Root of Atropa

223. Inbreeding depression occurs due to continuous

- (a) Intra - breeding
- (b) Inter - breeding
- (c) Inter-generic breeding
- (d) Inter-specific breeding

224. Identify the correct combination of crop-variety and insect pests

- (a) Okra - Pusa sawani - Shoot and Fruit borer
- (b) Flat bean - Pusa Gaurav - Fruit borer
- (c) Brassica - Pusa A-4 - Aphids
- (d) Brassica - Pusa sem-3 - Jassids

225. Which of the following crop is developed by mutation breeding, that is resistant to yellow mosaic virus and powdery mildew?

- (a) Cow-pea (b) Okra
- (c) Chilli (d) Mung bean

226. Which one of the following has been commercialised as blood-cholesterol lowering agent?

- (a) Streptokinase (b) Cyclosporin-A
- (c) Statins (d) α -Trypsin-A

227. As the organic matter increases in a water body, the BOD:

- (a) increases (b) decreases
- (c) remains unchanged (d) not a parameter

228. Restriction endonucleases are isolated from some bacteria Their role in bacteria is:

- (a) defence against virus
- (b) synthesis of proteins
- (c) act as genetic material
- (d) help in reproduction

229. From which bacterium the REN-Sal-I is isolated?

- (a) Escherichia coli
- (b) Streptococcus aureus
- (c) Haemophilus influenzae
- (d) Streptomyces albus

230. A transformed bacterium with human gene, fails to produce desired protein. The reason could be:

- (a) Human gene may have intron which bacteria cannot process.
- (b) Amino acid codons for human and bacteria differ.
- (c) Human protein is formed but degraded by bacteria.
- (d) The bacterial promoter gene cannot induce transcription of human gene

231. Read the statements 1 and 2. Choose the correct option:

Statement 1: RNAi take place in all prokaryotic and eukaryotic organisms as a method of cellular defence.

Statement 2: RNA interference is a pre-translational process.

- (a) Statement-1 incorrect, statement-2
- (b) Statement-1 correct, statement-2 correct. incorrect.
- (c) Both statements are correct.
- (d) Both statements are incorrect.

232. The human protein α – 1 antitrypsin is obtained from:

- (a) transformed bacteria
- (b) transgenic animal
- (c) transgenic plant
- (d) a plant from Western Ghats

233. Psammophytes are growing in/on

- (a) Rock (b) Deserts
- (c) Water (d) Shades

234. A plant shows the following modifications:

(i) Leaves covered with dense hairs

(ii) Leaf surface shiny or glabrous

(iii) Leaf blade remains rolled during day

The adaptation of the plant is to:

- (a) conserve water (b) prevent excessive heat
- (c) check transpiration (d) absorb water

235. Mac Arthur's vision of 5 closely related species of warblers living on same tree were able to avoid competition and co-exist by behavioural difference. This is an example for:

- (a) Competitive release
- (b) Resource partitioning
- (c) Competitive exclusion principle
- (d) Adaptive radiation

236. Climax community is a state of:

- (a) non – equilibrium (b) near equilibrium
- (c) pioneer species (d) changing community

237. The process of decomposition delays when,

- (a) the detritus is made up of sugars and nitrogen compounds
- (b) aeration is sufficient
- (c) warm and moist environment exists
- (d) detritus is rich in lignin and chitin

238. The variety of indigenous cows is an example for:

- (a) Genetic diversity (b) Species diversity
- (c) Ecological diversity (d) Microbial diversity

239. So far 1.5 million species are identified, in which the number of fungi species identified is more than the combined total of:

- (a) Algae, lichens, mosses and ferns
- (b) Fishes, amphibians, reptiles and mammals
- (c) Molluscs and crustaceans
- (d) Molluscs, fishes and amphibians

240. The safe method of disposal of e-waste is:

- (a) incineration (b) burning in open field
- (c) thrown into water (d) dumping in forest

