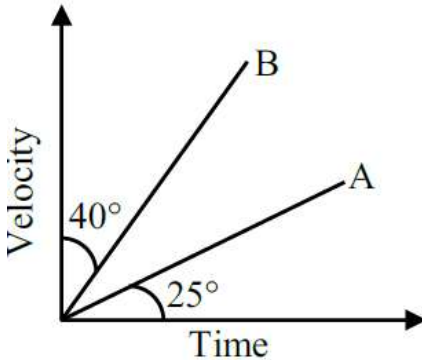


Physics

1. The ratio of the dimensions of Planck constant and that of moment of inertia has the dimensions of

- (a) time (b) frequency
(c) angular momentum (d) velocity

2. The velocity – time graph for two bodies A and B are shown. Then the acceleration of A and B are in the ratio



- (a) $\tan 25^\circ$ to $\tan 40^\circ$ (b) $\tan 25^\circ$ to $\tan 50^\circ$
(c) $\sin 25^\circ$ to $\sin 50^\circ$ (d) $\cos 25^\circ$ to $\cos 50^\circ$

3. A particle is projected with a velocity v so that its horizontal range is twice the greatest height attained. The horizontal range is

- (a) $\frac{v^2}{g}$ (b) $\frac{2v^2}{3g}$
(c) $\frac{4v^2}{5g}$ (d) $\frac{v^2}{2g}$

4. A stone of mass 0.05 kg is thrown vertically upwards. What is the direction and magnitude of net force on the stone during its upward motion?

- (a) 0.49 N vertically upwards
(b) 0.49 N vertically downwards
(c) 0.98 N vertically downwards
(d) 9.8 N vertically downwards

5. The kinetic energy of a body of mass 4 kg and momentum 6 Ns will be

- (a) 2.5 J (b) 3.5 J
(c) 4.5 J (d) 5.5 J

6. The ratio of angular speed of a second-hand to the hour-hand of a watch is

- (a) 720: 1 (b) 60: 1
(c) 3600: 1 (d) 72: 1

7. If the mass of a body is M on the surface of the earth, the mass of the same body on the surface of the moon will be

- (a) $M/6$ (b) M
(c) $6M$ (d) zero

8. Moment of Inertia of a thin uniform rod rotating about the perpendicular axis passing through its centre is

1. If the same rod is bent into a ring and its moment of inertia about its diameter is F . then the ratio $\frac{I}{I'}$ will be

- (a) $\frac{3}{2}\pi^2$ (b) $\frac{8}{3}\pi^2$
(c) $\frac{2}{3}\pi^2$ (d) $\frac{5}{3}\pi^2$

9. The ratio of hydraulic stress to the corresponding strain is known as

- (a) Compressibility (b) Bulk modulus
(c) Young's modulus (d) Rigidity modulus

10. The efficiency of a Carnot engine which operates between the two temperatures $T_1 = 500\text{ K}$ and $T_2 = 300\text{ K}$ is
- (a) 50% (b) 25%
(c) 75% (d) 40%
11. Water is heated from 0°C to 10°C . then its volume
- (a) decreases
(b) increases
(c) does not change
(d) first decreases and then increases
12. 1 gram of ice is mixed with 1 gram of steam. At thermal equilibrium, the temperature of the mixture is
- (a) 0°C (b) 100°C
(c) 50°C (d) 55°C
13. The ratio of kinetic energy to the potential energy of a particle executing SHM at a distance is equal to half of its amplitude, the distance being measured from its equilibrium position will be
- (a) 3: 1 (b) 4: 1
(c) 2: 1 (d) 8: 1
14. When two tuning forks A and B are sounded together. 4 beats per second are heard. The frequency of the fork B is 384 Hz. When one of the prongs of the fork A is filed and sounded with B. the beat frequency increases, then the frequency of the fork A is
- (a) 380 Hz (b) 378 Hz
(c) 379 Hz (d) 389 Hz
15. A stretched string is vibrating in the second overtone, then the number of nodes and antinodes between the ends of the string are respectively
- (a) 4 and 3 (b) 3 and 2
(c) 3 and 4 (d) 2 and 3
16. Two spheres carrying charges $+6\mu\text{C}$ and $+9\mu\text{C}$ separated by a distance d , experiences a force of repulsion F . When a charge of $-3\mu\text{C}$ is given to both the sphere and kept at the same distance as before, the new force of repulsion is
- (a) F (b) $3F$
(c) $F/3$ (d) $F/9$
17. Pick out the statement which is incorrect.
- (a) The tangent drawn to a line of force represents the direction of electric field
(b) The electric field lines form closed loop.
(c) A negative test charge experiences a force opposite to the direction of the field
(d) Field lines never intersect.
18. The angle between the dipole moment and electric field at any point on the equatorial plane is
- (a) 0° (b) 90°
(c) 180° (d) 45°
19. Three - point charges 3 nC , 6 nC and 9 nC are placed at the corners of an equilateral triangle of side 0.1 m . The potential energy of the system is
- (a) 8910 J (b) 89100 J
(c) 9910 J (d) None of these
20. A spherical shell of radius 10 cm is carrying a charge q . If the electric potential at distances 5 cm , 10 cm and 15 cm from the centre of the spherical shell is V_1 , V_2 and V_3 respectively, then
- (a) $V_1 > V_2 > V_3$ (b) $V_1 < V_2 < V_3$
(c) $V_1 = V_2 > V_3$ (d) $V_1 = V_2 < V_3$
21. A parallel plate capacitor is charged and then isolated The effect of increasing the plate separation on charge, potential and capacitance respectively are

- (a) constant, decreases, decreases
- (b) increases, decreases, decreases
- (c) constant, decreases, increases
- (d) constant, increases, decreases

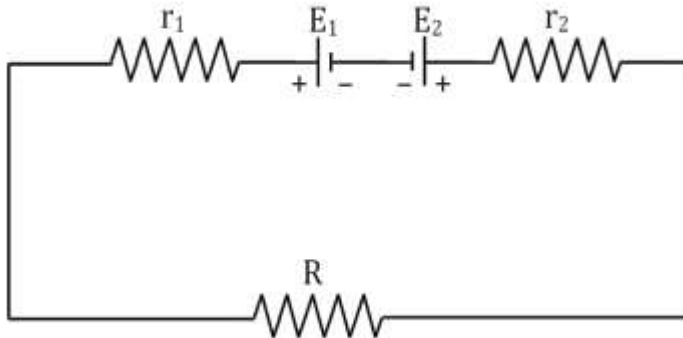
22. Four identical cells of emf E and internal resistance r are to be connected in series. Suppose if one of the cells is connected wrongly. the equivalent emf and effective internal resistance of the combination is

- (a) $4E$ and $4r$
- (b) $4E$ and $2r$
- (c) $2E$ and $4r$
- (d) $2E$ and $2r$

23. Three resistances 2Ω , 3Ω and 4Ω are connected in parallel. The ratio of currents passing through them when a potential difference is applied across its ends will be

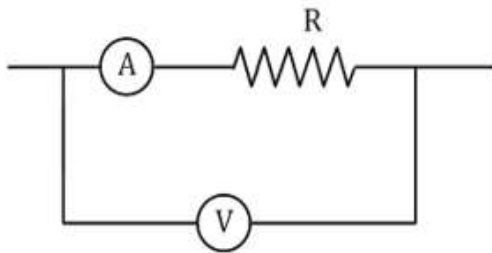
- (a) 6: 3: 2
- (b) 6: 4: 3
- (c) 5: 4: 3
- (d) 4: 3: 2

24. Two cells of emf E_1 and E_2 are joined in opposition (such that $E_1 > E_2$). If r_1 and r_2 be the internal resistances and R be the external resistance, then the terminal potential difference is



- (a) $\frac{E_1 + E_2}{r_1 + r_2} \times R$
- (b) $\frac{E_1 + E_2}{r_1 + r_2 + R} \times R$
- (c) $\frac{E_1 - E_2}{r_1 + r_2} \times R$
- (d) $\frac{E_1 - E_2}{r_1 + r_2 + R} \times R$

25. In the circuit shown below, the ammeter and the voltmeter readings are 3 A and 6 V respectively. Then the value of the resistance R is



- (a) 2Ω
- (b) $> 2\Omega$
- (c) $< 2\Omega$
- (d) $\geq 2\Omega$

26. In Wheatstones network $P = 2\Omega$, $Q = 2\Omega$, $R = 2\Omega$ and $S = 3\Omega$. The resistance with which S is to be shunted in order that the bridge may be balanced is

- (a) 1Ω
- (b) 2Ω
- (c) 4Ω
- (d) 6Ω

27. The resistance of the bulb filament is 100Ω at a temperature of 100°C . If its temperature co-efficient of resistance be $0.005 \text{ per } ^\circ\text{C}$, its resistance will become 200Ω at a temperature

- (a) 300°C
- (b) 400°C
- (c) 500°C
- (d) 200°C

28. Two concentric coils each of radius equal to $2\pi\text{cm}$ are placed right angles to each other. If 3A and 4A are the currents flowing through the two coils respectively. The magnetic induction (in Wbm^{-2}) at the centre of the coils will be
 (a) 12×10^{-5} (b) $10 - 5$
 (c) 5×10^{-5} (d) 7×10^{-5}
29. A proton beam enters a magnetic field of $10^{-4} \text{ Wb m}^{-2}$ normally. if the specific charge of the proton is 10^{11} Ckg^{-1} and its velocity is 10^9 ms^{-1} , then the radius of the circle described will be
 (a) 0.1 m (b) 10 m
 (c) 100 m (d) 1 m
30. A cyclotron is used to accelerate
 (a) neutron
 (b) only positively charged particles
 (c) only negatively charged particles
 (d) both positively and negatively charged particles
31. A galvanometer of resistance 50Ω gives a full-scale deflection for a current $5 \times 10^{-4} \text{ (A)}$ The resistance that should be connected in series with the galvanometer to read 3 V is
 (a) 595Ω (b) 5050Ω
 (c) 5059Ω (d) 5950Ω
32. Two parallel wires 1 m apart carry currents of 1 A and 3 A respectively in opposite directions. The force per unit length acting between these two wires is
 (a) $6 \times 10^{-7} \text{ Nm}^{-1}$ repulsive
 (b) $6 \times 10^{-7} \text{ Nm}^{-1}$ attractive
 (c) $6 \times 10^{-5} \text{ Nm}^{-1}$ repulsive
 (d) $6 \times 10^{-5} \text{ Nm}^{-1}$ attractive
33. If there is no torsion in the suspension thread, then the time period of a magnet executing SHM is
 (a) $T = \frac{1}{2\pi} \sqrt{\frac{MB}{1}}$ (b) $T = \frac{1}{2\pi} \sqrt{\frac{1}{MB}}$
 (c) $T = 2\pi \sqrt{\frac{1}{MB}}$ (d) $T = 2\pi \sqrt{\frac{MB}{1}}$
34. Core of electromagnets are made of ferromagnetic material which has
 (a) high permeability and low retentivity
 (b) high permeability and high retentivity
 (c) low permeability and high retentivity
 (d) low permeability and low retentivity
35. The magnetic susceptibility of a paramagnetic material at -73°C is 0.0075 and its value at -173°C will be
 (a) 0.0045 (b) 0.0030
 (c) 0.015 (d) 0.0075
36. Two coils have a mutual inductance 0.005H . The current changes in the first coil according to the equation $i = i_m \sin \omega t$ where $i_m = 10 \text{ A}$ and $\omega = 100\pi \text{ rads}^{-1}$. The maximum value of the emf induced in the second coil is
 (a) 2π (b) 5π
 (c) π (d) 4π
37. An aircraft with a wingspan of 40 m flies with a speed of 1080 km/hr in the eastward direction at a constant altitude in the northern hemisphere, where the vertical component of the earth's magnetic field is $1.75 \times 10^{-5} \text{ T}$. Then the emf developed between the tips of the wings is

- (a) 0.5 V (b) 0.34 V
(c) 0.21 V (d) 2.1 V

38. In an LCR circuit, at resonance

- (a) the current and voltage are in phase
(b) the impedance is maximum
(c) the current is minimum
(d) the current leads the voltage by $\pi/2$

39. A transformer is used to light 100 W – 110 V lamp from 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is

- (a) 90% (b) 95%
(c) 96% (d) 99%

40. The average power dissipated in a pure inductor is

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

41. If ϵ_0 and μ_0 are the permittivity and permeability of free space and ϵ and μ are the corresponding quantities for a medium, then refractive index of the medium is

- (a) $\sqrt{\frac{\mu_0 \epsilon_0}{\mu \epsilon}}$ (b) $\sqrt{\frac{\mu \epsilon}{\mu_0 \epsilon_0}}$
(c) 1 (d) Insufficient information

42. A person wants a real image of his own, 3 times enlarge(d) Where should he stand in front of a concave mirror of radius of curvature 30 cm ?

- (a) 10 cm (b) 30 cm
(c) 90 cm (d) 20 cm

43. Calculate the focal length of a reading glass of a person if his distance of distinct vision is 75 cm.

- (a) 25.6 cm (b) 37.5 cm
(c) 75.2 cm (d) 100.4 cm

44. In a Young's double slit experiment, the slit separation is 0.5 m from the slits. For a monochromatic light of wavelength 500 nm, the distance of 3rd maxima from 2nd minima on the other side is

- (a) 2.75 mm (b) 2.5 mm
(c) 22.5 mm (d) None of these

45. To observe diffraction, the size of the obstacle

- (a) has no relation to wavelength.
(b) should be $\lambda/2$, where λ is the wavelength.
(c) should be much larger than the wavelength.
(d) should be of the order of wavelength.

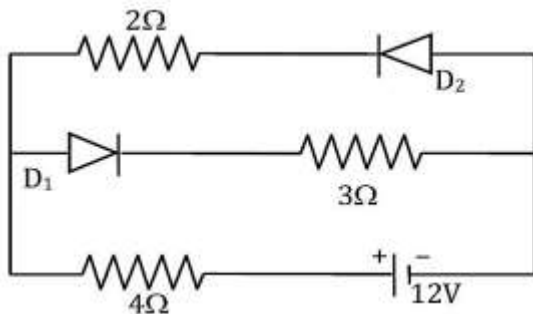
46. The polarizing angle of glass is 57° . A ray of light which is incident at this angle will have an angle of refraction as

- (a) 25° (b) 33°
(c) 43° (d) 38°

47. Light of two different frequencies whose photons have energies 1eV and 2.5eV respectively, successively illuminate a metallic surface whose work function is 0.5eV. Ratio of maximum speeds of emitted electrons will be

- (a) 1:5 (b) 1:4
(c) 1:2 (d) 1:1

48. Find the de-Broglie wavelength of an electron with kinetic energy of 120eV.
 (a) 95pm (b) 102pm
 (c) 112pm (d) 124pm
49. An α -particle of energy 5MeV is scattered through 180° by gold nucleus. The distance of closest approach is of the order of
 (a) 10^{-10} cm (b) 10^{-12} cm
 (c) 10^{-14} cm (d) 10^{-16} cm
50. If an electron in hydrogen atom jumps from an orbit of level $n = 3$ to an orbit of level $n = 2$, the emitted radiation has a frequency ($R =$ Rydberg constant, $C =$ velocity of light)
 (a) $\frac{3RC}{27}$ (b) $\frac{RC}{25}$
 (c) $\frac{8RC}{9}$ (d) $\frac{5RC}{36}$
51. What is the wavelength of light for the least energetic photon emitted in the Lyman series of the hydrogen spectrum? (take $h c = 1240 \text{ eVnm}$)
 (a) 82 nm (b) 102 nm
 (c) 122 nm (d) 150 nm
52. A nucleus at rest splits into two nuclear parts having radii in the ratio 1: 2. Their velocities are in the ratio
 (a) 8: 1 (b) 6: 1
 (c) 4: 1 (d) 2: 1
53. The half-life of a radioactive substance is 20 minutes. The time taken between 50% decay and 87.5% decay of the substance will be
 (a) 30 minutes (b) 40 minutes
 (c) 25 minutes (d) 10 minutes
54. A radioactive decay can form an isotope of the original nucleus with the emission of particles
 (a) one α and four β (b) one α and two β
 (c) one α and one β (d) four α and one β
55. An LED is constructed from a pn junction based on a certain semi-conducting material whose energy gap is 1.9eV. Then the wavelength of the emitted light is
 (a) 2.9×10^{-9} m (b) 1.6×10^{-8} m
 (c) 6.5×10^{-7} m (d) 9.1×10^{-5} m
56. Amplitude modulation has
 (a) one carrier with two side band frequencies
 (b) one carrier
 (c) one carrier with infinite frequencies
 (d) one carrier with high frequency
57. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



- (a) 1.71 A (b) 2.0 A
 (c) 2.31 A (d) 1.33 A

58. The input characteristics of a transistor in CE mode is the graph obtained by plotting

- (a) I_B against V_{BE} at constant V_{CE}
- (b) I_B against V_{CE} at constant V_{BE}
- (c) I_B against I_c at constant V_{CE}
- (d) I_B against I_C at constant V_{BE}

59. The given truth table is for Input Output

Input		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

- (a) AND gate
- (b) OR gate
- (c) NAND gate
- (d) NOR gate

60. The waves used for line-of-sight (LOS) communication is

- (a) ground waves
- (b) space waves
- (c) sound waves
- (d) sky waves

Chemistry

61. The unit cell with crystallographic dimensions, $a \neq b \neq c$, $\alpha = \gamma = 90$ and $\beta \neq 90$ is

- (a) Triclinic
- (b) Monoclinic
- (c) Orthorhombic
- (d) Tetragonal

62. While charging the lead storage battery _____

- (a) $PbSO_4$ on anode is reduced to Pb
- (b) $PbSO_4$ on cathode is reduced to Pb
- (c) $PbSO_4$ on cathode is oxidized to Pb
- (d) $PbSO_4$ on anode is oxidized to PbO_2

63. Adenosine is an example of

- (a) Nucleotide
- (b) Purine base
- (c) Pyrimidine base
- (d) Nucleoside

64. Orlon has monomeric unit

- (a) Acrolein
- (b) Glycol
- (c) Vinyl cyanide
- (d) Isoprene

65. The two electrons have the following set of quantum numbers:

$$P = 3, 2, -2, +\frac{1}{2}$$

$$Q = 3, 0, 0, +\frac{1}{2}$$

Which of the following statement is true?

- (a) P and Q have same energy
- (b) P has greater energy than Q
- (c) P has lesser energy than Q
- (d) P and Q represent same electron

66. H_2O_2 cannot oxidise

- (a) PbS (b) Na_2SO_3
(c) O_3 (d) KI

67. In the given set of reactions, 2-Bromopropane

$\xrightarrow[\text{al(c)/heat}]{\text{AgCN}}$ X $\xrightarrow{\text{LiAlH}_4}$ Y the IUPAC name of product 'Y' is

- (a) N-Methylpropanamine
(b) N-Isopropylmethanamine
(c) Butan-2-amine
(d) N-Methylpropan-2-amine

68. On heating with concentrated NaOH solution in an inert atmosphere of CO_2 , white phosphorous gives a gas. Which of the following statement is incorrect about the gas?

- (a) It is less basic than NH_3
(b) It is more basic than NH_3
(c) It is highly poisonous and has smell like rotten fish.
(d) It's solution in water decomposes in the presence of light

69. Sodium metal crystallizes in (B)(C)(C) lattice with edge length of 4.29 Å. The radius of sodium atom is

- (a) 2.857 Å (b) 1.601 Å
(c) 2.145 Å (d) 1.857 Å

70. 0.06%(w/v) aqueous solution of urea is isotonic with

- (a) 0.06% glucose solution
(b) 0.6% glucose
(c) 0.01M glucose solution
(d) 0.1M glucose solution

71. In a first order reaction, the concentration of the reactant is reduced to 12.5% in one hour. When was it half completed?

- (a) 3hr (b) 20 min
(c) 30 min (d) 15 min

72. The electrolyte having maximum flocculation value for AgI/Ag^+ sol. is

- (a) NaCl (b) Na_2S
(c) Na_2SO_4 (d) Na_3PO_4

73. Copper is extracted from Copper pyrites by heating in a Bessemer converter. The method is based on the principle that

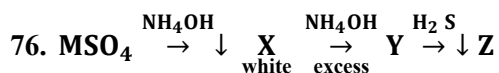
- (a) Copper has more affinity for oxygen than Sulphur at high temperature.
(b) Iron has less affinity for oxygen than Sulphur at high temperature.
(c) Copper has less affinity for oxygen than Sulphur at high temperature.
(d) Sulphur has less affinity for oxygen at high temperature.

74. Which of the following will be able to show geometrical isomerism?

- (a) MA_3B - Square planar
(b) MA_2B_2 - Tetrahedral
(c) MABCD - Square planar
(d) MABCD - Tetrahedral

75. The electronic configuration of Gd^{2+} is (at. No. of Gd is 64)

- (a) $[\text{Xe}]4f^{+8}$ (b) $[\text{Xe}]4f^8$
(c) $[\text{Xe}]4f^{+7}5d^16s^2$ (d) $[\text{Xe}]4f^{+7}d^1$



Here M and Z are

- (a) Cu, ZnS (b) Zn, ZnS
(c) Fe, FeS (d) Al, Al_2S_3

77. The hydrolysis of optically active 2-bromobutane with aqueous NaOH result in the formation of

- (a) (+) butan-2-ol (b) (-) butan-2-ol
(c) ($\pm$) butan-1-ol (d) ($\pm$) butan-2-ol

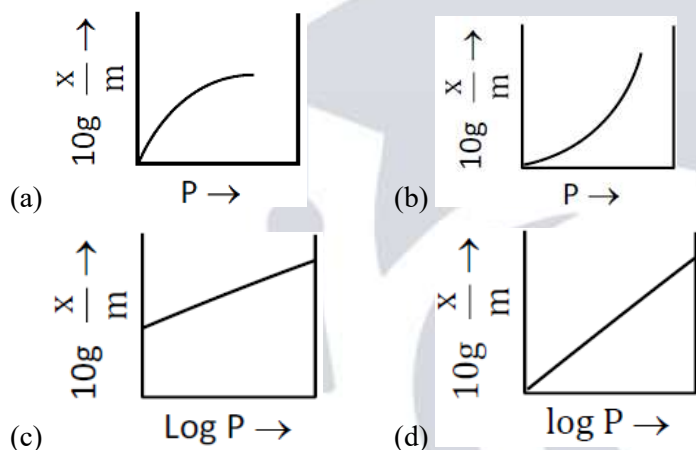
78. The distinguishing test between methanoic acid and ethanoic acid is

- (a) Litmus test
(b) Tollen's test
(c) Esterification test
(d) Sodium bicarbonate test

79. In $\text{H}_2 - \text{O}_2$ fuel cell the reaction occurring at cathode is

- (a) $2\text{H}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(l)}$
(b) $\text{O}_{2(g)} + 2\text{H}_2\text{O}_{(l)} + 4e^- \rightarrow 4\text{OH}_{(aq)}$
(c) $\text{H}^+ + e^- \rightarrow \frac{1}{2}\text{H}_2$
(d) $\text{H}^+_{(aq)} + \text{OH}_{(aq)} \rightarrow \text{H}_2\text{O}_{(l)}$

80. Which of the following curve is in accordance with Freundlich adsorption isotherm?



81. How many ions per molecule are produced in the solution when Mohr salt is dissolved in excess of water?

- (a) 4 (b) 5
(c) 6 (d) 10

82. Glycogen is

- (a) a polymer of β -D-glucose units
(b) a structural polysaccharide
(c) structurally very much similar to amylopectin
(d) structurally similar to amylopectin but extensively branched

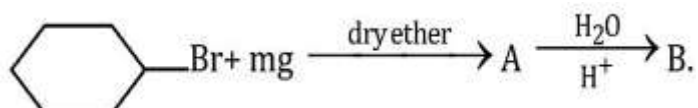
83. Number of possible alkynes with formula C_5H_8 is

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

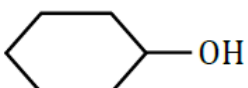
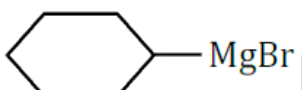
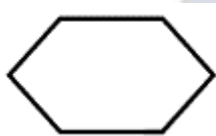
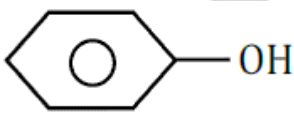
84. Which of the following aqueous solution has the highest freezing point?

- (a) 0.1M Sucrose (b) 0.01MNaCl
(c) 0.1MNaCl (d) 0.01M Na_2SO_4

85. Half-life period of a first order reaction is 10 min. Starting with initial concentration 12M, the rate after 20 min is
 (a) 0.0693 Mmin^{-1} (b) $0.693 \times 3 \text{ Mmin}^{-1}$
 (c) $0.0693 \times 3 \text{ Mmin}^{-1}$ (d) $0.0693 \times 4 \text{ min}^{-1}$
86. The salt which responds to dilute and concentrated H_2SO_4 is
 (a) CaF_2 (b) $\text{Ba}(\text{NO}_3)_2$
 (c) Na_2SO_4 (d) Na_3PO_4
87. On heating potassium permanganate, one of the following compound is not obtained:
 (a) O_2 (b) MnO
 (c) MnO_2 (d) K_2MnO_4
- 88.



The product 'B' is

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

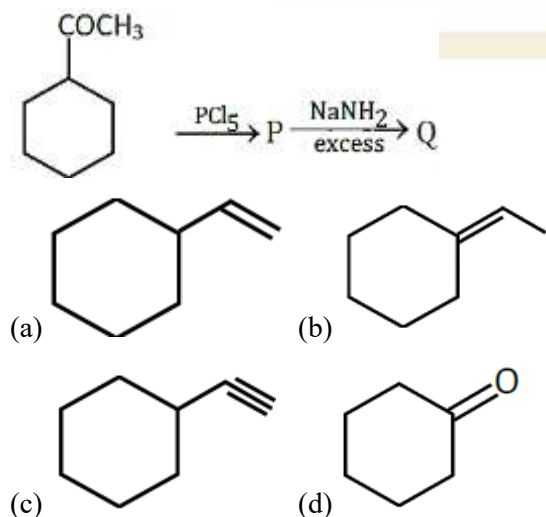
89. The formation of cyanohydrins from a ketone is an example of
 (a) Nucleophilic substitution
 (b) Nucleophilic addition
 (c) Electrophilic addition
 (d) Electrophilic substitution
90. One of the following is an essential amino acid
 (a) Tyrosine (b) Cysteine
 (c) Isoleucine (d) Serine
91. The aqueous solution of following salt will have the lowest pH :
 (a) NaClO_3 (b) NaClO
 (c) NaClO_2 (d) NaClO_4
92. For one of the element various successive ionization enthalpies (in kJmol^{-1}) are given below:

I.E.	1 st	2 nd	3 rd	4 th	5 th
	577.5	1810	2750	11,580	14,820

The element is

- (a) Si (b) P
 (c) Al (d) Mg

93. 0.30 g of an organic compound containing C, H and Oxygen on combustion yields 0.44 gCO₂ and 0.18 gH₂O. If one mol of compound weight 60, then molecular formula of the compound is
 (a) CH₂O (b) C₃H₈O
 (c) C₄H₆O (d) C₂H₄O₂
94. One of the following amide will not undergo Hoffmann bromamide reaction:
 (a) CH₃CONH₂ (b) CH₃CONHCH₃
 (c) C₆H₅CONH₂ (d) CH₃CH₂CONH₂
95. Cheilosis and digestive disorders are due to the deficiency of
 (a) Thiamine (b) Ascorbic acid
 (c) Riboflavin (d) Pyridoxine
96. How many Coulombs of electricity are required for the oxidation of one mol of water to dioxygen?
 (a) 9.65×10^4 C (b) 1.93×10^4 C
 (c) 1.93×10^5 C (d) 19.3×10^5 C
97. 100 cm³ of 1MCH₃COOH was mixed with 100 cm³ of 2MCH₃OH to form an ester. The change in the initial rate if each solution is diluted with equal volume of water would be
 (a) 2 times (b) 4 times
 (c) 0.5 times (d) 0.25 times
98. Which of the following colloids cannot be easily coagulated?
 (a) Lyophobic colloids
 (b) Multimolecular colloids
 (c) Macromolecular colloids
 (d) Irreversible colloids
99. The complex ion having minimum magnitude of Δ_0 (CFSE) is
 (a) [Cr(CN)₆]³⁻ (b) [Co(NH₃)₆]³⁺
 (c) [Co(Cl)₆]³⁻ (d) [Cr(H₂O)₆]³⁺
100. The arrangement of following compounds:
 (i) bromomethane (ii) bromoform
 (iii) chloromethane (iv) dibromomethane
 In the increasing order of their boiling point is
 (a) iii < i < iv < ii (b) iv < iii < i < ii
 (c) ii < iii < i < iv (d) i < ii < iii < iv
101. Iodoform can be prepared from all, except
 (a) propan-2-ol (b) butan-2-one
 (c) propan-1-ol (d) acetophenone
102. Identify 'Q' in the following sequence of reactions:



103. Cryolite is

- (a) Na_3AlF_6 and is used in the electrolysis of alumina for decreasing electrical conductivity.
- (b) Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point of alumina only.
- (c) Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point and increasing the conductivity of alumina
- (d) Na_3AlF_6 and is used in the electrolytic refining of alumina

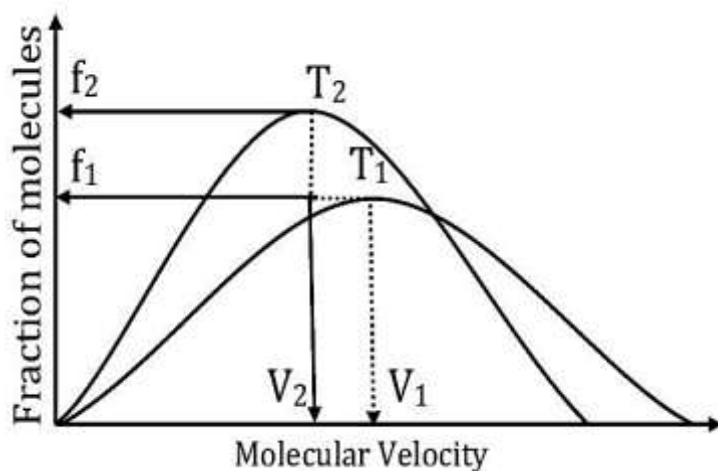
104. Which of the following compound of Xenon has pyramidal geometry?

- (a) XeOF_4 (b) XeF_2
- (c) XeO_3 (d) XeF_4

105. After adding non-volatile solute freezing point of water decreases to -0.186°C Calculate ΔT_b if $K_f = 1.86 \text{ K kg mol}^{-1}$ and $K_b = 0.521 \text{ K kg mol}^{-1}$

- (a) 0.521 (b) 0.0521
- (c) 1.86 (d) 0.0186

106. Plot of Maxwell's distribution of velocities is given below:



Which of the following is correct about this plot?

- (a) $T_1 < T_2$ (b) $f_1 > f_2$
- (c) $T_1 > T_2$ (d) $V_1 < V_2$

107. The pair of compound which cannot exist together in solution is

- (a) NaHCO_3 and NaOH (b) NaHCO_3 and H_2O
- (c) NaHCO_3 and Na_2CO_3 (d) Na_2CO_3 and NaOH

108. What amount of dioxygen (in gram) contains 1.8×10^{22} molecules?

- (a) 0.0960 (b) 0.960
- (c) 9.60 (d) 96.0

109. Using MOT, compare O_2^+ and O_2^- species and choose the incorrect option

- (a) O_2^+ have higher bond order than O_2^- .
- (b) O_2^- is less stable
- (c) O_2^+ is diamagnetic while O_2^- is paramagnetic
- (d) Both O_2^+ and O_2^- are paramagnetic

110. Which of the following is not true?

- (a) Erythromycin is a bacteriostatic antibiotic
- (b) Ampicillin is not a natural antibiotic
- (c) Prontosil is not converted into sulfanilamide in the body

(d) Vancomycin is a broad-spectrum antibiotic

111. In the reaction



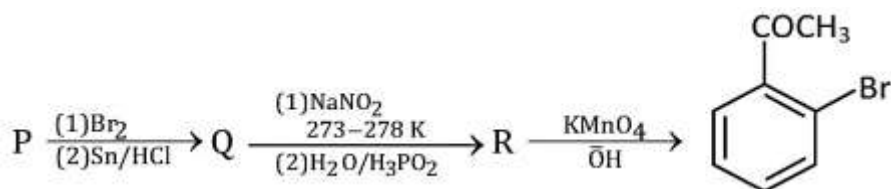
Heat of formation of SO_2 is

- (a) $x + y$ (b) $x - y$
(c) $2x - y$ (d) None of these

112. Arrange the following compounds in the increasing order of their acidic strength:

- (i) m-nitrophenol (ii) m-cresol
(iii) phenol (iv) m-chlorophenol
(a) $iii < ii < I < iv$ (b) $ii < iv < iii < i$
(c) $ii < iii < iv < I$ (d) $ii < iii < I < iv$

113. In the sequence of following reactions:



The starting compound 'P' is

- (a) o-nitro toluene (b) m-nitro toluene
(c) o-bromo toluene (d) p-nitro toluene

114. Acetic acid is treated with $Ca(OH)_2$ and the product so obtained is subjected to dry distillation. The final product is

- (a) ethanal (b) propanal
(c) propanone (d) ethanol

115. The correct statement is

- (a) BF_3 is the strongest Lewis acid among the other boron halides.
(b) BI_3 is the weakest Lewis acid among the boron halides.
(c) There is maximum $p\pi - p\pi$ back bonding in BF_3 .
(d) There is minimum $p\pi - p\pi$ back bonding in BF_3 .

116. Which of the following compound possesses the "C - H" bond with the lowest bond dissociation energy?

- (a) Toluene (b) Benzene
(c) n-pentane (d) 2, 2-dimethyl propane

117. In presence of HCl , H_2S results the precipitation of Group-2 elements but not Group-4 elements during qualitative analysis. It is due to

- (a) higher concentration of S^{2-}
(b) higher concentration of H^+
(c) lower concentration of S^{2-}
(d) lower concentration of H^+

118. One of the following conversion results in the change of hybridization and geometry :

- (a) CH_4 to C_2H_6 (b) NH_3 to NH_4^+
(c) BF_3 to BF_4^- (d) H_2O to H_3O^+

119. Water softening by Clark's process uses

- (a) CaHCO_3 (b) NaHCO_3
(c) Na_2CO_3 (d) Ca(OH)_2

120. An alkali metal hydride (NaH) reacts with diborane in 'A' to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are

- (a) C_2H_6 and $\text{C}_2\text{H}_5\text{Na}$
(b) CH_3COCH_3 and $\text{B}_3\text{N}_3\text{H}_6$
(c) C_6H_6 and NaBH_4
(d) $(\text{C}_2\text{H}_5)_2\text{O}$ and NaBH_4

Mathematics

121. $f(x) = \frac{1}{2} - \tan\left(\frac{\pi x}{2}\right) - 1 < x < 1$ and $g(x) = \sqrt{(3 + 4x - 4x^2)}$

Find domain of $(f + x)$

- (a) $\left[\frac{-1}{2}, 1\right)$ (b) $\left(\frac{-1}{2}, 1\right]$
(c) $\left[-\frac{1}{2}, \frac{3}{2}\right]$ (d) $(-1, 1)$

122. Write the set builder form $A = \{-1, 1\}$

- (a) $A = \{x: x \text{ is a real number}\}$
(b) $A = \{x: x \text{ is an integer}\}$
(c) $A = \{x: x \text{ is a root of the equation } x^2 = 1\}$
(d) $A = \{x: x \text{ is a root of the equation } x^2 + 1 = 0\}$

123. If the operation $\oplus$ is defined by $a \oplus b = a^2 + b^2$ for all real number 'a' and 'b', then $(2 \oplus 3) \oplus 4 =$

- (a) 181 (b) 182
(c) 184 (d) 185

124. If $z = \frac{(\sqrt{3}+i)^3(3i+4)^2}{(8+6i)^2}$, then $|z|$ is equal to

- (a) 0 (b) 1
(c) 2 (d) 3

125. If α and β are the roots of $x^2 - ax + b^2 = 0$, then $a^2 + b^2 = 0$, then $a^2 + b^2$ is equal to

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

126. If the 2nd and 5th term of G.P. are 24 and 3 respectively, then the sum of 1st six terms is

- (a) $\frac{189}{2}$ (b) $\frac{189}{5}$
(c) $\frac{179}{2}$ (d) $\frac{2}{189}$

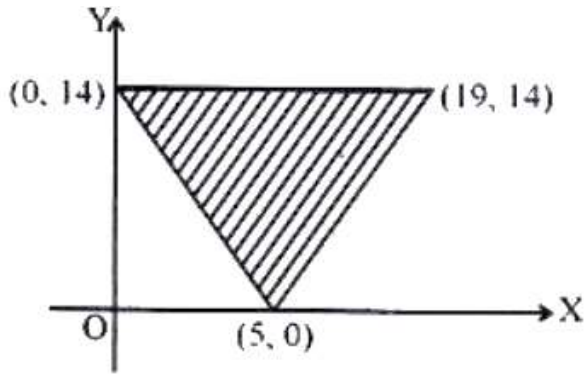
127. The middle term of expansion of $\left(\frac{10}{x} + \frac{x}{10}\right)^{10}$

- (a) 7C_5 (b) 8C_5
(c) 9C_5 (d) ${}^{10}C_5$

128. If $\begin{vmatrix} 2a & x_1 & y_1 \\ 2b & x_2 & y_2 \\ 2c & x_3 & y_3 \end{vmatrix} = \frac{abc}{2} \neq 0$, then the area of the triangle whose vertices are $\left(\frac{x_1}{a}, \frac{y_1}{a}\right), \left(\frac{x_2}{b}, \frac{y_2}{b}\right), \left(\frac{x_3}{c}, \frac{y_3}{c}\right)$ is

- (a) $\frac{1}{4}abc$ (b) $\frac{1}{8}abc$
(c) $\frac{1}{4}$ (d) $\frac{1}{8}$

129. The shaded region shown in fig. is given by the inequation



- (a) $14x + 5y \geq 70$ $y \leq 14$ and $x - y \leq 5$
 (b) $14x + 5y \geq 70$ $y \leq 14$ and $x - y \geq 5$
 (c) $14x + 5y \leq 70$ $y \leq 14$ and $x - y \geq 5$
 (d) $14x + 5y \geq 70$ $y \geq 14$ and $x - y \geq 5$

130. $\sim [(-p) \wedge q]$ is logically Equivalent to

- (a) $P \vee (\sim q)$ (b) $P \wedge (\sim q)$
 (c) $\sim [p \wedge (\sim q)]$ (d) None of these

131. The value of $\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right) + \sin^{-1}\left(\frac{1}{3}\right)$ is equal to

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

132. If the eccentricity of the hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \text{ is } \frac{5}{4} \text{ and } 2x + 3y - 6 = 0$$

Is a focal chord of the hyperbola, then the length of transverse axis is equal to

- (a) $\frac{12}{5}$ (b) $\frac{24}{5}$
 (c) $\frac{6}{5}$ (d) $\frac{5}{24}$

133. If $\vec{a} = \mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$, $|\vec{b}| = 5$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then the area of the triangle formed by these two vectors as two sides is

- (a) $\frac{15}{2}$ (b) 15
 (c) $\frac{15}{4}$ (d) $\frac{15\sqrt{3}}{2}$

134. Let $\vec{a} = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ if $\vec{b}$ is a vector such that $\vec{a} \cdot \vec{b} = |\vec{b}|^2$ and $|\vec{a} - \vec{b}| = \sqrt{7}$, then $|\vec{b}| =$

- (a) 7 (b) 14
 (c) $\sqrt{7}$ (d) 21

135. If direction cosines of a vector of magnitude 3 are $\frac{2}{3}, -\frac{9}{3}, \frac{2}{3}$ and $a > 0$, then vector is

- (a) $2\mathbf{i} + \mathbf{j} + 2\mathbf{k}$ (b) $2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$
 (c) $\mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$ (d) None of these

136. Equation of line passing through the point (2, 3, 1) and parallel to the line of intersection of the plane $x - 2y - z + 5 = 0$ and $x + y + 3z = 6$ is

- (a) $\frac{x-2}{5} = \frac{y-3}{-4} = \frac{z-1}{3}$ (b) $\frac{x-2}{-5} = \frac{y-3}{-4} = \frac{z-1}{3}$
 (c) $\frac{x-2}{5} = \frac{y-3}{4} = \frac{z-1}{3}$ (d) $\frac{x-2}{4} = \frac{y-3}{3} = \frac{z-1}{2}$

137. Foot of perpendicular drawn from the origin to the plane $2x - 3y + 4z = 29$ is

- (a) (5, -1, 4) (b) (2, -3, 4)
 (c) (7, -1, 3) (d) (5, -2, 3)

138. If two dice are thrown simultaneously, then the probability that the sum of the number which come up on the dice to be more than 5 is .

- (a) $\frac{5}{36}$ (b) $\frac{1}{6}$
(c) $\frac{5}{18}$ (d) $\frac{13}{18}$

139. If $y = f(x^2 + 2)$ and $f'(3) = 5$, then $\frac{dy}{dx}$ at $x = 1$ is ____

- (a) 5 (b) 25
(c) 15 (d) 10

140. If $x = \cos^3 \theta$, $y = \sin^3 \theta$, then $1 + \left(\frac{dy}{dx}\right)^2$ is

- (a) $\tan \theta$ (b) $\tan^2 \theta$
(c) $\sec^2 \theta$ (d) 1

141. Slope of Normal to the curve

$y = x^2 - \frac{1}{x^2}$ at $(-1, 0)$ is

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

142. $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$ is equal to ____

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

143. If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \frac{x}{x^2+1}$, find $f(f(2))$

- (a) $\frac{1}{29}$ (b) $\frac{10}{29}$
(c) $\frac{29}{10}$ (d) 29

144. Evaluate $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$

- (a) 1 (b) 0
(c) 2 (d) 3

145. A man takes a step forward with probability 0.4 and one step backward with probability 0.6. then the probability that at the end of eleven steps he is one step away from the starting point is

- (a) ${}^{11}C_5 \times (0.48)^5$ (b) ${}^{11}C_6 \times (0.24)^5$
(c) ${}^{11}C_5 \times (0.12)^5$ (d) ${}^{11}C_6 \times (0.72)^6$

146. $\int_0^{\pi/4} \log\left(\frac{\sin x + \cos x}{\cos x}\right) dx$

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

147. Area bounded by $y = x^3$, $y = 8$ and $x = 0$ is ____

- (a) 2 sq. unit (b) 4 sq. unit
(c) 12 sq. unit (d) 6 sq. unit

148. Let $\vec{a} = \vec{i} + 2\vec{j} + \vec{k}$, $\vec{b} = \vec{i} - \vec{j} + \vec{k}$ and $\vec{c} = \vec{i} + \vec{j} - \vec{k}$, a vector in the plane $\vec{a}$ and $\vec{b}$ whose projection on $\vec{c}$ is $\frac{1}{\sqrt{3}}$ is ____.

- (a) $3\vec{i} + \vec{j} - 3\vec{k}$ (b) $4\vec{i} + \vec{j} - 4\vec{k}$
(c) $\vec{i} + \vec{j} - 2\vec{k}$ (d) $4\vec{i} - \vec{j} + 4\vec{k}$

149. The mean deviation from the data 3, 10, 10, 4, 7, 10, 5 :

- (a) 3 (b) 2
(c) 3.75 (d) 2.75

150. The probability distribution of x is

x	0	1	2	3
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P(x)	0.2	k	k	2k
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Find the value of k

- (a) 0.2 (b) 0.3
(c) 0.4 (d) 0.1

151. If the function $g(x)$ is defined by

$$g(x) = \frac{x^{200}}{200} + \frac{x^{199}}{199} + \frac{x^{198}}{198} + \dots + \frac{x^2}{2} + x + 5$$

- (a) 1 (b) 200
(c) 100 (d) 5

152. A box contains 6 red marbles numbers from 1 through 6 and 4 white marbles 12 through 15 Find the probability that a marble drawn 'at random' is white and odd numbered

- (a) 5 (b) $\frac{1}{5}$
(c) 6 (d) $\frac{1}{6}$

153.

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} \text{ is}$$

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

154. $f(x) = \begin{cases} 3x - 8 & \text{if } x \leq 5 \\ 2k & \text{if } x > 5 \end{cases}$ is continuous, find k.

- (a) $\frac{2}{7}$ (b) $\frac{3}{7}$
(c) $\frac{4}{7}$ (d) $\frac{7}{2}$

155. If $f(x) = 2x^2$, find $\frac{f(3.8) - f(4)}{3.8 - 4}$ Choose the correct option:

- (a) 1.56 (b) 156
(c) 15.6 (d) 0.156

156. If $x = ct$ and $y = \frac{c}{t}$, find $\frac{dy}{dx}$ at $t = 2$.

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

157. A balloon which always remains spherical is being inflated by pumping in 10 cubic centimeters of gas per second Find the rate at which the radius of the balloon is increasing when the radius is 15cms

- (a) $\frac{1}{90\pi}$ cm/sec (b) $\frac{1}{9\pi}$ cm/sec
(c) $\frac{1}{30\pi}$ cm/sec (d) $\frac{1}{\pi}$ cm/sec

$$158. \int \frac{\sin^2 x}{1 + \cos x} dx$$

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

$$159. \int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$$

- (a) $e^x \tan\left(\frac{x}{2}\right) + c$ (b) $\tan\left(\frac{x}{2}\right) + C$
(c) $e^x + C$ (d) $e^x \sin x + C$

160. If 1, w, w^2 are three cube roots of unity, then $(1 - w + w^2)(1 + w - w^2)$ is

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

161. Solve for x

$$\tan^{-1} \left(\frac{1-x}{1+x} \right) = \frac{1}{2} \tan^{-1} x, x > 0$$

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

162. The system of linear equation $x + y + z = 6$, $x + 2y + 3z = 10$ and $x + 2y + az = b$ has no solutions when _____

- (a) $a = 2b \neq 3$ (b) $a = 3b \neq 10$
(c) $b = 2a = 3$ (d) $b = 3a \neq 3$

163. The value of $\tan(1^\circ) + \tan(89^\circ)$ is _____

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

164. If $\frac{(x+1)^2}{x^3+x} = \frac{A}{x} + \frac{Bx+C}{x^2+1}$, then $\operatorname{cosec}^{-1} \left(\frac{1}{A} \right) + \cot^{-1} \left(\frac{1}{B} \right) + \sec^{-1} C =$ _____

- (a) $\frac{5\pi}{6}$ (b) 0
(c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

165. The remainder obtained when $1! + 2! + 3! + \dots + 11!$ is divided by 12 is _____

- (a) 9 (b) 8
(c) 7 (d) 6

166. If $\alpha \leq 2\sin^{-1} x + \cos^{-1} x \leq \beta$, then

- (a) $\alpha = \frac{-\pi}{2}, \beta = \frac{\pi}{2}$ (b) $\alpha = \frac{-\pi}{2}, \beta = \frac{3\pi}{2}$
(c) $\alpha = 0, \beta = \pi$ (d) $\alpha = 0, \beta = 2\pi$

167. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^2 equal to _____

- (a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$
(c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$

168. The function $f(x) = [x]$, where $[x]$ denotes greatest integer function is continuous at _____

- (a) 4 (b) -2
(c) 1 (d) 1.5

169. If $y = \log \left(\frac{1-x^2}{1+x^2} \right)$, then $\frac{dy}{dx}$ is equal to _____

- (a) $\frac{-4x}{1-x^4}$ (b) Stem height
(c) $\frac{1}{4-x^4}$ (d) $\frac{-4x^3}{1-x^4}$

170. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

- (a) Touch each other (b) Cut at right angle
(c) Cut at angle $\frac{\pi}{3}$ (d) Cut at angle $\frac{\pi}{4}$

171. If x is real, then the minimum value of $x^2 - 8x + 17$ is

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

172. $\int_{-\pi/4}^{\pi/4} \frac{dx}{1+\cos 2x}$ is equal to

- (a) 2 (b) 1
(c) 4 (d) 0

173. The order of differential equation of all circles of given radius 'a' is

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

174. The solution of differential equation

$x \frac{dy}{dx} + 2y = x^2$ is

- (a) $y = \frac{x^2+C}{4x^2}$ (b) $y = \frac{x^2}{4}$
 (c) $y = \frac{x^4+C}{x^2}$ (d) $y = \frac{x^4+C}{4x^2}$

175. If $\sin x + \sin y = \frac{1}{2}$ and $\cos x + \cos y = 1$, then $\tan(x+y) =$ ____

- (a) $\frac{8}{3}$ (b) $-\frac{3}{4}$
 (c) $-\frac{8}{3}$ (d) $\frac{4}{3}$

176. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 27$, then $\alpha =$ ____

- (a) ± 1 (b) ± 2
 (c) $\pm\sqrt{7}$ (d) $\pm\sqrt{5}$

177. If $A = \begin{vmatrix} x & 1 \\ 1 & x \end{vmatrix}$ and $\begin{vmatrix} x & 1 & 1 \\ 1 & x & 1 \\ 1 & 1 & x \end{vmatrix}$, then $\frac{dQ}{dx} =$ ____

- (a) $3p+1$ (b) $1-3p$
 (c) $-3p$ (d) $3p$

178. A line passes through (2, 2) and is perpendicular in the line $3x + y = 3$ its y-intercept is ____

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

179. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = \frac{1}{x} \forall x \in \mathbb{R}$, then f is ____

- (a) One-one (b) onto
 (c) bijective (d) f is not defined

180. The solution set of the inequation $\frac{x^2+6x-7}{|x+4|} < 0$ is ____

- (a) $(-7, 1)$ (b) $(-7, -4)$
 (c) $(-7, -4) \cup (-4, 1)$ (d) $(-7, -4) \cup (4, 1)$

Biology

181. Which vector can clone a small fragment of DNA?

- (a) Bacterial artificial chromosome
 (b) Yeast artificial chromosome
 (c) Plasmid
 (d) Cosmid

182. Continuous self-pollination results in

- (a) Inbreeding depression
 (b) Self incompatibility
 (c) Formation of unisexual flowers
 (d) Gametes loose vigour

183. Identify the wrong statement.

- (a) Alleles I^A and I^B produce sugars.
 (b) Both I^A and I^B are present together and they express because of co-dominance.
 (c) Alleles b and c also produce sugar.
 (d) When I^B and b or i are present only I^B is expressed

184. The codon AUG had dual function. It is an initiation codon and also codes for

- (a) Formaldehyde (b) Methionine
 (c) Phenylalanine (d) Serine

185. Natural killer lymphocytes are an example for

- (a) Cytokine barrier (b) Physiological barrier
 (c) Physical barrier (d) Cellular barrier

186. Identify the phylum X :

ANIMALIA



TISSUE GRADE



BILATERAL



ACOELOMATE



X

- (a) Aschelminthes (b) Ctenophora
(c) None of these (d) Platyhelminthes

187. With respect to Eichhornia:

Statement X : It drains off Oxygen from water and is seen growing in standing water.

Statement Y: It is indigenous species of our country.

- (a) Both statement X and Y are correct
(b) Both statement X and Y are wrong.
(c) Only statement X is correct and Y is
(d) Only statement Y is correct and X is wrong. wrong.

188. Seeds without fertilization is obtained from

- (a) Parthenocarp (b) Apomixis
(c) Polyembryony (d) Dormancy

189. The hormone which acts on Sertoli cells and stimulates the process of spermiogenesis is

- (a) Androgen (b) LH
(c) GnRH (d) FSH

190. The nitrogen base only in DNA is also called

- (a) 5-methyl uracil (b) NH_4Cl
(c) Uracil (d) Guanine

191. Hisardale is obtained by crossing

- (a) Merino ewes with Bikaneri Rams
(b) Bikaneri ewes with Merino Rams
(c) Horse with Donkey
(d) Superior Bull with Superior Cow

192. The ancestors of modern- day Frogs and Salamanders are

- (a) Jawless fish (b) Coelacanth
(c) Ichthyopsis (d) Amphioxus

193. During sewage treatment biogas produced includes

- (a) Methane, Oxygen, Hydrogen sulphide
(b) Hydrogen sulphide, Methane, Sulphur oxide
(c) Hydrogen sulphide, Nitrogen Methane

(d) Methane, Hydrogen sulphide, Carbon dioxide

194. If 30j of energy is trapped at producer level, then how much energy will be available to Peacock as food in the following chain? Plant → Mice → Snake → Peacock

- (a) 0.03j (b) 0.003j
(c) 0.3j (d) 0.0003j

195. Which of the following is not an ex-situ conservation?

- (a) Seed bank (b) Botanical garden
(c) Cryopreservation (d) Biosphere reserves

196. One hormone hastens maturity period in juvenile conifers, a second hormone controls xylem differentiation, while the third increases the tolerance of plants to various stresses. They are respectively

- (a) Auxin, Gibberellins, Cytokinin
(b) Auxin, Gibberellins ABA
(c) Gibberellin, Auxin, Cytokinin
(d) Gibberellin, Auxin, ABA

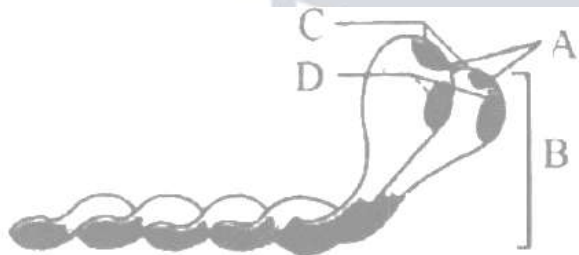
197. The element responsible for the ring structure of chlorophyll and maintenance of ribosome structure is

- (a) Mg^{+} (b) K^{+}
(c) Ca^{++} (d) S

198. Which of the following sentences is correct?

- (a) Cells of all living organisms have a nucleus.
(b) Both animal and plant cells have a well-defined cell wall.
(c) In prokaryotes there are no membrane bound cell organelles.
(d) Cells are formed de novo from abiotic materials.

199. Label the correct parts of the Myosin monomer:



- | | |
|----------------------------|------------------------|
| (a) (A) Cross arm | (B) Actin binding site |
| (C) Head | (D) ATP binding site |
| (b) (A) Head | (B) Cross arm |
| (C) Actin binding site | (D) ATP binding site |
| (c) (A) Actin binding site | (B) Head |
| (C) ATP binding site | (D) Cross arm |
| (d) (A) ATP binding site | (B) Actin binding site |
| (C) Head | (D) Cross arm |

200. The 2000-year-old seed excavated from Herod's place at dead sea belongs to

- (a) Lupine arcticus
(b) Strobilanthes kunthiana
(c) Dendrocalamus strictus
(d) Phoenix dactylifera

201. In a human foetus the limbs and digits develop after

- (a) First trimester (b) 8 weeks
(c) 12 weeks (d) 5th month

202. With respect to phenylketonuria identify which statement is not correct.

- (a) It is an example of pleiotropy.
(b) It is an error in metabolism.
(c) It is a case of aneuploidy.

(d) Caused due to autosomal recessive trait.

203. Match the following:

- | | |
|-----------------------|-----------------------|
| (A) VNTR | p. Largest gene |
| (B) Introns and Exons | q. DNA fingerprinting |
| (C) Dystrophin | r. Bulk DNA |
| (D) Satellite DNA | s. Splicing |
- (a) A – q, B – s, C – p, D, –r
 (b) A-s, B-p, C-q, D, -r
 (c) A – r, B – s, C – p, D, –q
 (d) A – q, B – p, C – s, D, –r

204. RNA polymerase-I transcribes eukaryotic ribosome which does not consist of

- (a) 28 SrRNA (b) 5 SrRNA
 (c) 5.8 SrRNA (d) 18 SrRNA

205. The organism which completely lack a cell and can live without oxygen are

- (a) Archaeobacteria (b) Thermoacidophiles
 (c) Mycoplasma (d) Methanogens

206. Green house crops such as tomatoes and bell pepper produce higher yields. This is due to

- (a) CO₂ is a limiting factor to
 (b) Tomatoes and bell pepper are not C₃ photosynthesis. plants.
 (c) CO₂ enriched atmosphere leads to
 (d) Diffused light in green house. higher yields.

207. A fall in glomerular filtration rate activates

- (a) juxta glomerular cells to release rennin
 (b) adrenal cortex to release adrenaline
 (c) adrenal medulla to release adrenaline
 (d) posterior pituitary to release vasopressin

208. The chromosome number in meiocyte is 34. The organism could be.

- (a) Dog (b) Apple
 (c) Ophioglossum (d) Onion

209. Progestasert is an IUD which makes the uterus unsuitable for implantation and cervix hostile to the sperms as they are

- (a) Copper releasing IUDs
 (b) Non-medicated IUDs
 (c) Hormone releasing IUDs
 (d) Ideal contraceptive

210. Double lines in pedigree analysis show

- (a) Sex unspecified
 (b) Consanguineous marriage
 (c) Unaffected offspring
 (d) Normal mating

211. Smack and Crack are produced from

- (a) Cannabis sativa and Atropa belladonna
 (b) Papaver somniferum and Erythroxylum coca
 (c) Cannabis sativa and Papaver somniferum
 (d) Erythroxylum coca and Atropa belladonna

212. Sonalika and Kalyan Sona are high yielding varieties of

- (a) Rice (b) Maize
 (c) Sugarcane (d) Wheat

213. BOD refers to

- (a) The amount of oxygen consumed if all the organic matter in 1000ml of water were oxidized by bacteria
- (b) The amount of oxygen released when all the organic matter was consumed by bacteria in 1 litre of water.
- (c) The oxygen required for bacteria to grow in 1 litre of effluent.
- (d) The amount of oxygen released if all the organic matter in 1000ml of water were oxidized by bacteria

214. During menstrual cycle the cyclical changes takes place in

- (a) Endometrium (b) Myometrium
- (c) Perimetrium (d) Corpus luteum

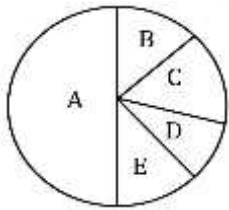
215. Assisted Reproductive Technology does not include?

- (a) In vitro fertilization and embryo
(b) Gamete intra fallopian transfer transfer
(c) Zygote extra fallopian transfer
(d) Artificial insemination

216. In a 3.2 Kbp long piece of DNA, 820 adenine bases were found. What would be the number of cytosine bases?

- (a) 1560 (b) 1480
(c) 780 (d) 740

217. Given below is the representation of the extent of global diversity of vertebrates. What group does the portions represents.



A B C D E

- | | | | | |
|-------------|------------|---------|------------|------------|
| (a) Mammals | Birds | Fishes | Amphibians | Reptiles |
| (b) Fishes | Mammals | Birds | Reptiles | Amphibians |
| (c) Birds | Reptiles | Fishes | Mammals | Amphibians |
| (d) Fishes | Amphibians | Mammals | Birds | Reptiles |

218. Choose the correct statement:

- (a) Pyruvate is formed in the
- (b) During the conversion of Succinyl CoA mitochondrial matrix. to Succinic acid a molecule of ATP is Synthesized
- (c) Oxygen is vital in respiration for
- (d) There is complete breakdown of glucose removal of Hydrogen. in fermentation.

219. According to Robert Constanza, 50% of the total cost for ecosystem services goes to

- (a) Recreation (b) Climate regulation
(c) Nutrient cycling (d) Soil formation

220. The function of a selectable marker is

- (a) Identify ori site.
- (b) To destroy recognition sites.
- (c) Eliminating transformants and
- (d) Elimination of non-transformants and permitting non-transformants. permitting transformants.

221. Find the wrongly matched pair:

- (a) Endemism - Species confined to one region and also found in other regions
- (b) Alien species - *Clarias gariepinus*.
- (c) Lungs of the planet - Amazon rain forest
- (d) Hot spots - Regions with species richness

222. If an inheritable mutation is observed in a population at high frequency, it is referred to as

- (a) DNA polymorphism
- (b) Expressed sequence Tag
- (c) Sequence annotation
- (b) Linkage

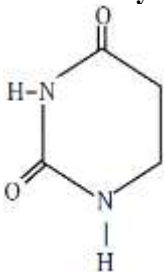
223. Which of the following would most likely help to slow down the greenhouse effect?

- (a) Ensuring that all excess paper
- (b) Promoting the use of private rather packaging is burned to ashes. than public transport.
- (c) Converting tropical forests into grazing land for cattle
- (d) Redesigning and fill dumps to allow methane to be collected

224. Select the mismatch pair from the following:

- (a) Insulin - Gluconeogenesis
- (b) Glucagon - Glycogenolysis
- (c) Oxytocin - Contraction of uterine muscles
- (b) Prolactin - Milk production in mammary glands

225. Identify this structure:



- (a) Uracil
- (b) Adenosine
- (c) Adenylic Acid
- (d) None of these

226. Which of the following is not correct in mass flow hypothesis?

- (a) The sugar is moved bidirectionally.
- (b) Loading of the phloem sets up a water potential gradient that facilitates the mass movement in the phloem.

- (c) As hydrostatic pressure in the phloem sieve tube increases pressure flow stops and sap is accumulated in phloem.
- (d) The sugar which is transported is sucrose.

227. In prokaryotes the Glycocalyx when it is thick is called?

- (a) Slime layer (b) Mesosome
(c) Capsule (a) Cell wall

228. The T-wave in an ECG represents

- (a) Electrical excitation of atria
(b) Return of the ventricles from excited state
(c) Depolarisation of ventricles
(d) Beginning of systole

229. Ernest chain and Howard Florey's contribution was

- (a) Discovery of Streptokinase
(b) Discovery of DNA sequence
(b) Establishing the potential of penicillin
(c) Production of genetically engineered as an effective antibiotic insulin

230. Which of the following is not correct with respect to malaria?

- (a) Sporozoites multiply in blood
(b) Malignant malaria is caused by Plasmodium falciparum.
(c) RBCs rupture and release haemozoin which causes chills.
(d) Female anopheles mosquito is the vector.

231. Three copies of chromosome -21 in a child with Down's syndrome have been analysed using molecular biology technology to detect any possible DNA polymorphism with reference to different alleles located on chromosome-21. Results showed that out of 3 copies 2 of the chromosomes of the child contain the same alleles as one of the mother's alleles. Based on this when did the non-disjunction event most likely occur?

- (a) Maternal meiosis - I
(b) Maternal meiosis - II
(c) Paternal meiosis - III
(d) Paternal meiosis -II

232. In 125 amino acid sequence if the codon for 25th amino acid is mutated to UAA, then

- (a) a polypeptide of 124 amino acids is formed
(b) a polypeptide of 25 amino acids is formed
(c) A polypeptide of 24 amino acids is formed
(d) No polypeptides are formed

233. A scrubber in the exhaust of a chemical industrial plant removes

- (a) Gases like Sulphur dioxide
(b) Particulate matter of the size 5 micrometres or above
(c) Gases like ozone or methane
(d) Gases like Nitrous oxide

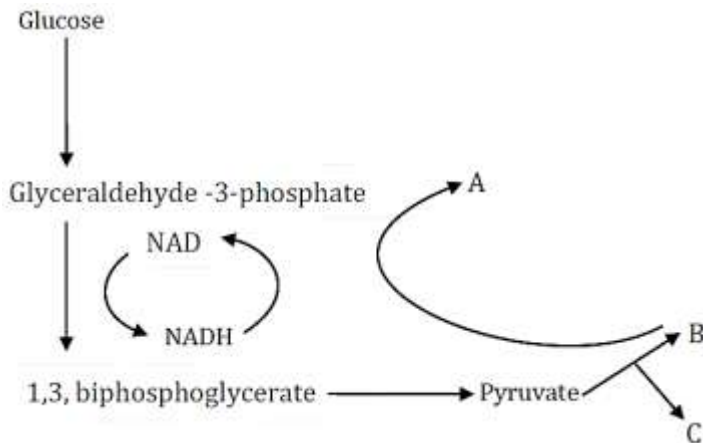
234. The formation of two species from one ancestral species is known as

- (a) Phyletic evolution
(b) Divergent evolution
(c) Convergent evolution
(d) allopatry

235. The breakdown of detritus into small particles by detritivores is called

- (a) Humification (b) Catabolism
(c) Leaching (b) Fragmentation

236. Choose the correct combination of labelling the molecules involved in the pathway of anaerobic respiration in Yeast.



- (a) A-Ethanol, B – CO₂, C - Acetaldehyde.
- (b) A-CO₂, B-Ethanol, C – Acetaldehyde.
- (c) A-Acetaldehyde, B – CO₂, C – Ethanol.
- (d) A- Ethanol, B-Acetaldehyde, C – CO₂.

237. Which of the following conditions correctly describes the manner of determining the sex in the given example?

- (a) XO type of sex determines male sex in grasshopper.
- (b) XO condition in humans as found in Klinefelter's syndrome determines female sex.
- (c) Homozygous sex chromosome XX produce male in Drosophila.
- (d) Homozygous sex chromosome ZZ determines female sex in birds.

238. Hibernating animals have tissue containing mitochondria with a membrane protein that accelerates electron transport while blocking the synthesis of ATP. What is the consequence of this?

- (a) Energy is saved because glycolysis and the citric acid cycle shuts down.
- (b) The energy of respiration is converted into heat.
- (c) Hibernating animals can synthesize fat instead of wasting energy of respiration.
- (d) Pyruvate is converted to lactic acid by anaerobic fermentation.

239. The pioneer species in Xerarch and Hydrarch succession are respectively

- (a) Lichens and sedges
- (b) Lichens and rooted hydrophytes
- (c) Lichens and phytoplanktons
- (d) Phytoplanktons and lichens

240. With respect to DNA fragmentation

Statement A: Gel electrophoresis and elution are two important processes.

Statement B: After staining with ethidium bromide it has to be exposed to U.V. light.

- (a) Both A and B are correct statements.
- (b) Only A is correct and B is not correct.
- (c) Only A is correct.
- (d) Only B is correct.