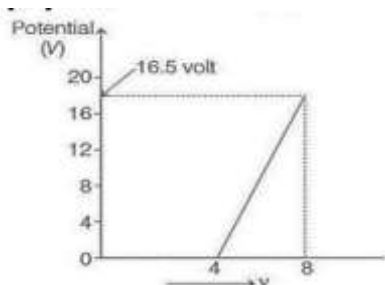


PART-I PHYSICS

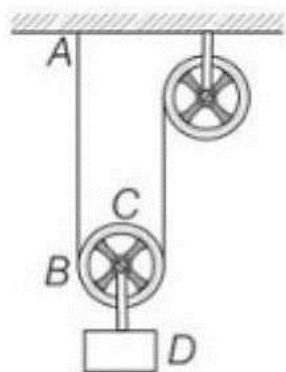
1. The stopping potential (V_0) versus frequency (ν) of a graph for photoelectric effect in a metal. From the graph, the planck's constant (h) is.



- (a) $6.60 \times 10^{-34} \text{ J-s}$ (b) $6.69 \times 10^{-34} \text{ J-s}$
 (c) $6.62 \times 10^{-34} \text{ J-s}$ (d) $6.63 \times 10^{-34} \text{ J-s}$
2. In a resonance column first and second resonance are obtained at depths 24 cm and 78 cm the third resonance will be obtained at depth.
- (a) 160 cm (b) 132 cm
 (c) 131 cm (d) 152 cm
3. A submarine A travelling at $17 \frac{\text{m}}{\text{s}}$ is being chased along the line of its velocity by another submarine B travelling at $34 \frac{\text{m}}{\text{s}}$. B sends a sonar signal of 600 Hz to detect A and receives a reflected sound of frequency ν . The of ν is

[Speed of sound in water = 1500 ms^{-1}]

- (a) 613.7 Hz (b) 6137 Hz
 (c) 62 Hz (d) 539 Hz
4. Transverse waves of the same frequency are generated in two steel wires A and B. The diameter of A is twice that of B and the tension in A is half that in B. The ratio of the velocities of the waves in A and B is
- (a) 1:2 (b) $1:\sqrt{2}$
 (c) $1:2\sqrt{2}$ (d) $3:2\sqrt{2}$
5. In the diagram shown below, both the strings AB and CD are made of same material and have same cross-section. The pulleys are light and fictionless. If the speed of wave in string AB is v_1 and in CD is v_2 , then $\frac{v_1}{v_2}$ is



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

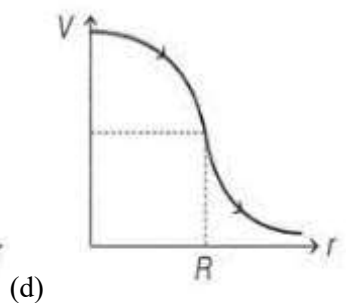
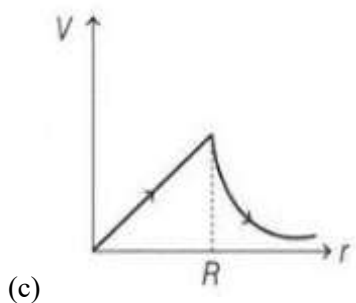
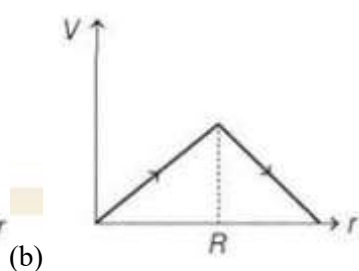
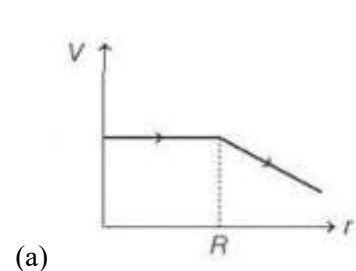
6. acceleration due to gravity on the surface of earth?

- (a) $\frac{g}{\left[1+\frac{d}{\sqrt{2}}\right]^2}$ (b) $g\left[1-\frac{2d}{R}\right]$
 (c) $\frac{g}{\left[1-\frac{d}{R}\right]^2}$ (d) $g\left[1-\frac{d}{R}\right]$

7. A direct current of 6A is superimposed on an alternating current $I = 10 \sin \omega t$ flowing through a wire. The effective value of the resulting current will be

- (a) $5\sqrt{2}$ (b) $5\sqrt{3}$
 (c) 9.27 (d) 8.37

8. Which one of the following graphs represents the variation of electric potential with distance r from the centre of a non-conducting charged sphere of radius R ?



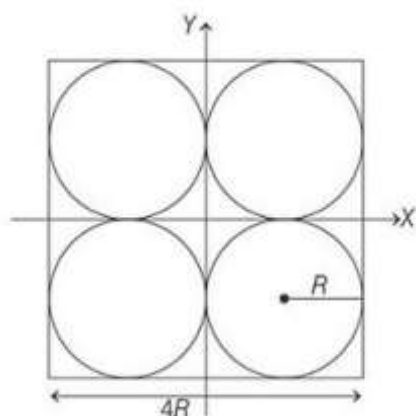
9. For an insulator, the forbidden energy gap is Options:

- (a) Zero (b) 1eV
(c) 2eV (d) 5eV

10. A machine gun fires 300 bullets per min if the mass of each bullet is 10 g and the velocity of the bullets is 600 ms^{-1} , the power (in kW) of the gun is

- (a) 43200 (b) 9
(c) 72 (d) 7.2

11. Four holes of radius 5 cm are cut from a thin square plate of 20 cm and mass 1 kg. The moment of inertia of the remaining portion about Z-axis is



- (a) $15 \text{ kg} - \text{m}^2$ (b) $0.37 \text{ kg} - \text{m}^2$
(c) $0.0017 \text{ kg} - \text{m}^2$ (d) $0.08 \text{ kg} - \text{m}^2$

12. a particle of mass m is projected with velocity v at an angle θ with the horizontal. At its highest point, it explodes into two pieces of equal mass, one of the piece continue to move on the original trajectory, then the velocity of second piece is.

- (a) $2v \cos \theta$ (b) $v \cos \theta$
(c) $3v \cos \theta$ (d) $\frac{v}{2} \cos \theta$

13. In the circuit shown assume the diode to be ideal. When V_i increases from -2 V to 6 V , the change in current is (in mA)



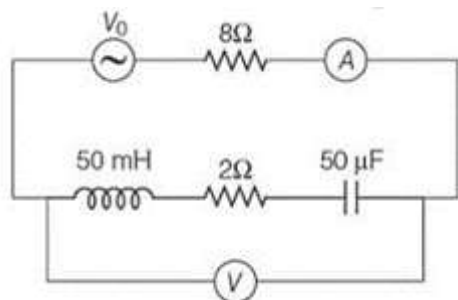
- (a) Zero (b) 20
(c) $\frac{25}{8}$ (d) 32

14. The de-Broglie wavelength of an electron moving with a velocity $\frac{c}{3}$ ($c = 3 \times 10^8 \text{ m/s}$) is equal to the wavelength of photon. The ratio of the kinetic energies of electron and photon is

- (a) 1:4 (b) 1:3

- (c) 1:2 (d) 2:1

15. In the circuit shown in the figure, the AC source gives a voltage $V = 20\cos(2000t)$ neglecting source resistance, the voltmeter and ammeter reading will be

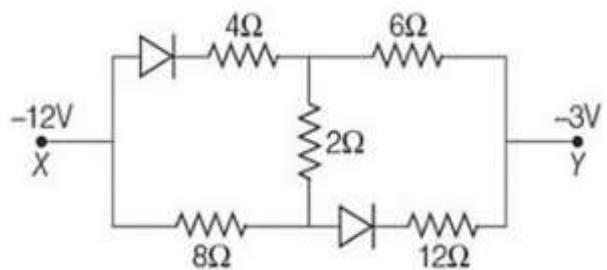


- (a) 0 V, 0.47 A (b) 2.82 V, 1.41 A
(c) 1.41 V, 0.47 A (d) 1.5 V, 8.37 A

16. An electromagnetic wave is propagating along X-axis. At $x = 1$ cm and $t = 18$ s, its electric vector $|E| = 8$ V/m, then the magnitude of its magnetic vector is

- (a) 266×10^{-8} (b) 3×10^{-7}
(c) 3.14×10^{-8} (d) 3.16×10^{-7}

17. In the following circuit the equivalent resistance between X and Y is Ω



- (a) 5 (b) 12
(c) 16 (d) 20

18. A monoatomic gas of molar mass m is kept in a insulated container. Container is moving with velocity v . If the container is suddenly stopped, then the change in the temperature of the gas is

- (a) $\frac{mv^2}{4R}$ (b) $\frac{m^2}{2R}$
(c) $\frac{mv^2}{R}$ (d) $\frac{mv^2}{3R}$

19. A projectile is projected with the velocity of $(3\hat{i} + 4\hat{j})$ m/s. The horizontal range of the projectile will be

- (a) 1.2 m (b) 2.4 m
(c) 3.6 m (d) 4.5 m

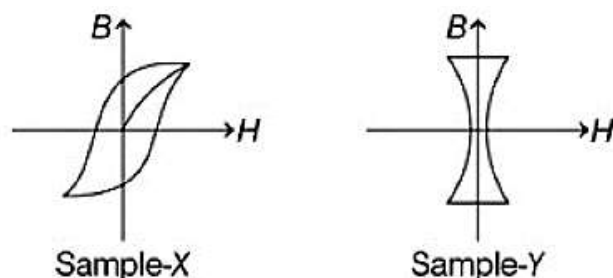
20. A transistor is connected in common-emitter (CE) configuration. The collector supply is 8 V and the voltage drop across a resistor in the collector circuit is 0.6 V. If the current gain factor α is 0.96, find the base current

- (a) $25\mu\text{A}$ (b) $50\mu\text{A}$
(c) $20\mu\text{A}$ (d) $35\mu\text{A}$

21. A solid sphere of 80 kg and radius 15 m moving in a space becomes a circular disc of radius 20 m in 1 h. The rate of change of moment of Inertia in this process is

- (a) $\frac{30}{9} \text{ kg} - \text{m}^2 \text{ s}^{-1}$ (b) $\frac{25}{9} \text{ kg} - \text{m}^2 \text{ s}^{-1}$
(c) $\frac{10}{9} \text{ kg} - \text{m}^2 \text{ s}^{-1}$ (d) $\frac{22}{9} \text{ kg} - \text{m}^2 \text{ s}^{-1}$

22. section* {If the B – H curves of two samples of X and Y of iron are as shown below, then which one of the following statement is correct?

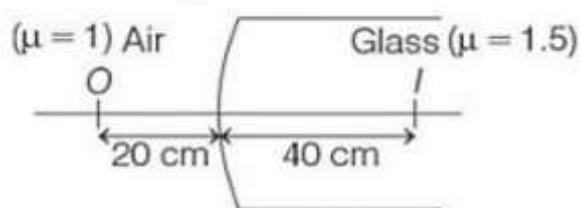


- (a) Both X and Y are suitable for making electromagnets.
(b) Both X and Y are suitable for making permanent magnet.
(c) X is suitable for making permanent magnet and Y for making electromagnet.
(d) X is suitable for making electromagnet and Y is suitable for permanent magnet.

23. In a radioactive material the activity at time t_1 , is A_1 and at a later time t_2 , it is A_2 . If the decay constant of the material is λ , then

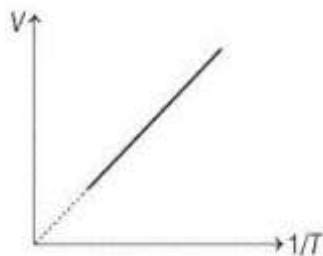
- (a) $A_1 = A_2 e^{-\lambda(t_1-t_2)}$ (b) $A_1 = A_2 e^{\lambda(t_1-t_2)}$
(c) $A_1 = A_2 \left(\frac{t_2}{t_1}\right)$ (d) $A_1 = A_2$

24. A mosquito O is sitting in front of a glass rod having spherical end of radius of curvature 40 cm. The image would be formed at



- (a) 40 cm left (b) infinity
(c) 20 cm to the right (d) 15 cm to the left

25. One mole of an ideal diatomic gas undergoes a process as shown in the figure. The molar specific heat of the gas in the process is

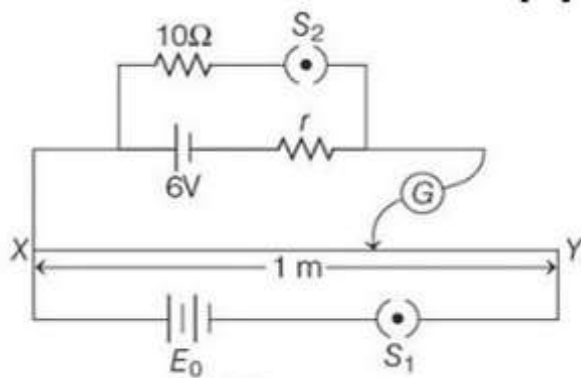


- (a) $\frac{3R}{2}$ (b) $\frac{R}{2}$
(c) $\frac{5R}{2}$ (d) $\frac{7R}{2}$

26. A capillary tube is attached horizontally to a constant heat arrangement. If the radius of the capillary tube is increased by 25%, then the rate of flow of liquid will change nearly by

- (a) 100% (b) 112%
(c) 124% (d) 144%

27. In the arrangement shown in figure, when the switch S_2 is open, the galvanometer, shows no deflection for $l = 50$ cm when the switch S_2 is closed, the galvanometer shows no deflection for $l = 0.416$ m. The internal resistance (r) of 6 V cell is



- (a) 2Ω (b) 3Ω
(c) 5Ω (d) 9Ω

28. In a young's double slit arrangement fringes are produced using light of wavelength $4000\text{\AA}$. One slit is covered by a thin plate of glass of refractive index 1.4 and the other with another glass plate of same thickness but of refractive index 1.7. By doing so the central bright shifts to original sixth fringe from Centre. Thickness of glass plate is

- (a) $2\mu\text{m}$ (b) $8\mu\text{m}$
(c) $11\mu\text{m}$ (d) $16\mu\text{m}$

29. An electric current I enters and leaves a uniform circular wire of radius r through diametrically opposite points. A charged particle q moves along the axis of circular wire passes through its centre at speed v . The magnetic force on the particle when it passes through the centre has a magnitude
- (a) $\frac{qv\mu_0 I}{2\pi r}$ (b) $q v \frac{\mu_0 I}{\pi r}$
 (c) $\frac{qv\mu_0 I}{r}$ (d) 0
30. An achromatic convergent doublet of two lenses in contact has a power of +5(d) The power of converging lens is +6(d) The ratio of the dispersive power of the convergent and divergent lenses is
- (a) 3: 7 (b) 2: 3
 (c) 1: 5 (d) 5: 3
31. If C , the velocity of light, g the acceleration due to gravity and P the atmospheric pressure be the fundamental quantities in MKS system, then the dimensions of length will be same as that of
- (a) $\frac{C}{g}$ (b) $\frac{C}{P}$
 (c) PCg (d) $\frac{C^2}{g}$
32. A boy running on a horizontal road at 8 km/h finds the rain falling vertically. He increases his speed to 12 km/h and finds that the drops makes 30° with the vertical. The speed of rain with respect to the road is
- (a) $4\sqrt{7}$ km/h (b) $9\sqrt{7}$ km/h
 (c) $12\sqrt{7}$ km/h (d) $15\sqrt{7}$ km/h
33. A particle of mass m_1 moving with velocity v collides with a mass m_2 at rest, then they get embedded. Just after collision, velocity of the system
- (a) increases (b) decreases
 (c) remains constant (d) becomes zero
34. The ratio of the specific heats of a gas is $\frac{C_p}{C_v} = 1.66$, then the gas may be
- (a) CO_2 (b) He
 (c) H_2 (d) NO_2
35. If a stone of mass 0.05 kg is thrown out a window of a train moving at a constant speed of 100 km/h then magnitude of the net force acting on the stone is
- (a) 0.5 N (b) zero
 (c) 50 N (d) 5 N
36. A body of mass M hits normally a rigid wall with velocity V and bounces back with the same velocity. The impulse experienced by the body is
- (a) MV (b) $1.5MV$
 (c) $2MV$ (d) zero
37. A hoop rolls down an inclined plane. The fraction of its total kinetic energy that is associated with rotational motion is
- (a) 1: 2 (b) 1: 3
 (c) 1: 4 (d) 2: 3
38. Infinite number of masses, each 1 kg are placed along the x-axis at $x = \pm 1m, \pm 2m, \pm 4m, \pm 8m, \pm 16m \dots$ the magnitude of the resultant gravitational potential in terms of gravitational constant G at the origin ($x = 0$) is
- (a) $G/2$ (b) G
 (c) $2G$ (d) $4G$

39. Water of volume 2 litre in a container is heated with a coil of 1 kW at 27°C. The lid of the container is open and energy dissipates at rate of 160 J/s. In how much time temperature will rise from 27°C to 77°C ?
[Given specific heat of water is 4.2 kJ/kg]
(a) 8 min 20 s (b) 6 min 2 s
(c) 7 min (d) 14 min
40. The figure shows the interference pattern obtained in a double-slit experiment using light of wavelength 600 nm. 1, 2, 3, 4 and 5 are marked on five fringes.
The third order bright fringe is
(a) 2 (b) 3
(c) 4 (d) 5

PART-II CHEMISTRY

41. Which one of the following is correct order of given isotopes?

- (I) $T_2 > D_2 > P_2$ (order of boiling point)
(II) $T_2 > D_2 > P_2$ (order of bond energy)
(III) $T_2 = D_2 = P_2$ (order of bond length)
(IV) $T_2 < D_2 < P_2$ (order of reactivity with Cl_2)
(a) I and II (b) III and IV
(c) II, III and IV (d) All of these

42. Ninhydrin gives yellow colour in paper chromatography with which amino acid?

- (a) Tryptophan (b) Proline
(c) Alanine (d) Tyrosine

43. How will raise in temperature affects the viscosity of liquids and gases?

- (a) Both increases
(b) Both decreases
(c) In case of liquids, decreases and in case of gases, increases.
(d) In case of liquid, increases and in case of gases, decreases.

44. Which of the following compounds is thermodynamically is the most stable?

- (a) $BaCO_3$ (b) $MgCO_3$
(c) $SrCO_3$ (d) $CaCO_3$

45. Glucose reacts with X number of molecules of phenyl hydrazine to yield osazone. The value of X is,

- (a) three (b) two
(c) one (d) four

46. Nylon- 6,6 is obtained from

- (a) adipic acid and hexamethylene diamine
(b) tetrafluoroethylene
(c) vinyl cyanide
(d) vinyl benzene

47. What is the hybridisation of $[\text{CrF}_6]^{3-}$?

- (a) $\text{sp}^3 \text{d}$ (b) $\text{sp}^3 \text{d}^2$
(c) $\text{d}^2 \text{sp}^3$ (d) $\text{d}^2 \text{sD}$

48. The structure of H_2O_2 is

- (a) planar, linear (b) non-planar, linear
(c) planar, non-linear (d) non-planar, non-linear

49. Match the species in Column I with their types in Column II.

Column I	Column II
(a) DDT	1. Photochemical smog
(b) NaClO_3	2. Disinfectant
(c) Cl_2	3. Herbicides
(d) PAN	4. Pesticides

- (a) $A \rightarrow 4, B \rightarrow 3, C \rightarrow 2, D \rightarrow 1$
(b) $A \rightarrow 1, B \rightarrow 2, C \rightarrow 3, D \rightarrow 1$
(c) $A \rightarrow 2, B \rightarrow 3, C \rightarrow 1, D \rightarrow 4$
(d) $A \rightarrow 3, B \rightarrow 1, C \rightarrow 2, D \rightarrow 4$

50. In which pair or pairs is the stronger bond found in the first species?

(I) $\text{O}_2^{2-}, \text{O}_2;$

(II) $\text{N}_2, \text{N}_2^+;$

(III) NO^+, NO^-

- (a) I only (b) II only
(c) I and II only (d) II and III only

51. Select the correct statement about the complex $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$.

- (a) Its ionisation isomer is $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$.
(b) It gives yellow precipitate with AgNO_3 .
(c) Its ionisation isomer give white precipitate with BaCl_2 .
(d) All the above are correct statements.

52. A certain metal sulphide, MS_2 , is used extensively as a high temperature lubricant. If MS_2 is 40.06% by mass sulphur, metal M has atomic mass.

- (a) 160u (b) 64u

- (c) 40u (d) 96u



53. X and Y are

- (a) benzene, benzaldehyde
(b) toluene, benzaldehyde
(c) toluene, benzoic acid
(d) benzene, benzoic acid

54. Ge (II) compounds are powerful reducing agents whereas Pb (IV) compounds are strong oxidants. It can be because

- (a) Pb is more electropositive than G
(b) ionisation potential of lead is less than that of Ge.
(c) ionic radii of Pb^{2+} and Pb^{4+} are larger than that of Ge^{2+} and Ge^{4+} .
(d) more pronounced inert pair effect in lead has.

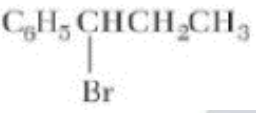
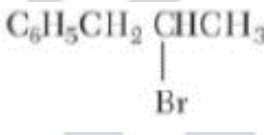
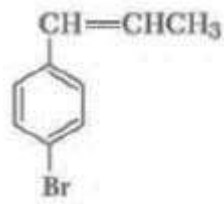
55. Which compound has antifluorite structure?

- (a) MnO_4 (b) Na_2O
(c) Na_2O_2 (d) Li_2O_2

56. 100 mL of 2M of formic acid ($\text{pK}_a = 3.74$) is neutralise by NaOH, at the equivalence point pH is

- (a) 7 (b) 6
(c) 9.5 (d) 8.87

57. The reaction of $\text{C}_6\text{H}_5\text{CH}=\text{CHCH}_3$ with HBr produces

- (a)  (b) 
(c) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{Br}$
(d) 

58. Standard entropy of X_2 , Y_2 and XY_2 are 60, 40 and $50 \text{ J K}^{-1} \text{ mol}^{-1}$, respectively. For the reaction, $\frac{1}{2}\text{X}_2 + \frac{3}{2}\text{Y}_2 \rightarrow \text{XY}_3$, $\Delta H = -30 \text{ kJ}$, to be at equilibrium, the temperature will be

- (a) 1250 K (b) 500 K
(c) 750 K (d) 1000 K

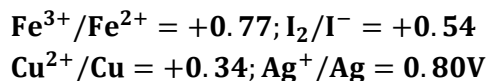
59. On passing a current of 1.0 ampere for 16 min and 5sec through one litre solution of CuCl_2 , all copper of the solution was deposited at cathode. The strength of CuCl_2 solution was (Molar mass of Cu = 63.5; Faraday constant = $96,500 \text{ C mol}^{-1}$)

- (a) 0.01 N (b) 0.01M
(c) 0.02M (d) 0.2 N

60. The total number of P – OH bonds for pyrophosphoric acid

- (a) 4 (b) 5
(c) 6 (d) 8

61. Using the standard electrode potential, find out the pair between which redox reaction is not feasible. $E^\ominus$ values



- (a) Fe^{3+} and I^- (b) Ag^+ and Cu
(c) Fe^{3+} and Cu (d) Ag and Fe^{3+}

62. What is $[\text{NH}_4^+]$ in a solution that is 0.02M NH_3 0.01M KOH ?

$$[\text{K}_b(\text{NH}_3) = 1.8 \times 10^{-5}]$$

- (a) $3.6 \times 10^{-5}\text{M}$ (b) $1.8 \times 10^{-5}\text{M}$
(c) $0.9 \times 10^{-5}\text{M}$ (d) $7.2 \times 10^{-5}\text{M}$

63. For an isomerisation reaction $\text{A} \rightleftharpoons \text{B}$, the temperature dependence of equilibrium constant is given by

$$\log_e K = 4.0 - \frac{2000}{T}$$

The value of ΔS° at Hook is, therefore

- (a) 4R (b) 5R
(c) 400R (d) 2000R

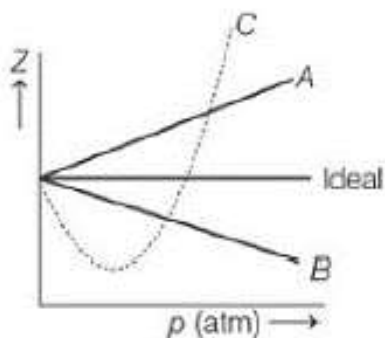
64. For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJmol^{-1} and $108.8 \text{ JK}^{-1} \text{ mol}^{-1}$, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is:

- (a) 293.4 K (b) 273.4 K
(c) 393.4 K (d) 373.4 K

65. In an adiabatic process, no transfer of heat takes place between system and surrounding. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following.

- (a) $q = 0, \Delta T \neq 0, W = 0$ (b) $q \neq 0, \Delta T = 0, W = 0$
(c) $q = 0, \Delta T = 0, W = 0$ (d) $q = 0, \Delta T < 0, W \neq 0$

66. The given graph represents the variation of compressibility factor (Z) = $\frac{pV}{nRT}$, for three real gases A, B and C. Identify the only incorrect statement.



- (a) For the gas A, $a = 0$ and its dependence on p is linear at all pressure.
 (b) For the gas B, $b = 0$ and its dependence on p is linear at all pressure.
 (c) For the gas C, which is typical real gas for which neither a nor $b = 0$. By knowing the minima and point of the intersection, with $Z = 1$, a and b can be calculated.
 (d) At high pressure the slope is positive for all real gases.

67. The pH of 0.1M solution of the following salts increases in the order:

- (a) $\text{NaCl} < \text{NH}_4\text{Cl} < \text{NaCN} < \text{HCl}$
 (b) $\text{HCl} < \text{NH}_4\text{Cl} < \text{NaCl} < \text{NaCN}$
 (c) $\text{NaCN} < \text{NH}_4\text{Cl} < \text{NaCl} < \text{HCl}$
 (d) $\text{HCl} < \text{NaCl} < \text{NaCN} < \text{NH}_4\text{Cl}$

68. An element X occurs in short period having configuration ns^2np^1 . The formula and nature of its oxide is

- (a) XO_3 , basic (b) XO_3 , acidic
 (c) X_2O_3 , amphoteric (d) X_2O_3 , basic

69. Which one of the following statements in relation to the hydrogen atom is correct?

- (a) 3s, 3p and 3d -orbitals all have the same energy.
 (b) 3s and 3p-orbitals are of lower energy than 3d -orbital.
 (c) 3p-orbital is lower in energy than 3d -orbital.
 (d) 3s-orbital is lower in energy than 3p-orbital.

70. In the molecules CH_4 , NF_3 , NH_4^+ and H_2O

- (a) number of lone pairs are same
 (b) all have same hybridisation of centre of atom
 (c) the bond angles are same
 (d) number of bond pairs are same

71. 0.20 g of an organic compound gave 0.12 g of AgBr By using Carius method, the percentage of bromine in the compound will be

- (a) 34.06% (b) 44.04%
 (c) 54% (d) 25%

72. A 100.0 mL dilute solution of Ag^+ is electrolysed for 15.0 minutes with a current of 1.25 mA and the silver is removed completely. What was the initial $[\text{Ag}^+]$?

- (a) 2.32×10^{-1} (b) 2.32×10^{-4}
 (c) 2.32×10^{-3} (d) 1.16×10^{-5}

73. pH of a 0.1M monobasic acid is found to be 2. Hence, its osmotic pressure at a given temperature TK is

- (a) 0.1RT (b) 0.11RT
 (c) 1.1RT (d) 0.01RT

74. Which of the following is not a member of chalcogens?

- (a) O (b) S
 (c) Se (d) Po

75. Which of the following element do not form complex with EDTA?

- (a) Ca (b) Mg
(c) Be (d) Sr

76. Each edge of a cubic unit cell is 400 pm long. If atomic mass of the element is 120 and its density is 6.25 g/cm^3 , the crystal lattice is : (use $N_A = 6 \times 10^{23}$)

- (a) primitive (b) body centered
(c) face centered (d) end centered

77. Arrange the following alcohols in increasing order of their reactivity towards the reaction with HCl.

$(\text{CH}_3)_2\text{CH} - \text{OH}(1)$, $(\text{CH}_3)_3\text{C} - \text{OH}(2)$, $(\text{C}_6\text{H}_5)_3\text{C} - \text{OH}(3)$

- (a) $1 < 2 < 3$ (b) $2 < 1 < 3$
(c) $3 < 1 < 2$ (d) $2 < 3 < 1$

78. Thirty percent of the bases in a sample of DNA extracted from eukaryotic cells is adenine. What percentage of cytosine is present in this DNA?

- (a) 10% (b) 20%
(c) 30% (d) 40%

79. The blue colour of snail is due to presence of

- (a) Albumin (b) Haemocyanin
(c) Globulins (d) Fibrinogen

80. Which of the following is a diamine?

- (a) Dopamine (b) Histamine
(c) Meprobamate (d) Chlorphenamine

PART- III (A) ENGLISH PROFICIENCY

81. Forthrightness in speech may not always be a desirable quality.

- (a) Outspokenness (b) Obliqueness
(c) Mendacity (d) Equivocation

82. The inexorable demands of the workers brought the company to a closure.

- (a) Unreasonable (b) Relentless
(c) Monetary (d) Violent

**83. Select the one which best expresses the same sentence in Passive/Active voice.
Then her face was bowed.**

- (a) Then she was being bowed her face.
(b) Her face was bowed by them.
(c) Then she bowed her face.
(d) Then her face has been bowed.

84. The complex form of the sentence given below would be Spare the rod and spoil the child.

- (a) The child is spoiled if the rod is spared.
(b) The child becomes spoiled when the rod is spared.
(c) The child is spoiled whenever the rod is spared.
(d) The child is spoiled when the rod is spared.

85. The attack on the freedom of the press is a retrograde step.

- (a) progressive (b) stubborn
(c) punitive (d) aggressive

86. The leader might have had some covert reason for the change of his political affiliations.

- (a) Unjustifiable (b) Obvious
(c) Inexplicable (d) Flimsy

87. Regard for others as a principle of action or selflessly.

- (a) Gynicism (b) Nepotism
(c) Philanthropy (d) Altruism

88. Code of diplomatic etiquette and precedence is Options:

- (a) Formalism (b) Statesmanship
(c) Protocol (d) Hierarchy

89. (A) Now under liberated economy they are learning to compete domestically and globally.

(B) In India corporations until recently achieved success by avoiding competition, using protected and regulated domestic markets.

(C) The trend is irreversible.

(D) Business leaders are preparing themselves to meet competitive challenges, and to avoid being swept away.

- (a) BADC (b) BDCA
(c) BDAC (d) CDBA

90. (A) Recovery was given inadequate attention and consequently some bank branches regularly incurred heavy losses and their parent bodies had to bale them out.

(B) As a result, banks indulged in extensive lending to borrowers who had little or no potential to make repayments.

(C) To fulfil the social objectives laid down by the masters of nationalisation, banks were asked to lend to identified priority sectors.

(D) 1992-93 results showed that the loss making branches of public sector banks increased from 10,000 to 13,000 and the quantum of losses showed at ₹3,369 crores.

- (a) BACD (b) DABC
(c) CBAD (d) BCAD

91. Choose the word which is most similar in meaning to the word 'Optimistic'.

- (a) Favourable (b) Gloomy
(c) Hopeful (d) Rude

92. Choose the word which is most opposite in meaning to the word 'Drowsy'.

- (a) Sleepy (b) Nodding
(c) Yawning (d) Wakeful

93. Direction: (93 to 95) Which of the following phrases (I), (II), and (III) given below each sentence should replace the phrase printed in bold letters to make the sentence grammatically correct? Choose the best option among the five given alternatives that reflect the correct use of phrase in the context of the grammatically correct sentence. If the sentence is correct as it is, mark (d) i.e., "No correction required" as the answer.

He is really feeling under the weather today; he has a terrible cold.

(I) feeling like the weather

(II) feeling over the weather

(III) feeling in the weather

- (a) Only (I) is correct
(b) Only (III) is correct
(c) Only (II) is correct
(d) No correction required

94. By working part-time and looking after his old mother, he managed to get the best for both worlds.

- (I) the best at both worlds
(II) the best of both worlds
(III) the best on both worlds

- (a) Only (I) is correct
- (b) Only (II) is correct
- (c) Only (III) is correct
- (d) No correction required

95. Hey, Nanny, speak about the devil and you are here.

- (I) speak at the devil**
- (II) speak on the devil**
- (III) speak of the devil**

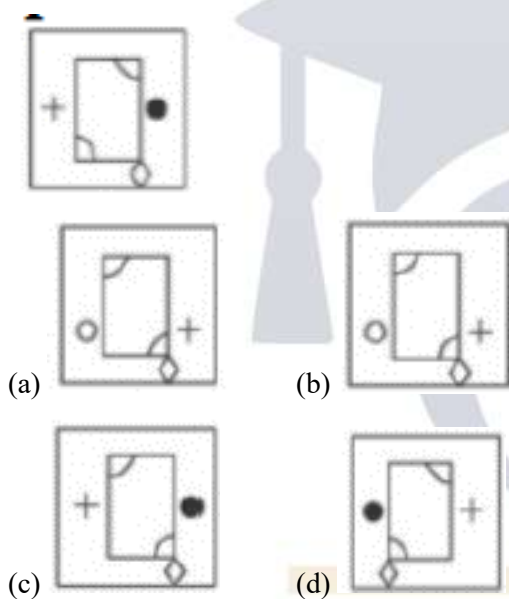
- (a) Only (I) is correct
- (b) Only (II) is correct
- (c) Only (III) is correct
- (d) No correction required

PART – III (B) LOGICAL REASONING

96. The average marks of 50 students in a class was found to be 64 . If the marks of two students were incorrectly entered as 38 and 42 instead of 83 and 24 , respectively, then what is the correct average?

- (a) 64.54
- (b) 62.32
- (c) 61.24
- (d) 61.86

97. Select the correct mirror image of the given figure when the mirror is placed on the right of the figure.



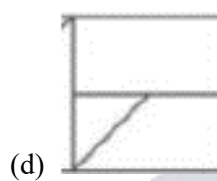
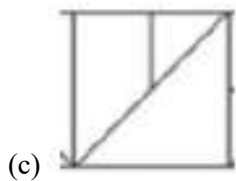
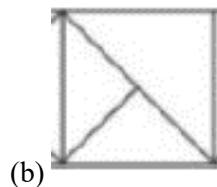
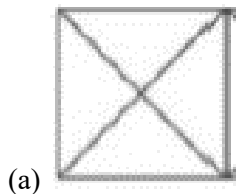
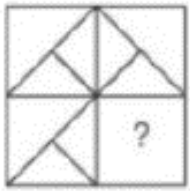
98. Six friends A, B, C, D, E and F are sitting around a round table facing the centre. A sits second to the right of B, E sits second to the left of C. B doesn't sit adjacent to E. D does not sit opposite to E or C. Who sits to the immediate left of E ?

- (a) A
- (b) D
- (c) B
- (d) C

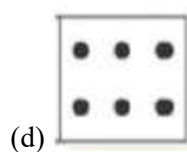
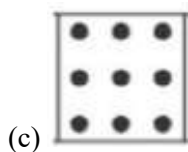
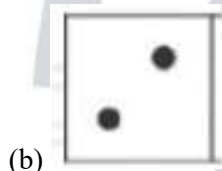
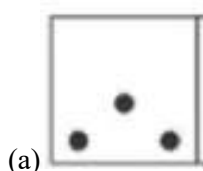
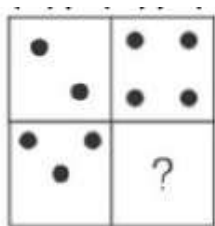
99. Five friends A, B, C, D and E bought cars which were priced differently. B's car was costlier than C's car but was less costly than E's car. A's car was costlier than D's car but less costly than C's car. Whose car was the 2 nd costliest?

- (a) E
- (b) A
- (c) B
- (d) C

100. In the following question, complete the missing segment by selecting the appropriate figure from the given alternatives, (a), (b), (c) and (d).



101. In each of the following question, find out which of the answer figures (a), (b), (c) and (d) completes the figure matrix?



102. Statements 60% of government employees went on strike.

Mr. Gopal is a government employee.

Conclusions

(I) Mr. Gopal went on strike.

(II) Mr. Gopal did not participate in the strike.

- (a) Only conclusion I follows
- (b) Only conclusion II follows
- (c) Both conclusions i and II follows
- (d) Either conclusion I or II follows

103. Statements

Lawyers marry only fair girls.

Shobha is very fair.

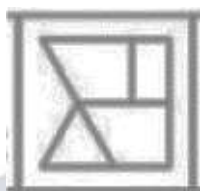
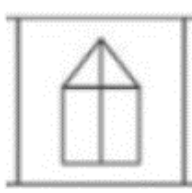
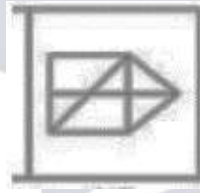
Conclusions

- (I) Shobha is married to a lawyer.
(II) Shobha is not married to a lawyer.

- (a) Only conclusion I follows.
(b) Only conclusion II follows.
(c) Both conclusion I and II follows
(d) Either conclusion I or II follows

104. In the question given below, find out which of the figures can be formed from the pieces given in the problem figure.



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

105. Select the option in which the words share the same relationship as that shared by the given pair of words.

Barometer: Pressure

- (a) Ammeter: Current (b) Thermometer: Volume
(c) Voltmeter: Heat (d) Scale: Seconds

PART- IV MATHEMATICS

106. If α be a root of the equation $4x^2 + 2x - 1 = 0$, then the other root of the equation is

- (a) $4\alpha^3 + 2\alpha$ (b) $4\alpha^2 - 2\alpha$
(c) $4\alpha^3 - 3\alpha$ (d) $4\alpha^3 + 3\alpha$

107. If $A = \{x: x \text{ is a multiple of } 4\}$ and, $B = \{x: x \text{ is a multiple of } 6\}$, then $A \cap B$ consists of multiples of

- (a) 16 (b) 12
(c) 8 (d) 4

108. If $|w| = 2$, then the set of points $z = w - \frac{1}{w}$ is contained in or equal to the set of points

z satisfying

- (a) $\text{Im}(z) = 0$ (b) $|\text{Im}(z)| \leq 1$
(c) $|\text{Re}(z)| \leq 2$ (d) $|z| \leq 3$

109. The value of $\lim_{x \rightarrow 0} \frac{1 - \cos(1 - \cos x)}{x^4}$ is Options:

- (a) $\frac{1}{6}$ (b) $\frac{1}{8}$
(c) $\frac{1}{10}$ (d) $\frac{1}{12}$

110. Let $a_1, a_2, \dots, a_{40}$ be in AP and $h_1, h_2, \dots, h_{10}$ be in HP. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is

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

111. The number of terms in the expansion of $(1 + 5\sqrt{2}x)^9 + (1 - 5\sqrt{2}x)^9$ Options:

- (a) 5 (b) 7
(c) 9 (d) 10

112. The number of different seven-digit numbers that can be written using only the three digit 1, 2 and 3 with the condition that the digit 2 occurs twice in each number is

- (a) ${}^7C_2 2^5$ (b) ${}^7P_2 2^5$
(c) ${}^7C_2 5^2$ (d) None of these

113. Given $2x - y + 2z = 2$, $x - 2y + z = -4$, $x + y + \lambda z = 4$, then the value of λ such that the given system of equation has no solution is

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

114. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$ If B is the inverse of A, then the value of α is

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

115. If $x \in \left(0, \frac{\pi}{2}\right)$, then the value of $\cos^{-1}\left(\frac{7}{2}(1 + \cos 2x) + \sqrt{(\sin^2 x - 48\cos^2 x)\sin x}\right)$ is equal to

- (a) $x - \cos^{-1}(7\cos x)$ (b) $x + \sin^{-1}(7\cos x)$
(c) $x + \cos^{-1}(6\cos x)$ (d) $x + \cos^{-1}(7\cos x)$

116. A running track of 440ft is to be laid out enclosing a football field, the shape of which is a rectangle with a semi-circle at each end. If the area of the rectangular portion is to be maximum, then the lengths of its side are

- (a) 70ft and 110ft (b) 80ft and 120ft
(c) 35ft and 110ft (d) 35ft and 120ft

117. $\left(\frac{dy}{dx}\right) \tan x = y \sec^2 x + \sin x$, find general solution

- (a) $y = \tan x(\log |\operatorname{cosec} x - \cot x| + \cos x + c)$
(b) $y = \sec^2 x + \tan x + c$
(c) $y = \log |\sec x + \tan x| + \operatorname{cosec} x + c$
(d) $y = \tan^2 x + \sin x + c$

118. If the straight line $y = mx + c$ touches the parabola $y^2 - 4ax + 4a^3 = 0$ then c is

- (a) $am + \frac{a}{m}$ (b) $am - \frac{a}{m}$
(c) $\frac{a}{m} + a^2 m$ (d) $\frac{a}{m} - a^2 m$

119. A normal is drawn at the point P to the parabola $y^2 = 8x$, which is inclined at 60° with the straight line $y = 8$. Then the point P lies on the straight line

- (a) $2x + y - 12 - 4\sqrt{3} = 0$
(b) $2x - y - 12 + 4\sqrt{3} = 0$
(c) $2x - y - 12 - 4\sqrt{3} = 0$
(d) None of these

120. The value of $\int \frac{1}{x^1} dx$, is $[(x-1)^3(x+2)^5]^{\frac{1}{4}}$

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

121. The area of the region bounded by the parabola $(y-2)^2 = (x-1)$, the tangent to the parabola at the point $(2, 3)$ and the X-axis is

- (a) 3 (b) 6
 (c) 9 (d) 12

122. $\hat{u}$ and $\hat{v}$ are two non-collinear unit vectors such that $\left| \frac{\hat{u}+\hat{v}}{2} + \hat{u} \times \hat{v} \right| = 1$. Then the value of $|\hat{u} \times \hat{v}|$ is equal to

- (a) $\left| \frac{\hat{u}+\hat{v}}{2} \right|$ (b) $|\hat{u} + \hat{v}|$
 (c) $|\hat{u} - \hat{v}|$ (d) $\left| \frac{\hat{u}-\hat{v}}{2} \right|$

123. A six faced die is a biased one. It is thrice more likely to show an odd -numbers than show an even number. It is thrown twice. The probability that the sum of the numbers in two throws is even, is

- (a) $\frac{5}{9}$ (b) $\frac{5}{8}$
 (c) $\frac{1}{2}$ (d) None of these

124. The sum of all the solution of the equation $\cos \theta \cos \left(\frac{\pi}{3} + \theta \right) \cos \left(\frac{\pi}{3} - \theta \right) = \frac{1}{4}$, $\theta \in [0, 6\pi]$

- (a) 15π (b) 30π
 (c) $\frac{100\pi}{3}$ (d) None of these

125. Let α be the solution of $16^{\sin^2 \theta} + 16^{\cos^2 \theta} = 10$ in $\left(0, \frac{\pi}{4} \right)$. If the shadow of a vertical pole is $\frac{1}{\sqrt{3}}$ of its height, then the altitude of the sun is

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

126. For each parabola $y = x^2 + px + q$, meeting coordinate axes at 3-distinct points, if circles are drawn through these points, then the family of circles must pass through

- (a) $(1,0)$ (b) $(0,1)$
 (c) $(1,1)$ (d) (p, q)

127. The number of ways of arranging letters of the word HAVANA so that V and N do not appear together is

- (a) 40 (b) 60
 (c) 80 (d) 100

128. Let $a_1, a_2, a_3 \dots$ be a harmonic progression with $a_1 = 5$ and $a_{20} = 25$. The least positive integer n for which $a_n < 0$, is

- (a) 22 (b) 23
(c) 24 (d) 25

129. If the plane $3x + y + 2z + 6 = 0$ is parallel to the line $\frac{3x-1}{2b} = 3 - y = \frac{z-1}{a}$ then the value of $3a + 3b$ is

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

130. Let a, b be the solutions of $x^2 + px + 1 = 0$ and c, d be the solution of $x^2 + qx + 1 = 0$. If $(a - c)(b - c)$ and $(a + d)(b + d)$ are the solution of $x^2 + ax + \beta = 0$, then β is equal to

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

131. If $\begin{bmatrix} 1 & -\tan \theta \\ \tan \theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan \theta \\ -\tan \theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then

- (a) $a = 1, b = 1$
(b) $a = \sin 2\theta, b = \cos 2\theta$
(c) $a = \cos 2\theta, b = \sin 2\theta$
(d) None of these

132. The value of $\lim_{x \rightarrow 0} \frac{(1+x)^{\frac{1}{x}} - e + \frac{1}{2}ex}{x^2}$ is

- (a) $\frac{11}{24}e$ (b) $-\frac{11}{24}e$
(c) $\frac{e}{24}$ (d) None of these

133. The locus of the mid-point of the chord if contact of tangents drawn from points lying on the straight line $4x - 5y = 20$ to the circle $x^2 + y^2 = 9$ is

- (a) $20(x^2 + y^2) - 36x + 45y = 0$
(b) $20(x^2 + y^2) + 36x - 45y = 0$
(c) $36(x^2 + y^2) - 20x + 45y = 0$
(d) $36(x^2 + y^2) + 20x - 45y = 0$

134. Let $f(x) = \int \frac{x^2 dx}{(1+x^2)(1+\sqrt{1+x^2})}$ and $f(0) = 0$, then the value of $f(1)$ be

- (a) $\log(1 + \sqrt{2})$ (b) $\log(1 + \sqrt{2}) - \frac{\pi}{4}$
(c) $\log(1 + \sqrt{2}) + \frac{\pi}{2}$ (d) None of these

135. The mean of five observations is 4 and their variance is 5.2. If three of these observations are 1, 2 and 6, then the other two are

- (a) 2 and 9 (b) 3 and 8
(c) 4 and 7 (d) 5 and 6

136. In a sequence of 21 terms, the first 11 terms are in AP with common difference 2 and the last 11 terms are in GP with common ratio 2. If the middle term of AP be equal to the middle term of the GP, then the middle term of the entire sequence is

- (a) $-\frac{10}{31}$ (b) $\frac{10}{31}$
(c) $\frac{32}{31}$ (d) $-\frac{31}{32}$

137. If $p \neq a, q \neq b, r \neq c$ and the system of equations

$$\begin{aligned} px + ay + az &= 0 \\ bx + qy + bz &= 0 \\ cx + cy + rz &= 0 \end{aligned}$$

has a non-trivial solution, then the value of $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$ is

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

138. If $g(x) = x^2 + x - 2$ and $\frac{1}{2}g \circ f(x) = 2x^2 - 5x + 2$, then $f(x)$ is equal to

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

139. The smallest positive integral value of n such that $\left[\frac{1 + \sin \frac{\pi}{8} + i \cos \frac{\pi}{8}}{1 + \sin \frac{\pi}{8} - i \cos \frac{\pi}{8}} \right]^n$ is purely imaginary, is equal to

- (a) 4 (b) 3
(c) 2 (d) 8

140. A house subtends a right angle at the window of a opposite house and the angle of elevation of the window from the bottom of the first house is 60° . If the distance between two houses be 6 m, then the height of the first house is

- (a) $8\sqrt{3}$ m (b) $6\sqrt{3}$ m
(c) $4\sqrt{3}$ m (d) None of these

141. A spherical balloon is filled with 4500π cubic meters of helium gas. If a leak in the balloon causes the gas to escape at the rate of 72π cubic meters per minute then the rate (in meters per minute) at which the radius of the balloon decreases 49 min after the leakage began is

- (a) $\frac{9}{7}$ (b) $\frac{7}{9}$
(c) $\frac{2}{9}$ (d) 9

142. If in a $\triangle ABC$, $2b^2 = a^2 + c^2$, then $\frac{\sin 3B}{\sin B}$ is equal to Options:

- (a) $\frac{c^2 - a^2}{2ca}$ (b) $\frac{c^2 - a^2}{ca}$
(c) $\frac{(c^2 - a^2)^2}{(ca)^2}$ (d) $\left[\frac{c^2 - a^2}{2ca} \right]^2$

143. If the sum of the coefficients in the expansion of $(x + y)^n$ is 1024, then the value of the greatest coefficient in the expansion is

- (a) 356 (b) 252
(c) 210 (d) 120

144. The area enclosed by the curves $y = \sin x + \cos x$ and $y = |\cos x - \sin x|$ over the interval $\left[0, \frac{\pi}{2}\right]$ is

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

145. If $\alpha, \beta, \gamma \in [0, \pi]$ and if α, β, γ are in AP, then $\frac{\sin \alpha - \sin \gamma}{\cos \gamma - \cos \alpha}$ is equal to Options:

- (a) $\sin \beta$ (b) $\cos \beta$
(c) $\cot \beta$ (d) $2\cos \beta$

146. If the constraints in a linear programming problem are changed then

- (a) The problem is to be re-evaluated.
(b) Solution is not defined.
(c) The objective function has to be modified.
(d) The change in constraints is ignored.

147. In a binomial distribution, the mean is 4 and variance is 3. Then its mode is:

- (a) 5 (b) 6
(c) 4 (d) None of these

148. The sum $1 + \frac{1+a}{2!} + \frac{1+a+a^2}{3!} + \dots \infty$ is equal to

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

149. The Boolean expression $\sim (p \vee q) \vee (\sim p \wedge q)$ is equivalent to:

- (a) p (b) q
(c) $\sim q$ (d) $\sim p$

150. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately

- (a) 25.5 (b) 24.0
(c) 22.0 (d) 20.5

