MHT CET 2026 PCM Apr 17 Shift 2 Question Paper

Conducted by the State Common Entrance Test Cell, Maharashtra

Time Allowed: 180 Minutes **Total Questions: 150** **Maximum Marks: 200**

General Instructions

(i) This **PCM** paper is from **MHT CET 2026**, conducted by the **State Common Entrance Test Cell, Maharashtra**.

(ii) Answer all **150 multiple choice questions**: **50 Physics**, **50 Chemistry** and **50 Mathematics**.

(iii) Each question offers **four choices**, with **one correct answer**.

(iv) Allow **90 minutes for Physics and Chemistry together**, followed by **90 minutes for Mathematics**. The first group closes before the second opens.

(v) Correct answers earn **1 mark in Physics and Chemistry** and **2 marks in Mathematics**.

(vi) There is **no negative marking**. Unanswered questions score zero.

1. There are two vectors $\vec{A} = 6\hat{i} + 9\hat{j} - \hat{k}$ and $\vec{B} = 2\hat{i} + 3\hat{j} - p\hat{k}$ which have the same direction. The value of 'p' is

(A) 3 (B) $\frac{1}{3}$

(C) $\frac{2}{3}$ (D) $-\frac{1}{3}$

2. A force 'F' is applied on a square plate of side 'L'. If the percentage error in determining 'L' is 3% and that in 'F' is 2% then the percentage error in determining the pressure is

(A) 5% (B) 6%

(C) 7% (D) 8%

3. A ball P is projected at an angle of 60° with the vertical with certain initial speed. Another ball Q of the same mass as that of ball P is projected vertically upwards with the same initial speed as that of P. At the highest point, the ratio of potential energy of ball P to that of ball Q is $(\sin 30^\circ = 0.5)$

(A) 1 : 4 (B) 4 : 1

(C) 2 : 3 (D) 3 : 2

4. A machine gun fires a bullet of mass 40g with a speed of 600 ms^{-1}. The person holding the gun can bare maximum force of 168N on it. The number of bullets that can be fired from the gun per second is

(A) 8 (B) 7

(C) 6 (D) 5

5. Radius of gyration of a thin uniform circular disc about the axis passing through its centre and perpendicular to its plane is K_c. Radius of gyration of the same disc about a diamter of the disc is K_d. the ratio $K_d : K_c$ is

(A) 1 : 4 (B) $1 : \sqrt{2}$

(C) $\sqrt{2} : 1$ (D) 2 : 1

6. A solid sphere of radius R and mass M is rotating about its diameter. The moment of intertia of the solid sphere rotating about an axis at a distance $\frac{R}{3}$ from the centre and parallel to that diameter is

(A) $\frac{11}{15}MR^2$ (B) $\frac{13}{20}MR^2$

(C) $\frac{23}{45}MR^2$ (D) $\frac{47}{45}MR^2$

7. A mass tied to a string is whirled in a horizontal circular path with a constant angular velocity and its angular momentum is 'L'. If the length of the string is now halved, keeping angular velocity same then the angular momentum will be

(A) $\frac{L}{4}$ (B) $\frac{L}{2}$

(C) L (D) $2L$

8. Two planets A and B are orbiting around the sun. The distances of the two planets A and B from the sun are r_A and r_B respectively. Also $r_B = 225\, r_A$. If the orbital speed of the planet A is 'V' then the orbital speed of planet B will be

(A) $\frac{V}{3}$ (B) $\frac{V}{5}$

(C) $\frac{V}{15}$ (D) $\sqrt{15}\, V$

9. When a capillary tube of radius 'r' is immersed in water, rise of water is upto height 'h'. The mass of water in capillary tube is 'm'. When another capillary tube of radius 'xr' is immersed in water, the mass of water that will rise in this tube is

(A) $x \cdot m$ (B) $\frac{m}{x}$

(C) $x^2 m$ (D) $(x + 1)m$

10. The excess pressure inside the first soap bubble is three times that inside the second soap bubble. The ratio of the volume of the first soap bubble to the volume of the second soap bubble is

(A) 3 : 4 (B) 1 : 3

(C) 1 : 9 (D) 1 : 27

11. Two soap bubbles, A and B, have radii in the ratio 3 : 2. The excess pressure inside the bubble A to that of B is in the ratio

(A) 2 : 3 (B) 3 : 2

(C) 1 : 5 (D) 4 : 9

12. A black body emits radiation of maximum intensity of wavelength 'λ' at temperature 'T' K. Its corresponding wavelength at temperature $(2.5T)$ K will be

(A) $\frac{2\lambda}{3}$ (B) $\frac{2\lambda}{5}$

(C) $\frac{4\lambda}{5}$ (D) $\frac{16\lambda}{81}$

13. In a composite slab there are two materials having coefficients of thermal conductivity K and 2K, thickness x and 4x repectively. The temperature of the two outer surfaces of a composite slab are T_2 and T_1 $(T_2 > T_1)$. T_2 is on side K and T_1 is on side 2K. The rate of heat transfer through the slab in a steady state is $\left[\frac{A(T_2 - T_1)K}{x}\right] \cdot f$, where f is equal to

(A) 1 (B) $\frac{1}{2}$

(C) $\frac{2}{3}$ (D) $\frac{1}{3}$

14. A carnot engine having efficiency $\frac{1}{6}$, operates between the source temperature T_H and the sink temperature T_C. Its efficiency increases to $\frac{1}{3}$, when T_C is decreased by 64 K. The temperatures T_H and T_C are repectively

(A) 374 K , 310 K (B) 384 K , 320 K

(C) 384 K , 340 K (D) 320 K , 256 K

15. A thermodynamic system is compressed adiabatically, then its temperature

(A) becomes zero. (B) remains constant.

(C) increases. (D) decreases.

16. Two cylinders A and B fitted with pistons contain equal amount of an ideal diatomic gas at 303 K. The piston of cylinder A is free to move and that of cylinder B is held fixed. The same amount of heat is given to the gas in each cylinder. If the rise in temperature of the gas in cylinder B is 63 K then the rise in temperature of the gas in A is

(A) 35 K (B) 40 K

(C) 45 K (D) 50 K

17. The temperature at which r.m.s. velocity of hydrogen molecules is 4.5 times that of an oxygen molecule at 47° C is (molecular weight of hydrogen and oxygen are 2 and 32 respectively)

(A) 47° C (B) 132° C

(C) 320° C (D) 405° C

18. The displacement of a particle performing linear S.H.M. is given by $y = A\cos[\pi(t + \phi)]$. If at $t = 0$, the displacement is $y = 2$ cm and velocity is 2π cm/s, the value of amplitude A in cm is

(A) $\frac{1}{\sqrt{2}}$ (B) $\sqrt{2}$

(C) 2 (D) $2\sqrt{2}$

19. A light spring is suspended with mass 'm_1' at its lower end and its upper end is fixed to a rigid support. The mass is pulled down a short distance and then released. The period of oscillation is T second. When a mass 'm_2' is added to 'm_1' and the system is made to oscillate the period is found to be $\frac{3}{2}$ T. The ratio $\left(\frac{m_1}{m_2}\right)$ is

(A) 2 : 3 (B) 3 : 4

(C) 4 : 5 (D) 5 : 6

20. For a particle performing linear S.H.M. of amplitude 'r', the potential energy is 'λ' times its total energy. The displacement of particle is

(A) $r\lambda$ (B) $\frac{r}{\lambda}$

(C) $r\sqrt{\lambda}$ (D) $\frac{r}{\sqrt{\lambda}}$

21. In a sonometer experiment, the fundamental frequency of vibration of wire is 'n_1' when wire is stretched by hanging a metal bob. If the bob is completely immersed in water, the frequency of vibration of wire becomes 'n_2'. The relative density of the metal of the bob is

(A) $\frac{n_1}{n_1 - n_2}$ (B) $\frac{n_1 - n_2}{n_2}$

(C) $\frac{n_1^2}{n_1^2 - n_2^2}$ (D) $\frac{n_2^2}{n_1^2 - n_2^2}$

22. The beats are produced when there is a superposition of two sound waves which will have

(A) same amplitude and same frequency. (B) different amplitude but same frequency.

(C) same amplitude but slightly different frequencies. (D) different amplitude and different frequencies.

23. In a pipe closed at one end, air column is vibrating in the fourth overtone so the vibrating air column has 'x' nodes and 'y' antinodes. The values of x and y are respectively

(A) $4, 4$ (B) $4, 5$

(C) $5, 4$ (D) $5, 5$

24. Two sounding waves send waves at certain temperature in air of wavelength 50 cm and 50.5 cm repectively. The frequency of sources differ by 6 Hz. The velocity of sound in air at same temperature is

(A) $330\ \text{m/s}$ (B) $313\ \text{m/s}$

(C) $303\ \text{m/s}$ (D) $300\ \text{m/s}$

25. Three point charges +q, +2q and +Q are placed at the vertices of an equilateral triangle. If the potential energy of the system of three charges is zero, the value of Q in terms of q is

(A) $-\frac{q}{3}$ (B) $\frac{-2q}{3}$

(C) $\frac{q}{2}$ (D) $\frac{3q}{2}$

26. Two point charges +e and +4e are kept at a distance 'd' units apart. Third point charge +q is placed between the two charges at a distance 'x' units from charge +e so as to be in equilibrium. The value of 'x' is

(A) $\frac{d}{3}$ units (B) $\frac{d}{2}$ units

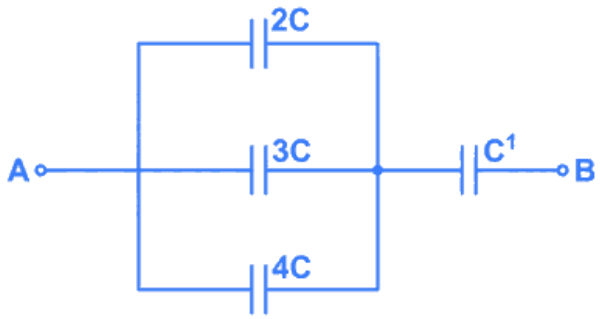
(C) $\frac{2d}{5}$ units (D) $\frac{3d}{4}$ units

27. Two indentical metal plates are given charges q_1 and q_2 $(q_2 < q_1)$ respectively. They are brought close together to form a parallel plate capacitor with capacitance 'C'. The potential difference 'V' between the plates is

(A) $\frac{q_1 - q_2}{C}$ (B) $\frac{q_1 + q_2}{C}$

(C) $\frac{q_1 - q_2}{2C}$ (D) $\frac{q_1 + q_2}{2C}$

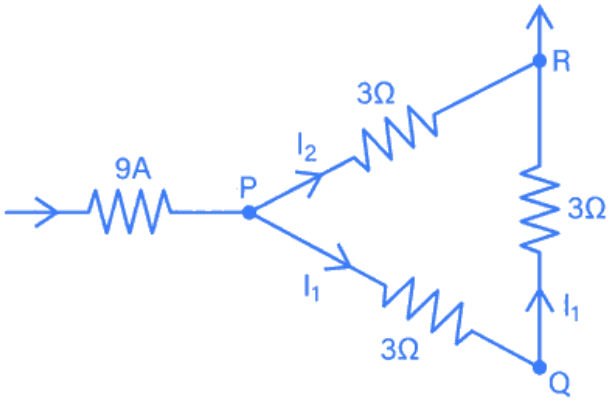
28. If the equivalent capacitance between points A and B of the combination of capacitors shown in figure, is 6C, the capacitor C^1 is



(A) $9C$ (B) $15C$

(C) $18C$ (D) $24C$

29. A current of 9A enters point P of an equilateral triangle PQR having three wires of 3Ω each and leaves by point R. The currents I_1 and I_2 are respectively



(A) $2A, 7A$ (B) $3A, 6A$

(C) $5A, 4A$ (D) $6A, 3A$

30. The current passing through the galvanometer is 4 % of the total current in the curcuit. If the resistance of the galvanometer is 'G', the shunt resistance 'S' connected across the galvanometer is

(A) $25\,G$ (B) $24\,G$

(C) $\frac{G}{24}$ (D) $\frac{G}{25}$

31. Two wires of same length are bent to form the circular loop with two turns and a square loop of one turn. Both of them carry same current. The ratio of magnetic moment of circular loop of two turns to that of square loop is

(A) $\pi : 4$ (B) $4 : \pi$

(C) $\pi : 1$ (D) $2 : \pi$

32. The magnetic field at a distance 'r' from a long straight wire carrying current I is 0.4 tesla. The magnetic field at a distance 2r will be

(A) $0 \cdot 1$ tesla (B) $0 \cdot 2$ tesla

(C) $0 \cdot 8$ tesla (D) $1 \cdot 6$ tesla

33. In the cyclotron, as radius of the circular path of the charged particle increases, (ω = angular velocity, V = linear velocity)

(A) V increases , ω decreases. (B) V increases , ω remains constant.

(C) only ω increases , V remains constant. (D) both ω and V increase.

34. Two planar concentric rings of metal wire having radii 'r_1' and 'r_2' (with $r_1 > r_2$) are placed in air. The current 'I' is flowing through the coil of larger radius. The mutual inductance between the coils is given by (μ_0 = permeability of free space)

(A) $\dfrac{\mu_0 \pi r_1^2}{2 r_2}$ (B) $\dfrac{\mu_0 \pi r_2^2}{2 r_1}$

(C) $\dfrac{\mu_0 \pi (r_1 + r_2)^2}{2 r_1}$ (D) $\dfrac{\mu_0 \pi (r_1 - r_2)^2}{2 r_2}$

35. Two coils having self-inductance $L_1 = 75$ mH and $L_2 = 48$ mH are coupled with each other. If the mutual inductance of the coils is 37.2 mH, then coefficient of coupling will be

(A) 0.58 (B) 0.60

(C) 0.62 (D) 0.64

36. A straight line conductor of length 0.4 m is moved with a speed of 7.0 ms^{-1} perpendicular to magnetic field of intensity 0.8 Wb m^{-2}. The induced e.m.f. across the conductor is

(A) $2 \cdot 24$ V (B) $2 \cdot 80$ V

(C) $3 \cdot 20$ V (D) $5 \cdot 60$ V

37. In LCR circuit, at a particular angular frequency the capacitive reactance and inductive reactance is same. If the angular frequency is doubled, the ratio of the reactance of the capacitor to that of the inductor will be

(A) $\dfrac{1}{4}$ (B) $\dfrac{1}{2}$

(C) 1 (D) 4

38. In an a.c. circuit with pure capacitance 'C' and a.c. source $E = E_0 \sin \omega t$, the equation of instantaneous current is given by

(A) $I = E_0 \, \omega C \cdot \sin(\omega t)$

(B) $I = E_0 \omega C \sin\left(\omega t + \dfrac{\pi}{2}\right)$

(C) $I = \dfrac{E_0}{\omega C} \sin(\omega t)$

(D) $I = \dfrac{E_0}{\omega C} \sin\left(\omega t + \dfrac{\pi}{2}\right)$

39. In a series LCR circuit alternating e.m.f. and current are given by the equations $V = V_0 \sin(\omega t)$ and $I = I_0 \sin\left(\omega t + \dfrac{\pi}{3}\right)$ respectively. The average power dissipated in the circuit over one cycle of a.c. is ($\cos 60^\circ = 0.5$)

(A) zero (B) $\dfrac{V_0 I_0}{2}$

(C) $\dfrac{\sqrt{3}}{2} V_0 I_0$ (D) $\dfrac{V_0 I_0}{4}$

40. A ray of light incident on one face of an equilateral glass prism having refractive index $\sqrt{2}$, produces the emergent ray which just grazes along the adjacent face. The value of angle of incidence is ($\sin 90^\circ = 1$)

$\left(\sin 30^\circ = \dfrac{1}{2}\right) \left(\sin 45^\circ = \dfrac{1}{\sqrt{2}}\right)$

(A) $\sin^{-1}\left(\sqrt{2} \sin 15^\circ\right)$ (B) $\sin^{-1}\left(\dfrac{1}{\sqrt{2}} \sin 15^\circ\right)$

(C) $\sin^{-1}\left(\sqrt{2} \sin 30^\circ\right)$ (D) $\sin^{-1}\left(\dfrac{1}{\sqrt{2}} \sin 45^\circ\right)$

41. An unpolarised light of intensity 64 Wm^{-2} passes through three polarizers successively such that the transmission axis of last polarizer is crossed with the first. The intensity of the emerging light is 6 Wm^{-2}. The angle between the transmission axis of the first two polarizers is

(A) $\dfrac{1}{2} \sin^{-1}\left(\dfrac{\sqrt{3}}{2}\right)$ (B) $\dfrac{1}{2} \cos^{-1}\left(\dfrac{\sqrt{3}}{2}\right)$

(C) $\dfrac{1}{2} \sin^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$ (D) $\dfrac{1}{2} \cos^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$

42. In Young's experiment, the intensity ratio of the maxima and minima in an interference pattern produced by two coherent sources is 36 : 1. The ratio of the amplitudes of the two individual sources will be

(A) 4 : 7 (B) 5 : 7

(C) 7 : 5 (D) 7 : 4

43. For obtaining maximum contrast between the bright and dark fringes in an interference pattern, the intensities of the two light coherent sources should be

(A) large (B) small

(C) equal (D) in the ratio 2 : 1

44. The ratio of the accelerating potentials required to accelerate (i) an α-particle and (ii) a proton to have the same de Broglie wavelength associated with them is
(mass of α - particle $= 6.4 \times 10^{-27}$ kg, mass of proton $= 1.6 \times 10^{-27}$ kg)

(A) 1 : 8 (B) 1 : 4

(C) 8 : 1 (D) 4 : 1

45. In photoelectric effect, keeping the frequency of incident radiation and accelerating potential fixed, if the intensity of incident light is increased,

(A) the photoelectric current increases.

(B) the kinetic energy of emitted photoelectrons increases.

(C) photoelectric current decreases.

(D) kinetic energy of emitted photoelectrons decreases.

46. In Bohr's atomic model, the energy of the electron is 'E' in the second orbit of hydrogen atom. So the energy of the electron in the third orbit of helium atom ($Z = 2$) will be

(A) $\frac{16\,E}{3}$ (B) $\frac{16\,E}{9}$

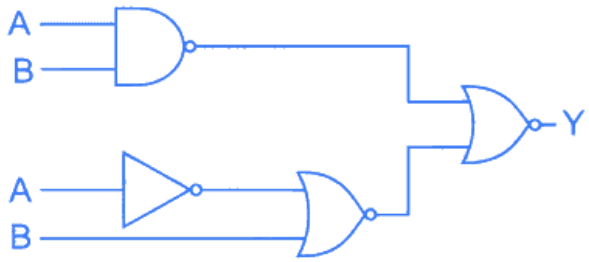
(C) $\frac{4\,E}{3}$ (D) $\frac{4\,E}{9}$

47. The activity of a radioactive sample is measured as N_0 counts per minute at time $t = 0$ and $\frac{N_0}{e}$ counts per minute at time $t = 3$ minute. The time (in minute) in which the activity reduces to half the value, is

(A) $\frac{1}{3}\log_e 2$ (B) $3\log_e 2$

(C) $3\log_{10} 2$ (D) $\frac{3}{\log_e 2}$

48. In the following digital circuit, the output 'Y' will be '1' (one) for inputs 'A' and 'B' having values



(A) $A = 0, B = 0$ (B) $A = 0, B = 1$

(C) $A = 1, B = 0$ (D) $A = 1, B = 1$

49. In common emitter configuration of transistor amplifier, r_i, R_L and β represent the input resistance, load resistance and the a.c. current gain respectively. The voltage gain A_V and power gain A_P are represented in magnitude respectively by

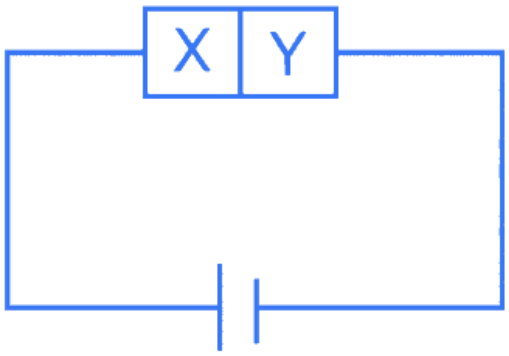
(A) $\beta\left(\frac{r_i}{R_L}\right), \beta^2\left(\frac{r_i}{R_L}\right)$

(B) $\beta\left(\frac{R_L}{r_i}\right), \beta\left(\frac{R_L}{r_i}\right)^2$

(C) $\beta\left(\frac{R_L}{r_i}\right), \beta^2\left(\frac{R_L}{r_i}\right)$

(D) $\beta\left(\frac{r_i}{R_L}\right), \beta\left(\frac{r_i}{R_L}\right)^2$

50. A semiconductor X is made by doping a germanium crystal with indium ($Z = 49$). A second semiconductor Y is made by doping germanium crystal with arsenic ($Z = 33$). Both are joined end to end and connected to a battery as shown. Which of the following statements is correct?



(A) X is p-type, Y is n-type and the junction is forward biased.

(B) X is p-type, Y is n-type and the junction is reverse biased.

(C) X is n-type, Y is p-type and the junction is forward biased.

(D) X is n-type, Y is p-type and the junction is reverse biased.

51. How many moles of potassium chlorate are heated to produce $11 \cdot 2$ L oxygen at STP ?

(A) $\frac{1}{2}$ mole (B) $\frac{1}{3}$ mole
(C) $\frac{1}{4}$ mole (D) $\frac{2}{3}$ mole

52. Find the energy of third stationary orbit of Bohr's model of hydrogen atom if the energy of ground state is $-E$ J

(A) $-\frac{E}{2}$ J (B) $-\frac{E}{4}$ J
(C) $-\frac{E}{9}$ J (D) $-\frac{E}{16}$ J

53. Which of the following statements regarding Pi (π) bond is NOT true ?

(A) It is weaker than sigma bond.
(B) It is formed by lateral overlapping of two half filled P orbitals.
(C) It is formed after the formation of sigma bond.
(D) The presence of Pi (π) bond increases the bond length of covalent bond.

54. Identify the number of lone pair and bond pair electrons present in the valence shell of central atom in BrF_3.

(A) 1 _ Lone pair and 2 _ Bond pair of electrons
(B) 2 _ Lone pair and 2 _ Bond pair of electrons
(C) 2 _ Lone pair and 3 _ Bond pair of electrons
(D) 1 _ Lone pair and 3 _ Bond pair of electrons

55. A gas at 10 °C occupies a volume of 283 mL. if it is heated to 20 °C keeping the pressure constant. What is the new volume of gas ?

(A) 566 mL (B) 450 mL
(C) 350 mL (D) 293 mL

56. Calculate the quantity of heat released from system when 2 moles of and ideal gas compressed isothermally from volume 25 dm^3 to 10 dm^3 at constant external pressure 4 bar.

(A) $5 \cdot 5$ kJ (B) $5 \cdot 0$ kJ
(C) $6 \cdot 5$ kJ (D) $6 \cdot 0$ kJ

57. Calculate the standard enthalpy of combustion of carbon monoxide if
$\Delta_f H^\circ(CO) = -110$ kJ mol^{-1}
$\Delta_f H^\circ(CO_2) = -393$ kJ mol^{-1}

(A) -503 kJ mol^{-1} (B) -110 kJ mol^{-1}
(C) -283 kJ mol^{-1} (D) -383 kJ mol^{-1}

58. Which of the following processes is an endothermic ?

(A) The aqueous NaOH and HCl solutions mixed together.
(B) Formation of ammonia by Haber process.
(C) Ice melts at room temperature.
(D) The freezing of liquid water.

59. The solubility of sapringly soluble salt AB_2 is $18 \cdot 78 \times 10^{-4}$ g/dm^3 What is its solubility product ? (Molar mass of $AB_2 = 187 \cdot 8$ g mol^{-1})

(A) 2×10^{-15} (B) 4×10^{-15}
(C) 6×10^{-15} (D) 8×10^{-15}

60. What is the pH of resulting solution when 20 mL $\frac{M}{10}$ NaOH and 10 mL $\frac{M}{10}$ H_2SO_4 are mixed together ?

(A) 0 (B) 2
(C) 7 (D) 10

61. Which of the following is correct relationship between solubility and solubility product for silver oxalate ?

(A) $S = \sqrt[3]{K_{sp} \times 4}$ (B) $S = \sqrt[3]{\frac{4}{K_{sp}}}$
(C) $S = \sqrt[3]{\frac{K_{sp}}{4}}$ (D) $S = \sqrt[4]{\frac{K_{sp}}{27}}$

62. Identify oxidation number of Sulphur respectively in SO_2 and SO_4^{2-} .

(A) $+6, +4$ (B) $+4, +6$
(C) $+4, +3$ (D) $+3, +4$

63. Identify colour change when NaCl solution is titrated against $AgNO_3$ solution using fluorescein indicator.

(A) Colourless to pale yellow
(B) Reddish pink to pale yellow
(C) Pale yellow to reddish pink
(D) Colourless to reddish pink

64. Which from the following metal chlorides does not contain water of crystallisation ?

(A) LiCl (B) $MgCl_2$

(C) CsCl (D) $BeCl_2$

65. What is the name of second lower homologue of $CH_3(CH_2)_2COOH$?

(A) Methanoic acid (B) Ethanoic acid

(C) Propanoic acid (D) Pentanoic acid

66. How many chiral carbon atoms are present in 2-Iodo-3, 4, 5-trimethylhexane ?

(A) 2 (B) 3

(C) 4 (D) 1

67. Identify the product 'B' in the following reaction

$$\text{Toluene} \xrightarrow{\text{Chromyl chloride/}CS_2} A \xrightarrow{H_3O^+} B$$

(A) Benzal chloride (B) Benzaldehyde

(C) Benzyl alcohol (D) Benzoic acid

68. Identify the 'A' in the following reaction.
$CaC_2 + H_2O \rightarrow A + Ca(OH)_2$

(A) Ethene (B) Ethyne

(C) Propene (D) Propyne

69. Calculate the number of atoms in 1 g metal that forms bcc crystal structure $[\rho \times a^3 = 6 \cdot 6 \times 10^{-22}\ \text{g}]$

(A) $4 \cdot 05 \times 10^{21}$ (B) $5 \cdot 12 \times 10^{21}$

(C) $3 \cdot 03 \times 10^{21}$ (D) $2 \cdot 47 \times 10^{21}$

70. Which of the following dopants is used in germanium to form n-type semiconductor ?

(A) B (B) In

(C) Ga (D) P

71. Calculate the void volume of bcc unit cell if volume of unit cell is $8 \cdot 0 \times 10^{-23}\ \text{cm}^3$

(A) $3 \cdot 08 \times 10^{-23}\ \text{cm}^3$ (B) $4 \cdot 16 \times 10^{-23}\ \text{cm}^3$

(C) $5 \cdot 44 \times 10^{-23}\ \text{cm}^3$ (D) $2 \cdot 56 \times 10^{-23}\ \text{cm}^3$

72. Calculate the molar mass of a nonvolatile solute if 6.4 g of it dissolved in 100 g water produces a relative lowering in vapour pressure of $0 \cdot 016$ at 300 K.

(A) $60\ \text{gmol}^{-1}$ (B) $66\ \text{gmol}^{-1}$

(C) $72\ \text{gmol}^{-1}$ (D) $84\ \text{gmol}^{-1}$

73. Calculate the cryoscopic constant of a solvent if depression in freezing point of $0 \cdot 3$ m solution of nonelectrolyte is $0 \cdot 48$ K

(A) $1 \cdot 1\ \text{K kg mol}^{-1}$ (B) $1 \cdot 6\ \text{K kg mol}^{-1}$

(C) $2 \cdot 2\ \text{K kg mol}^{-1}$ (D) $2 \cdot 6\ \text{K kg mol}^{-1}$

74. Identify the correct statement from following.

(A) The vapour pressure of a solvent increases by dissolving nonvolatile solute into it.

(B) The boiling point of solvent decreases by dissolving a nonvolatile solute into it.

(C) The osmotic pressure of electrolytic solution is greater than nonelectrolytic solution of the same concentration.

(D) The freezing point of solvent is a colligative properly.

75. What is the change in oxidation number of Pb at positive electrode of lead accumulator acting as galvanic cell ?

(A) increases by 1 (B) decreases by 1

(C) increases by 2 (D) decreases by 2

76. The graphical variation of molar conductivity (Λ) against square root of molar concentration ($\sqrt{c}$) of certain electrolyte 'X' is linear with intercept on y axis. Identify X from following.

(A) CH_3COOH (B) NH_4OH

(C) HCOOH (D) CH_3COONa

77. If standard reduction potential (E^0) of $\left(Al^{+3}_{(aq)}|Al_{(s)}\right)$, $\left(Fe^{+2}_{(aq)}|Fe_{(s)}\right)$, $\left(Cu^{+2}_{(aq)}|Cu_{(s)}\right)$ and $\left(Ag^{+1}_{(aq)}|Ag_{(s)}\right)$ are $-1 \cdot 66$ V, $-0 \cdot 44$ V, $+0 \cdot 34$ V and $+0 \cdot 79$ V respectively. Which of the following reaction is non spontaneous ?

(A) $2Ag_{(s)} + Fe^{+2}_{(aq)} \rightarrow 2Ag^{+1}_{(aq)} + Fe_{(s)}$

(B) $2Al_{(s)} + 3Cu^{+2}_{(aq)} \rightarrow 2Al^{+3}_{(aq)} + 3Cu_{(s)}$

(C) $Fe_{(s)} + Cu^{+2}_{(aq)} \rightarrow Fe^{+2}_{(aq)} + Cu_{(s)}$

(D) $2Al_{(s)} + 3Fe^{+2}_{(aq)} \rightarrow 2Al^{+3}_{(aq)} + 3Fe_{(s)}$

78. For the reaction $2NOBr_{(g)} \rightarrow 2NO_{(g)} + Br_{2(g)}$ rate law is $r = k[NOBr]^2$, if rate constant is $1 \cdot 62$ mol dm^{-3} s^{-1} and concentration of NOBr is 2×10^{-3} mol L^{-1}. What is the rate of reaction ?

(A) $4 \cdot 05 \times 10^{-5}$ mol dm^{-3}s^{-1}

(B) $6 \cdot 48 \times 10^{-6}$ mol dm^{-3}s^{-1}

(C) $2 \cdot 12 \times 10^{-5}$ mol dm^{-3}s^{-1}

(D) $8 \cdot 63 \times 10^{-6}$ mol dm^{-3}s^{-1}

79. In first order reaction 20 millimole of reactant is reduced to 10 millimole in $1 \cdot 151$ minute. Find rate constant.

(A) $0 \cdot 6023$ minute^{-1} (B) $6 \cdot 120$ minute^{-1}

(C) $0 \cdot 3010$ minute^{-1} (D) $2 \cdot 010$ minute^{-1}

80. Which of the following is an example of second order reaction ?

(A) $2\,H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$

(B) $CH_3CHO_{(g)} \rightarrow CH_{4(g)} + CO_{(g)}$

(C) $2\,NO_{2(g)} + F_{2(g)} \rightarrow 2NO_2F_{(g)}$

(D) $2\,NO_{(g)} + 2H_{2(g)} \rightarrow N_{2(g)} + 2H_2O_{(l)}$

81. Which of the following noble gases exhibits higher oxidation states ?

(A) Ne (B) Ar

(C) Kr (D) Xe

82. Which from following pair of elements in their respective oxidation states develops same value of calculated spin only magnetic moment ?

(A) Ti^{3+} and Zn^{2+} (B) Cr^{2+} and Fe^{2+}

(C) Cr^{3+} and Ti^{3+} (D) Zn^{2+} and Cu^{2+}

83. What is the atomic number of first post actinoid element ?

(A) 101 (B) 108

(C) 104 (D) 110

84. What is the EAN of metal ion in $[Cu(NH_3)_4]^{2+}$?

(A) 35 (B) 27

(C) 29 (D) 36

85. Identify a ligand with lowest field strength among the following.

(A) Br^- (B) OH^-

(C) en (D) H_2O

86. Identify the product obtained when 2-chlorobutane is heated with aqueous solution of potassium hydroxide.

(A) But - 1 - ene (B) But - 2 - ene

(C) Butan - 1 - ol (D) Butan - 2 - ol

87. Identify the product obtained when 2-Chloro - 2 - methylbutane is reacted with sodium metal in presence of dry ether?

(A) $2,2,3,3-$ tetramethyloctane (B) $3,3,4,4-$ tetramethyloctane

(C) $2,2,3,3-$ tetramethylhexane (D) $3,3,4,4-$ tetramethylhexane

88. Which among the following has highest melting point ?

(A) Phenol (B) o-Nitrophenol

(C) p-Nitrophenol (D) p-Cresol

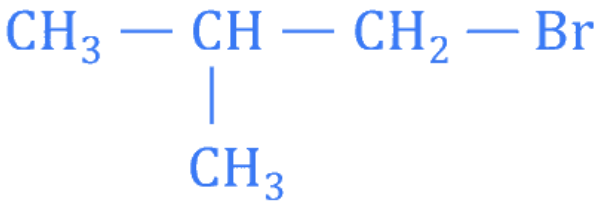
89. Which of the following alcohols on addition of Lucas reagent reacts fast and turns the reagent turbid instantly.

(A) n - Butyl alcohol (B) sec - Butyl alcohol

(C) iso - Butyl alcohol (D) tert - Butyl alcohol

90. Which among the following does NOT undergo Williamson's synthesis?

(A) C_2H_5Br

(B) 

(C) $C_6H_5 - Br$

(D) $C_6H_5 - CH_2 - Br$

91. Identify the product 'Y' in the following reaction

$$\text{Benzonitrile} \xrightarrow{C_6H_5MgBr/\text{dry ether}} X \xrightarrow{H_3O^+} Y + MgBr(OH) + NH_3$$

(A) Benzophenone (B) Benzylalcohol

(C) Benzaldehyde (D) Benzoic acid

92. Identify the main product of following reaction



(A) R – COOH
(B) RCOR′
(C) RCHO
(D) R CH_2 OH

93. Which from following amines when heated with ethanolic KOH and chloroform forms aryl isocyanide ?

(A) Benzenamine
(B) N -methylaniline
(C) N, N - Dimethylaniline
(D) Ethylethanamine

94. Identify false statement from following regarding preparation of amines by Hofmann degradation method.

(A) It is useful to convert amides to primary amines.
(B) In this -CO-group is reduced to $-CH_2-$ group.
(C) Molar mass of the amine obtained is always less than the amide.
(D) The reagent used is Br_2 and $KOH_{(aq)}$.

95. Identify medicinaly important compound extracted from citrus fruits?

(A) Antimicrobials
(B) Vit. C
(C) Analgesics
(D) Antiseptics

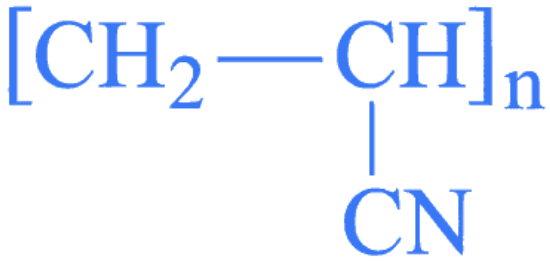
96. Which from following is a protein of muscles ?

(A) Keratin
(B) Myosin
(C) Legumelin
(D) Insulin

97. Which from following enzymes cleaves glycosidic bond in sucrose?

(A) Amylose
(B) Trypsin
(C) Invertase
(D) Maltase

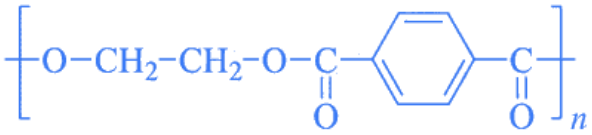
98. Which from following polymer is obtained by addition polymerization?



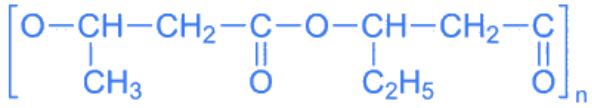
(A)

(B) $[NH-(CH_2)_5-CO]_n$

(C)



(D)

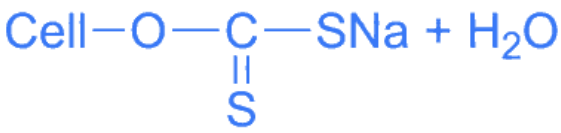


99. Identify the polymer used to prepare disposable cups and plates.

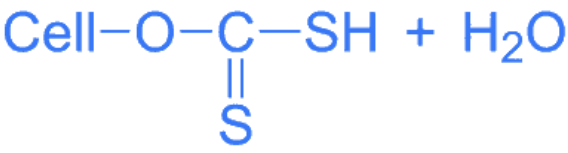
(A) Polypropylene
(B) Polystyrene
(C) Polyethylene terephthalate
(D) High density polyethylene

100. Which from following is a first stage in preparation of viscose rayon ?

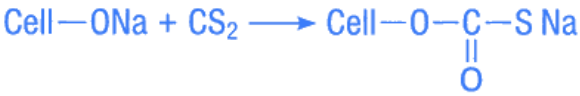
(A) Cell – OH + NaOH



(B)



(C)



(D)

collegedunia

101. If $\tan A$ and $\tan B$ are the roots of the equation $5x^2 - 4x + 1 = 0$, then the value of $A + B$ is...

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

102. $\frac{(\cos 2\theta + i \sin 2\theta)^7}{(\cos 4\theta + i \sin 4\theta)^3} =$

(A) $\cos 2\theta + i \sin 2\theta$ (B) $(\cos 2\theta + i \sin 2\theta)^4$
(C) $\cos 4\theta + i \sin 4\theta$ (D) $(\cos 4\theta + i \sin 4\theta)^{-2}$

103. In a test, there are 5 questions of the 'true or false' type. No student has got all the answers correct and the sequence of answers for every student is unique. The maximum number of students who could have appeared for the test is....

(A) 5 (B) 31
(C) 15 (D) 89

104. The line $y = 2x + c$ passes through a point that is equidistant from both the axes and lies in the first quadrant $(x > 0, y > 0)$. Then the value of c is...

(A) 0 (B) 1
(C) 2 (D) -2

105. If the equation $ax^2 + 4xy - 2y^2 + 4x + 8y + 1 = 0$ represents a pair of straight lines, then the coordinates of their point of intersection are.....

(A) $\left(\frac{1}{2}, -\frac{3}{2}\right)$ (B) $\left(-\frac{3}{2}, \frac{1}{2}\right)$
(C) $\left(\frac{1}{2}, \frac{3}{2}\right)$ (D) $\left(-\frac{1}{2}, \frac{3}{2}\right)$

106. If the circles $x^2 + y^2 = 16$ and $x^2 + y^2 + 2ax + 4y + 4 = 0$ touch each other internally then $a =$

(A) $\frac{2}{3}$ (B) $\frac{1}{56}$
(C) $\frac{-2}{3}$ (D) $\frac{3}{2}$

107. If the line $3x + 4y + k = 0$ touches the ellipse $9x^2 + 16y^2 = 144$, then the value of k is.

(A) $\pm 3\sqrt{2}$ (B) $\pm 4\sqrt{2}$
(C) $\mp 8\sqrt{2}$ (D) $\mp 12\sqrt{2}$

108. Which of the following statements is/are False?
$S_1 : \exists\, n \in N$, such that $n^2 + n + 2$ is divisible by 4.
$S_2 : \exists\, x \in N$, such that $x - 17 < 20$.
$S_3 : \forall\, n \in N, \quad x^2 + 3x - 10 = 0$.
$S_4 : \forall\, n \in N, \quad n^2 \geq 1$.

(A) S_1 and S_2. (B) S_1 and S_3.
(C) Only S_3. (D) S_2 and S_4.

109. The negation of $(p \wedge q) \rightarrow ((p \vee r) \rightarrow \sim q)$ is equivalent to ...

(A) $p \wedge q$ (B) $p \wedge \sim r$
(C) $q \wedge (p \vee r)$ (D) $\sim p \wedge \sim q$

110. The statement pattern $[(p \wedge q) \rightarrow (\sim p \vee r)] \vee [(\sim p \vee r) \rightarrow (p \wedge q)]$ is

(A) a contradiction (B) a tautology
(C) equivalent to $(p \wedge q) \vee r$. (D) equivalent to $(p \vee q)$.

111. In $\triangle ABC$, with usual notation, if cot A, cot B, cot C are in arithmetic progression, then

(A) sin A, sin B, sin C are in arithmetic progression. (B) a^2, b^2, c^2 are in arithmetic progression.
(C) cos A, cos B, cos C are in arithmetic progression. (D) a, b, c are in arithmetic progression.

112. If $A = \begin{bmatrix} 1 & -\tan\frac{\theta}{2} \\ \tan\frac{\theta}{2} & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ then $A^{-1}B$ is equal to

(A) $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ (B) $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
(C) $\begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$ (D) $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$

113. If $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & -5 & 0 \\ 0 & 0 & 7 \end{bmatrix}$; $B = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ then, $(2A + 3B)^{-1} =$ _____

(A) $\begin{bmatrix} \frac{1}{3} & 0 & 0 \\ 0 & -\frac{1}{4} & 0 \\ 0 & 0 & \frac{1}{26} \end{bmatrix}$ (B) $\begin{bmatrix} \frac{1}{3} & 0 & 0 \\ 0 & \frac{1}{4} & 0 \\ 0 & 0 & \frac{1}{26} \end{bmatrix}$

(C) $\begin{bmatrix} \frac{1}{3} & 0 & 0 \\ 0 & \frac{1}{4} & 0 \\ 0 & 0 & -\frac{1}{26} \end{bmatrix}$ (D) $\begin{bmatrix} -\frac{1}{3} & 0 & 0 \\ 0 & \frac{1}{4} & 0 \\ 0 & 0 & -\frac{1}{26} \end{bmatrix}$

114. If $\sin^{-1}(x-2) + \cos^{-1}(x) + \tan^{-1}(x+2) + \cot^{-1}(x+4) = \sec^{-1}(\sqrt{k}) - \frac{\pi}{2}$, then $\cos(2\operatorname{cosec}^{-1}\sqrt{k-1}) = \ldots$

(A) $\frac{15}{16}$ (B) $\frac{31}{32}$

(C) $\frac{63}{64}$ (D) $\frac{7}{8}$

115. $\sin\left(3\sin^{-1}\left(\frac{1}{5}\right)\right) =$

(A) $\frac{74}{125}$ (B) $\frac{71}{125}$

(C) $\frac{3}{5}$ (D) $\frac{1}{2}$

116. $\cos^{-1}\left(\cos\frac{4\pi}{3}\right) + \sin^{-1}\left(\sin\frac{4\pi}{3}\right) = \ldots$

(A) $\frac{4\pi}{3}$ (B) $\frac{8\pi}{3}$

(C) $\frac{\pi}{3}$ (D) $\frac{3\pi}{2}$

117. If $f(x) = \frac{1-x}{1+x}$, then $f(f(\cos x)) =$

(A) $\cos x$ (B) x

(C) $\tan\frac{x}{2}$ (D) $\cos\frac{x}{2}$

118. If the function $f(x) = \frac{4\sqrt{2}(\sin 3x + \sin x)}{2\sin 2x \sin\frac{3x}{2} + \cos\frac{5x}{2} - \cos\frac{3x}{2}}$ for $x \neq \frac{\pi}{2}$ is continuous at $x = \frac{\pi}{2}$, then the value of $f\left(\frac{\pi}{2}\right)$ is equal to

(A) $(2)^2$ (B) $(3)^2$

(C) $4\sqrt{2}$ (D) $2\sqrt{2}$

119. If $f(x) = \cos x \cos 2x \cos 4x \cos 8x \cos 16x$, then $f'\left(\frac{\pi}{4}\right) =$

(A) $\operatorname{cosec}\left(\frac{\pi}{4}\right)$ (B) $\cos\left(\frac{\pi}{4}\right)$

(C) $\tan\left(\frac{\pi}{4}\right)$ (D) 0

120. If $y = \frac{1}{3x+5}$, then the value of $\frac{d^9y}{dx^9}$ is..

(A) $\frac{9! \times 3^9}{(3x+5)^9}$ (B) $\frac{(-1)^8 \times 9! \times 3^9}{(3x+5)^9}$

(C) $\frac{(-1)^9 \times 9! \times 3^9}{(3x+5)^{10}}$ (D) $\frac{(-1)^8 \times 8! \times 3^9}{(3x+5)^{10}}$

121. The derivative of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ with respect to $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ at $x = \frac{1}{2}$ is

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{2}$

(C) $\frac{\sqrt{3}}{5}$ (D) $\frac{1}{4}$

122. If $y = \sqrt{\cos x^2 + \sqrt{\cos x^2 + \sqrt{\cos x^2 + \ldots \infty}}}$ and $\frac{dy}{dx} = \frac{f(x)}{2y-1}$ then, $\int f(x)\,dx = \ldots$

(A) $\sin x^2 + c$ (B) $-\sin x^2 + c$

(C) $\cos x^2 + c$ (D) $-\cos x^2 + c$

123. If $f(x) = \cot^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$ and $g(x) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\lim_{x\to a}\frac{f(x)-f(a)}{g(x)-g(a)}$, $\left(0 < a < \frac{1}{2}\right)$ is

(A) $\frac{3}{2}$ (B) $\frac{1}{2}$

(C) $-\frac{3}{2}$ (D) $-\frac{1}{2}$

124. The coordinates of the points on the curve $4y = x^2$ that are nearest to the point $(0, 5)$ are ...

(A) $(-2\sqrt{3}, 3)$ (B) $(2\sqrt{3}, -3)$

(C) $(3, 2\sqrt{3})$ (D) $(2\sqrt{3}, 2)$

125. The equation of the tangent to the curve $y = \sqrt{9 - 3x^2}$ at the point where the ordinate and abscissa equal is...

(A) $x - 3y + 3 = 0$ (B) $3x - y - 3 = 0$

(C) $x + 3y - 6 = 0$ (D) $3x + y - 6 = 0$

126. If the line $y = 4x - 5$ is tangent to the curve $y^2 = ax^3 + b$ at the point $(2, 3)$, then the value of $7a - 2b$ is...

(A) 0 (B) 7

(C) 14 (D) 28

127. If

$$\int \frac{\sin x}{\sin 4x}\,dx = \alpha \log\left|\frac{1+\sin x}{1-\sin x}\right| + \beta$$

$$\log\left|\frac{1+\sqrt{2}\,\sin x}{1-\sqrt{2}\,\sin x}\right| + c$$

, then the value of $32(\alpha + \beta^2) =$

(A) 5 (B) -1

(C) 9 (D) -3

128. If $\int f(x)\,dx = g(x)$ then $\int x^3 f(x^2)\,dx$ is equal to

(A) $\frac{1}{2}\left[x^2 g(x^2) - \int g(x^2)\,d(x^2)\right]$

(B) $\frac{1}{2}\left[x^2[f(x)]^2 - \int [g(x)]^2\,dx\right]$

(C) $\frac{1}{2}\left[x^2 g(x) - \int g(x)\,d(x)\right]$

(D) $\frac{1}{2}\left[x^2 g(x^2) + \int g(x^2)\,d(x^2)\right]$

129. If

$$\int \frac{3x+7}{x^2-3x+2}\,dx = m\log\left(\frac{x-2}{x-1}\right) + n$$

$$\log(x-2) + c$$

, where $m, n \in R$ and c is an integration constant, then $m + n =$

(A) 6 (B) 7

(C) 3 (D) 13

130. If $f(x) = \frac{\sin^{-1} x}{\sqrt{1-x^2}}$ and $g(x) = e^{\sin^{-1} x}$, then the value of $\int f(x)g(x)\,dx = \ldots$

(A) $e^{\sin^{-1} x}(\sin^{-1} x - 1) + c$

(B) $e^{\sin^{-1} x}(1 - \sin^{-1} x) + c$

(C) $e^{\sin^{-1} x}(\sin^{-1} x + 1) + c$

(D) $e^{\sin^{-1} x}(-\sin^{-1} x - 1) + c$

131. The function $f(x) = \int_0^x \frac{dt}{1+\cos t}$ satisfies which of the following differential equations?

(A) $2\frac{df}{dx} = 1 + [f(x)]^2$ (B) $\frac{df}{dx} = 1 + [f(x)]^2$

(C) $2\frac{df}{dx} = 1 - [f(x)]^2$ (D) $\frac{df}{dx} = 1 - [f(x)]^2$

132. If $\int_a^b (x^2 - x)\,dx = 18, \int_a^b x^3\,dx = 0$, then $a + b$ is equal to

(A) 3 (B) 6

(C) 0 (D) 9

133. The value of the definite integral $\int_0^{\pi} \frac{1}{5 + 4\cos x}\,dx$ is equal to ...

(A) π (B) $\frac{\pi}{2}$

(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

134. Let $f(x) = x - [x]$ for every real number x, where $[x]$ is integral part of x. then $\int_{-1}^{1} f(x)\,dx$ is

(A) 1 (B) 2

(C) 1/2 (D) 0

135. The area of the region bounded by curves $y = \sin x, y = \cos x$ and the lines $x = 0, x = \frac{\pi}{4}$ is

(A) $2\sqrt{2} - 1$ (B) $\sqrt{2} - 1$

(C) $2 - \sqrt{2}$ (D) $\frac{1-\sqrt{2}}{2}$

136. The general solution of the differential equation $\sec y + (x - e^{\sin y})\frac{dy}{dx} = 0$ is...

(A) $e^{\sin y} = x + c$ (B) $xe^{\sin y} = \frac{e^{2\sin y}}{2} + c$

(C) $2x\cos y = e^x + c$ (D) $\sin y - e^{\sin y} = c$

137. The general solution of the differential equations $\frac{dy}{dx} = (9x + y + 5)^2$ is...

(A) $\tan^{-1}\left(\frac{9x+y+5}{2}\right) = -2x + c$

(B) $\tan^{-1}\left(\frac{9x+y+5}{2}\right) = 2x + c$

(C) $\tan^{-1}\left(\frac{9x+y+5}{3}\right) = -3x + c$

(D) $\tan^{-1}\left(\frac{9x+y+5}{3}\right) = 3x + c$

138. Let $\vec{a}$ and $\vec{b}$ be linearly independent vectors such that
$|\vec{a}| = \sqrt{3}, |\vec{b}| = 3$ and $|\vec{a} - \vec{b}| = 4$.
If $\vec{a} \times (2\hat{i} + 2\hat{j} - \hat{k}) = (2\hat{i} + 2\hat{j} - \hat{k}) \times \vec{b}$ and $|(\vec{a} + \vec{b}) \cdot (3\hat{i} + 4\hat{j} + 2\hat{k})| = \sqrt{\lambda}$, then $\lambda = \ldots$

(A) 32 (B) 64

(C) 256 (D) 128

139. The value of b such that the scalar product of the vector $\hat{i}+\hat{j}+\hat{k}$ with the unit vector parallel to the sum of the vectors $2\hat{i}+4\hat{j}-5\hat{k}$ and $b\hat{i}+2\hat{j}+3\hat{k}$ is one, is...

(A) -2 (B) -1

(C) 0 (D) 1

140. If $|\vec{a}\cdot\vec{b}|=|\vec{a}\times\vec{b}|$, $\vec{a}\cdot\vec{b}<0$ and θ is the angle between $\vec{a}$ and $\vec{b}$, then the value of $\sin\theta+\tan\theta$ is...

(A) $\frac{\sqrt{2}-2}{2}$ (B) $\frac{\sqrt{2}+2}{2}$

(C) $\frac{1+\sqrt{2}}{2}$ (D) $\frac{2-\sqrt{2}}{2}$

141. Let $\vec{a}=\lambda\hat{i}+\hat{j}+\hat{k}, \vec{b}=2\hat{i}+4\hat{j}+4\hat{k}, \vec{c}=\hat{i}+\mu\hat{j}+\hat{k}$ If $\vec{a}$ is parallel to $\vec{b}$ and $\vec{b}$ is perpendicular to $\vec{c}$ then $\lambda-\mu=\ldots$

(A) -2 (B) -1

(C) 2 (D) 1

142. The equation of the perpendicular line from the point $(2,-3,1)$ to the line $\frac{x+1}{2}=\frac{y-3}{3}=\frac{z+2}{-1}$ is

(A) $\frac{x-2}{24}=\frac{y+3}{13}=\frac{z-1}{9}$

(B) $\frac{x-2}{24}=\frac{y-3}{-13}=\frac{z-1}{9}$

(C) $\frac{x+2}{-24}=\frac{y+3}{13}=\frac{z+1}{-9}$

(D) $\frac{x-2}{-24}=\frac{y+3}{13}=\frac{z-1}{-9}$

143. The angle between the line $x-1=2-y=\frac{2z-6}{4}$ and the plane $\vec{r}\cdot(2\hat{i}+\hat{j}+\hat{k})=10$ is

(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{12}$

144. The sum of the coordinates of one of the points on the line $\frac{x-2}{1}=\frac{y+3}{-2}=\frac{z+5}{2}$ which is at a distance of 3 units from the point $(2,-3,-5)$ is ...

(A) 7 (B) -7

(C) 11 (D) -11

145. If A and B are the feet of the perpendiculars drawn from $(1,2,3)$ to planes YZ and ZX, then the equation of the plane passing through the points A, B and the origin is

(A) $6x+3y+2z=0$ (B) $6x-3y-2z=0$

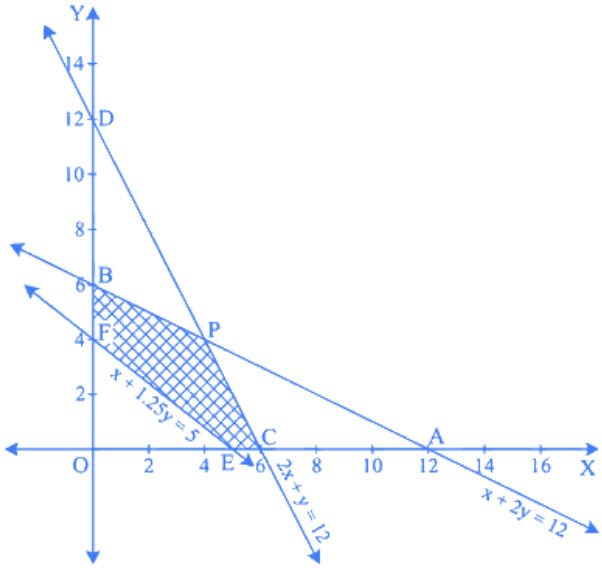
(C) $6x+3y-2z=0$ (D) $3x+6y+2z=0$

146. If the distance of point $B(2,1,-3)$ from the line passing through the point $A(4,-2,2)$, and parallel to the vector $\vec{c}=-4\hat{i}-6\hat{j}-2\hat{k}$ is x, then $x^4+x^2+541=$

(A) 2026 (B) 2025

(C) 2024 (D) 2023

147. In the following figure, the shaded region represents the system of constraints:



(A) $2x+y\le 12, x+2y\le 12, x+1.25y\ge 5, x\le 0, y\ge 0$

(B) $2x+y\le 12, x+2y\le 12, x+1.25y\ge 5, x\ge 0, y\le 0$

(C) $2x+y\le 12, x+2y\le 12, x+1.25y\le 5, x\ge 0, y\ge 0$

(D) $2x+y\le 12, x+2y\le 12, x+1.25y\ge 5, x\ge 0, y\ge 0$

148. On average, one out of 10 persons is busy. If six persons are selected at random, then the probability that at least 5 of them will be busy is...

(A) $\frac{25}{(10)^6}$ (B) $\frac{35}{(10)^6}$

(C) $\frac{45}{(10)^6}$ (D) $\frac{55}{(10)^6}$

149. If a discrete random variable X takes the values $1, 2, 3, 4$ such that $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$, then $P(X = 4) = \ldots$

(A) $\frac{15}{61}$ (B) $\frac{30}{61}$

(C) $\frac{10}{61}$ (D) $\frac{6}{61}$

150. Three numbers are chosen from 1 to 30. The probability that minimum is 10 and maximum is 26 is _____

(A) $\frac{1}{406}$ (B) $\frac{3}{812}$

(C) $\frac{5}{812}$ (D) $\frac{7}{812}$

- End of Question Paper -