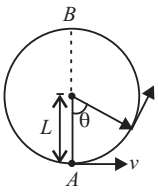
VERY SIMILAR
PRACTICE TEST 3

Time : 3 hrs. Max. Marks : 300

PHYSICS

1. A bob of mass M is suspended by a massless string of length L. The horizontal velocity v at position A is just sufficient to make it reach the point B. The angle θ at which the speed of the bob is half of that at A, satisfies



(a) $\theta = \frac{\pi}{4}$ (b) $\frac{\pi}{4} < \theta < \frac{\pi}{2}$

(c) $\frac{\pi}{2} < \theta < \frac{3\pi}{4}$ (d) $\frac{3\pi}{4} < \theta < \pi$

2. A diatomic molecule is made of two masses m_1 and m_2 which are separated by a distance r. If we calculate its rotational energy by applying Bohr's rule of angular momentum quantization, its energy will be given by (n is an integer)

(a) $\frac{n^2\hbar^2}{2(m_1+m_2)r^2}$ (b) $\frac{2n^2\hbar^2}{(m_1+m_2)r^2}$

(c) $\frac{(m_1+m_2)n^2\hbar^2}{2m_1m_2r^2}$ (d) $\frac{(m_1+m_2)^2n^2\hbar^2}{2m_1^2m_2^2r^2}$

3. The concentration of hole-electron pairs in pure Silicon at $T = 300$ K is 7×10^{15} m^{-3}. Antimony is doped into Silicon in a proportion of 1 atom in 10^7 Si atoms. Assuming that half of the impurity atoms contribute electron in the conduction band, calculate the factor by which the number of charge carriers increases due to doping of 5×10^{28} m^{-3} of Si atoms.

(a) 1.8×10^5 (b) 5.8×10^5

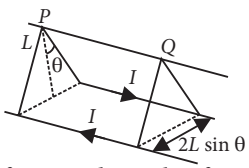
(c) 6.8×10^5 (d) 8.8×10^5

4. A uniform rod of length L and mass M is held vertical, with its bottom end pivoted to the floor. The rod falls under gravity, freely turning about the pivot. If acceleration due to gravity is g, what is the instantaneous angular speed of the rod when it makes an angle 60° with the vertical?

(a) $\left(\frac{g}{L}\right)^{1/2}$ (b) $\left(\frac{3g}{4L}\right)^{1/2}$

(c) $\left(\frac{3\sqrt{3}g}{2L}\right)^{1/2}$ (d) $\left(\frac{3g}{2L}\right)^{1/2}$

5. Two long parallel wires carry currents of equal magnitude but in opposite directions. These wires are suspended from rod PQ by four chords of same length L as shown in the figure. The mass per unit length of the wire is λ. Determine the value of θ assuming it to be small.



(a) $I\sqrt{\frac{\mu_0}{4\pi\lambda gL}}$ (b) $I\sqrt{\frac{4\pi\lambda gL}{\mu_0}}$

(c) $I\sqrt{\frac{\mu_0}{2\pi\lambda g}}$ (d) $2\pi\lambda\sqrt{\frac{\mu_0}{g}}I$

6. A circular coil of radius 8.0 cm and of 20 turns is rotated about its vertical diameter with an angular speed of 50 rad s^{-1} in a uniform horizontal magnetic field of magnitude 3.0×10^{-2} T. If the coil forms a closed loop of resistance 10 Ω, calculate the average power loss due to Joule heating.

(a) 9 mW (b) 18 mW

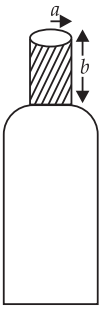
(c) 27 mW (d) 36 mW

7. A train moves from rest with acceleration α and in time t_1 covers a distance x. It then decelerates to rest at constant retardation β for distance y in time t_2. Then

(a) $\frac{x}{y}=\frac{\beta}{\alpha}$ (b) $\frac{\beta}{\alpha}=\frac{t_2 y}{t_1 x}$

(c) $x = y$ (d) $\frac{x}{y}=\frac{\beta t_1}{\alpha t_2}$

8. A bottle has an opening of radius a and length b. A cork of length b and radius $(a + \Delta a)$ where $(\Delta a << a)$ is compressed to fit into the opening completely (see figure). If the bulk modulus of cork is B and frictional coefficient between the bottle and cork is μ then the force needed to push the cork into the bottle is



(a) $(\pi\mu Bb)a$ (b) $(2\pi\mu Bb)\Delta a$

(c) $(\pi\mu Bb)\Delta a$ (d) $(4\pi\mu Bb)\Delta a$

9. A particle is projected from the ground with an initial speed of v at angle θ with horizontal. The average velocity of the particle between its point of projection and the highest point of trajectory is

(a) $\frac{v}{2}\sqrt{1+2\cos^2\theta}$ (b) $\frac{v}{2}\sqrt{1+\cos^2\theta}$

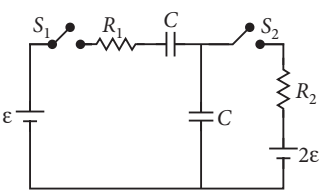
(c) $\frac{v}{2}\sqrt{1+3\cos^2\theta}$ (d) $v\cos\theta$

10. A direct current of magnitude a is superimposed on an alternating current $b \sin \omega t$. Find the resulting effective current in the circuit.

(a) $\sqrt{\left[a^2+\frac{b^2}{2}\right]}$ (b) $\sqrt{\left[a^2+\frac{b^2}{4}\right]}$

(c) $\sqrt{\left[a+\frac{b}{2}\right]}$ (d) $\sqrt{\left[a+\frac{b}{4}\right]}$

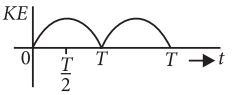
11. In the circuit shown, switch S_2 is closed first and is kept closed for a long time. Now S_1 is closed. Just after that instant the current through S_1 is

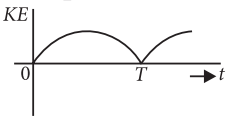


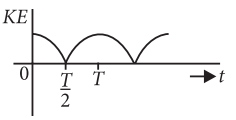
(a) $\frac{\varepsilon}{R_1}$ towards right (b) $\frac{\varepsilon}{R_1}$ towards left

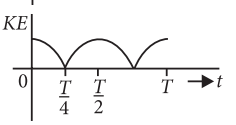
(c) zero (d) $\frac{2\varepsilon}{R_1}$ towards left

12. A particle is executing simple harmonic motion with a time period T. At time $t = 0$, it is at its position of equilibrium. The kinetic energy-time graph of the particle will look like

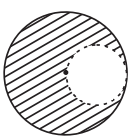
(a) 

(b) 

(c) 

(d) 

13. From a solid sphere of mass M and radius R, a spherical portion of radius $\frac{R}{2}$ is removed, as shown in the figure. Taking gravitational potential $V = 0$ at $r = \infty$, the potential at the centre of the cavity thus formed is (G = gravitational constant)



(a) $\frac{-2GM}{3R}$ (b) $\frac{-2GM}{R}$

(c) $\frac{-GM}{2R}$ (d) $\frac{-GM}{R}$

14. A monochromatic beam of light has a frequency $\upsilon=\frac{3}{2\pi}\times10^{12}$ Hz and is propagating along the direction $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$. It is polarized along the $\hat{k}$ direction. The acceptable form for the magnetic field is

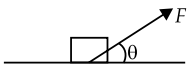
(a) $\frac{E_0}{C}\frac{(\hat{i}+\hat{j}+\hat{k})}{\sqrt{3}}\cos\left[10^4\frac{(\hat{i}+\hat{j})}{\sqrt{2}}\cdot\vec{r}+(3\times10^{12})t\right]$

(b) $\frac{E_0}{C}\frac{(\hat{i}-\hat{j})}{\sqrt{2}}\cos\left[10^4\frac{(\hat{i}+\hat{j})}{\sqrt{2}}\cdot\vec{r}-(3\times10^{12})t\right]$

(c) $\frac{E_0}{C}\frac{(\hat{i}-\hat{j})}{\sqrt{2}}\cos\left[10^4\frac{(\hat{i}-\hat{j})}{\sqrt{2}}\cdot\vec{r}-(3\times10^{12})t\right]$

(d) $\frac{E_0}{C}\hat{k}\cos\left[10^4\frac{(\hat{i}+\hat{j})}{\sqrt{2}}\cdot\vec{r}+(3\times10^{12})t\right]$

15. A body of mass m rests on a horizontal floor with which it has a coefficient of static friction μ. It is desired to make the body move by applying a minimum possible force $\vec{F}$ as shown in the diagram. The values of θ and F_{min} shall be respectively equal to



(a) $\tan^{-1}\mu, \dfrac{\mu mg}{\sqrt{(1+\mu^2)}}$

(b) $\tan^{-1}\mu, \dfrac{mg}{\sqrt{(1+\mu^2)}}$

(c) $\tan^{-1}\mu, \dfrac{\mu mg}{\sqrt{(1-\mu^2)}}$

(d) $\tan^{-1}\mu, \dfrac{mg}{\sqrt{(1-\mu^2)}}$

16. If the maximum amplitude of an amplitude modulated wave is 25 V and the minimum amplitude is 5 V, the modulation index is

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

17. An electron of mass m with an initial velocity $\vec{v} = v_0\hat{i}$ $(v_0 > 0)$ enters an electric field $\vec{E} = -\vec{E}_0\hat{i}$ (E_0 = constant > 0) at t = 0. If λ_0 is its de-Broglie wavelength initially, then its de- Broglie wavelength at time t is

(a) $\dfrac{\lambda_0}{\left(1+\dfrac{eE_0}{mv_0}t\right)}$ (b) $\lambda_0\left(1+\dfrac{eE_0}{mv_0}t\right)$

(c) $\lambda_0 t$ (d) λ_0

18. Consider an ideal gas confined in an isolated closed chamber. As the gas undergoes an adiabatic expansion, the average time of collision between molecules increases as V^q, where V is the volume of the gas. The value of q is $\left(\gamma = \dfrac{C_P}{C_V}\right)$

(a) $\dfrac{\gamma+1}{2}$ (b) $\dfrac{\gamma-1}{2}$

(c) $\dfrac{3\gamma+5}{6}$ (d) $\dfrac{3\gamma-5}{6}$

19. Two identical thin rings, each of radius a are placed coaxially at a distance a apart. Let charges Q_1 and Q_2 be placed uniformly on the two rings. The work done in moving a charge q from the centre of one ring to that of the other is

(a) zero (b) $\dfrac{q\sqrt{2}}{4\pi\varepsilon_0 a}(Q_1 - Q_2)$

(c) $\dfrac{q(\sqrt{2}-1)}{4\pi\varepsilon_0 a\sqrt{2}}(Q_1 - Q_2)$

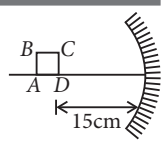
(d) $\dfrac{q(\sqrt{2}-1)}{4\pi\varepsilon_0 a}(Q_1 - Q_2)$

20. A cylindrical tube open at both the ends has a fundamental frequency of 390 Hz in air. If $1/4^{th}$ of the tube is immersed vertically in water the fundamental frequency of air column is

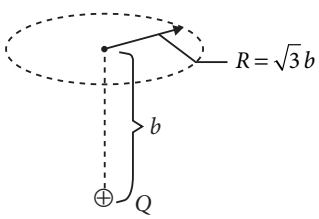
(a) 260 Hz (b) 130 Hz
(c) 390 Hz (d) 520 Hz.

NUMERICAL VALUE TYPE

21. A square $ABCD$ of side 1 mm is kept at distance 15 cm infront of the concave mirror as shown in the figure. If focal length of the mirror is 10 cm, then the length of the perimeter of its image will be _____ mm.



22. In the given situation, radius of disc is $\sqrt{3}b$ and distance of point charge from the disc is b.



The ratio of electric flux not going through the disc and electric flux of charge through the disc is x : 1. The value of x is _____.

23. In Young's double slit experiment, slits are separated by 2 mm and the screen is placed at a distance of 1.2 m from the slits. Light consisting of two wavelengths 6500 Å and 5200 Å are used to obtain interference fringes. The separation between the fourth bright fringes of two different patterns produced by the two wavelengths is _____ mm.

24. When a light of photons of energy 4.2 eV is incident on a metallic sphere of radius 10 cm

and work function 2.4 eV, photoelectrons are emitted. The number of photoelectrons liberated before the emission is stopped, is 1.25×10^x. The value of x is _____.

$\left(e = 1.6 \times 10^{-19} \text{C and } \frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 \text{ N m}^2\text{C}^{-2}\right)$

25. Water is in streamline flow along a horizontal pipe with non uniform cross-section. At a point in the pipe where the area of cross-section is 10 cm^2, the velocity of water is 1 m s^{-1} and the pressure is 2000 Pa. The pressure at another point where the cross-sectional area is 5 cm^2 is _____ Pa.

CHEMISTRY

26. The melting point of RbBr is 682°C, while that of NaF is 988°C. The melting point of NaF is much higher than that of RbBr because
(a) the two crystals are not isomorphous
(b) the molar mass of NaF is smaller than that of RbBr
(c) the internuclear distance, $r_c + r_a$ is greater for RbBr than for NaF
(d) the bond in RbBr has more covalent character than the bond in NaF.

27. Identify the isostructural pairs.
(a) $[NF_3, NO_3^-]$ and $[BF_3, H_3O^+]$
(b) $[NF_3, HN_3]$ and $[NO_3^-, BF_3]$
(c) $[NF_3, H_3O^+]$ and $[NO_3^-, BF_3]$
(d) $[NF_3, H_3O^+]$ and $[HN_3, BF_3]$

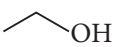
28. $E°$ values of three metals are listed below :
$Zn^{2+}_{(aq)} + 2e^- \longrightarrow Zn_{(s)}$; $E° = -0.76$ V
$Fe^{2+}_{(aq)} + 2e^- \longrightarrow Fe_{(s)}$; $E° = -0.44$ V
$Sn^{2+}_{(aq)} + 2e^- \longrightarrow Sn_{(s)}$; $E° = -0.14$ V
Which of the following statements are correct?
(i) Zinc will be corroded in preference to iron if zinc coating is broken on the surface.
(ii) If iron is coated with tin and the coating is broken on the surface then iron will be corroded.
(iii) Zinc is more reactive than iron but tin is less reactive than iron.
(a) (i) and (ii) (b) (ii) and (iii)
(c) (i), (ii) and (iii) (d) (i) and (iii)

29. In the reaction $A \rightarrow$ Products, when the concentration of A was reduced from 2.4×10^{-2} M to 1.2×10^{-2} M the rate decreased 8 times at the same temperature. The reaction is
(a) zero order (b) first order
(c) second order (d) third order.

30. A sample of gas has a volume of V_1 litre at temperature t_1°C. When the temperature of the gas is changed to t_2°C at constant pressure, then the volume of the gas was found to increase by 10%. The percentage increase in temperature is
(a) 10% (b) $\left(10 + \frac{2730}{t_1}\right)\%$
(c) 20% (d) $(0.1 + t_1^{-1})\%$

31. In the reaction :

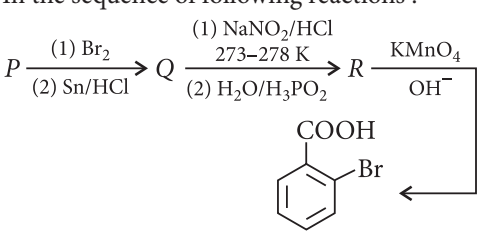
$$\text{Ethanol} \xrightarrow{PCl_5} X \xrightarrow{\text{alc. KOH}} Y \xrightarrow[H_2O,\,\Delta]{H_2SO_4,\ \text{Room temp.}} Z$$

the product Z is
(a) C_2H_4
(b) $CH_3CH_2OCH_2CH_3$
(c) $CH_3CH_2OSO_3H$ (d) 

32. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?
(a) CO_2 is more volatile than CS_2.
(b) Metal sulphides are thermodynamically more stable than CS_2.
(c) CO_2 is thermodynamically more stable than CS_2.
(d) Metal sulphides are less stable than the corresponding oxides.

33. In which of the following ionisation processes, the bond order has increased and the magnetic behaviour has changed?
(a) $N_2 \longrightarrow N_2^+$ (b) $C_2 \longrightarrow C_2^+$
(c) $NO \longrightarrow NO^+$ (d) $O_2 \longrightarrow O_2^+$

34. In the sequence of following reactions :



The starting compound 'P' is
(a) m-nitrotoluene
(b) p-nitrotoluene
(c) o-nitrotoluene
(d) o-bromotoluene.

35. The stability of carbanions in the following compounds

(i) $RC\equiv\ddot{\underset{\cdot\cdot}{C}}$ (ii) 

(iii) $R_2C=\ddot{C}H$ (iv) $R_3C-\ddot{C}H_2$

is in the order

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

36. If M is an element of actinoids series, the degree of complex formation decreases in the order

(a) $M^{4+} > M^{3+} > MO_2^{2+} > MO_2^+$
(b) $MO_2^+ > MO_2^{2+} > M^{3+} > M^{4+}$
(c) $M^{4+} > MO_2^{2+} > M^{3+} > MO_2^+$
(d) $MO_2^{2+} > MO_2^+ > M^{4+} > M^{3+}$

37. For compounds with the same anion, the hydration energies of Na^+, K^+, Rb^+, Cs^+ and Li^+ follow the order

(a) $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$
(b) $Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$
(c) $K^+ > Na^+ > Li^+ > Cs^+ > Rb^+$
(d) $Li^+ > K^+ > Na^+ > Cs^+ > Rb^+$

38. In which of the following reactions will there be no change in the oxidation number of nitrogen?

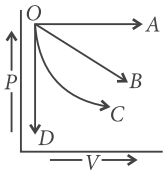
(a) $HNO_3 + 2H_2SO_4 \longrightarrow NO_2^+ + H_3O^+ + 2HSO_4^-$
(b) $2N_2O_4 + 2KI \longrightarrow 2KNO_3 + 2NO + I_2$
(c) $2KNH_2 + N_2O \longrightarrow KN_3 + KOH + NH_3$
(d) $4NO_2 + O_2 + 2H_2O \longrightarrow 4HNO_3$

39. Which among the following statements are correct with respect to adsorption of gases on a solid?

(i) The extent of adsorption is equal to kp^n according to Freundlich isotherm.
(ii) The extent of adsorption is equal to $kp^{1/n}$ according to Freundlich isotherm.
(iii) The extent of adsorption is equal to $(1 + bp)/ap$ according to Langmuir isotherm.
(iv) The extent of adsorption is equal to $ap/(1 + bp)$ according to Langmuir isotherm.

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

40. For which of the following processes, $q = \Delta U$



(a) $O \rightarrow A$
(b) $O \rightarrow D$
(c) $O \rightarrow B$
(d) $O \rightarrow C$

41. When a brown compound of Mn (A) is treated with HCl, it gives a gas (B). The gas (B) taken in excess reacts with NH_3 to give an explosive compound (C).

The compounds A, B and C are

(a) $A = MnO_2$, $B = Cl_2$, $C = NCl_3$
(b) $A = MnO$, $B = Cl_2$, $C = NH_3Cl$
(c) $A = Mn_3O_4$, $B = Cl_2$, $C = NCl_3$
(d) $A = MnO_3$, $B = Cl_2$, $C = NCl_2$

42. The empirical formula of an organic compound containing carbon and hydrogen is CH_2. The mass of one litre of this organic gas is exactly equal to that of one litre of N_2. Therefore, the molecular formula of the organic gas is

(a) C_2H_4 (b) C_3H_6 (c) C_6H_{12} (d) C_4H_8

43. H_2O_2 cannot oxidise

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

44. An electric current is passed through an aqueous solution (buffered at pH = 6.0) of alanine (pI = 6.0) and ariginine (pI = 10.2). The two amino acids can be separated because

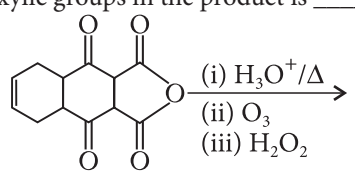
(a) alanine migrates to anode, and arginine to cathode
(b) alanine migrates to cathode and arginine to anode
(c) alanine does not migrate while arginine migrates to cathode
(d) alanine does not migrate while arginine migrates to anode.

45. Which one of the following is a non-steroidal hormone?

(a) Estradiol (b) Prostaglandin
(c) Progesterone (d) Estrone

NUMERICAL VALUE TYPE

46. In the given reaction, the total number of carboxylic groups in the product is _____.



47. The change in pH if 0.02 mol CH_3COONa is added to 1.0 L of 0.01 M HCl is _____.
(K_a of $CH_3COOH = 1.8 \times 10^{-5}$)

48. A greenish yellow gas reacts with an alkali metal hydroxide to form a halate which can be used in fire works safety matches. The halate molecule formed has x number of oxygen atoms. The value of x is _____.

49. A certain metal was irradiated with light of frequency 3.2×10^{16} sec^{-1}. The photoelectrons emitted have twice the kinetic energy as photoelectrons emitted when the same metal is irradiated with a light of frequency 2×10^{16} sec^{-1}. The threshold frequency of the metal is $x \times 10^{15}$ sec^{-1}. The value of x is _____.

50. Out of the following compounds, the number of compounds that cannot be prepared by Kolbe's electrolytic method is _____.
Ethane, Butane, Methane, Propane, Pentane, Hexane, Ethene, Ethyne

MATHEMATICS

51. If the function $f: [1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is

(a) $\left(\frac{1}{2}\right)^{x(x-1)}$

(b) $\frac{1}{2}(1+\sqrt{1+4\log_2 x})$

(c) $\frac{1}{2}(1-\sqrt{1+4\log_2 x})$

(d) none of these

52. If $\sin\theta + \text{cosec}\theta = 2$, the value of $\sin^{10}\theta + \text{cosec}^{10}\theta$ is
(a) 10 (b) 2^{10} (c) 2^9 (d) 2

53. The sides of a triangle are $x = 2$, $y + 1 = 0$ and $x + 2y = 4$. Its circumcentre is
(a) (4, 0) (b) (2, –1) (c) (0, 4) (d) (2, 3)

54. The number of values of a for the which the function $f(x) = (x + 1)\,|x - a|$ is differentiable $\forall\, x \in R$, is
(a) 0 (b) 1
(c) 2 (d) more than 2

55. If both the roots of the equations $ax^2 + px + q = 0$ and $bx^2 + lx + m = 0$ $(a \neq b)$ are common, then
(a) $pm = lq$ (b) $pq = lm$
(c) $p^2l = m^2q$ (d) $pm^2 = lq^2$.

56. The solution of differential equation $\frac{dy}{dx} + \frac{y}{x\log_e x} = \frac{1}{x}$ under the condition $y = 1$ when $x = e$ is

(a) $2y = \log_e x + \frac{1}{\log_e x}$

(b) $y = \log_e x + \frac{2}{\log_e x}$

(c) $y\log_e x = \log_e x + 1$

(d) $y = \log_e x + e$

57. In the expansion of $\left(x - \frac{1}{x}\right)^6$, the constant term is
(a) –20 (b) 20 (c) 30 (d) –30

58. A plane which passes through the point (3, 2, 0) and the line $\frac{x-3}{1} = \frac{y-6}{5} = \frac{z-4}{4}$ is
(a) $x - y + z = 1$ (b) $x + y + z = 5$
(c) $x + 2y - z = 0$ (d) $2x - y + z = 5$

59. Suppose $f(x) = \frac{k}{2^x}$ is a probability distribution of a random variable X that can take values 0, 1, 2, 3, 4. Then k is equal to
(a) 16/15 (b) 15/16
(c) 31/16 (d) none of these

60. If for the curve $y = 1 + bx - x^2$, the tangent at (1, –2) is parallel to x-axis, then b =
(a) 2 (b) –2 (c) 1 (d) –1

61. Given that $0 < x < \frac{\pi}{4}$ and $\frac{\pi}{4} < y < \frac{\pi}{2}$ and $\sum_{k=0}^{\infty} (-1)^k \tan^{2k} x = p$; $\sum_{k=0}^{\infty} (-1)^k \cot^{2k} y = q$; then $\sum_{k=0}^{\infty} \tan^{2k} x \cot^{2k} y =$

(a) $\frac{1}{p} + \frac{1}{q} - \frac{1}{pq}$ (b) $\frac{1}{\left\{\frac{1}{p} + \frac{1}{q} - \frac{1}{pq}\right\}}$

(c) $p + q - pq$ (d) $p + q + pq$

62. If $\sum_{i=1}^{9} (x_i - 5) = 9$ and $\sum_{i=1}^{9} (x_i - 5)^2 = 45$, then the standard deviation of the 9 items x_1, x_2, ..., x_9 is
(a) 9 (b) 4 (c) 3 (d) 2

63. If $x+iy=\dfrac{3}{2+\cos\theta+i\sin\theta}$, then x^2+y^2 is equal to

(a) $3x-4$ (b) $4x-3$

(c) $4x+3$ (d) None of these

64. Let $P(n)=2^{3n}-7n-1$ then $P(n)$ is divisible by

(a) 63 (b) 36 (c) 49 (d) 25

65. If ω is a cube root of unity, then $\begin{vmatrix} x+1 & \omega & \omega^2 \\ \omega & x+\omega^2 & 1 \\ \omega^2 & 1 & x+\omega \end{vmatrix} =$

(a) x^3+1 (b) $x^3+\omega$

(c) $x^3+\omega^2$ (d) x^3

66. If the eccentricity of $\dfrac{x^2}{a^2}-\dfrac{y^2}{b^2}=1$ is $\dfrac{5}{4}$, then the eccentricity of $\dfrac{x^2}{b^2}-\dfrac{y^2}{a^2}=1$ is

(a) $\dfrac{5}{4}$ (b) $\dfrac{5}{3}$ (c) $\dfrac{4}{3}$ (d) $\dfrac{9}{4}$

67. $\displaystyle\int_{-\pi}^{\pi}\frac{\cos^2 x}{1+a^x}\,dx$ where $a>0$ is

(a) $\dfrac{\pi}{2}$ (b) $a\pi$ (c) 2π (d) $\dfrac{\pi}{a}$

68. Let L be the line of intersection of the planes $2x+3y+z=1$ and $x+3y+2z=2$. If L makes an angle α with the positive x-axis, then $\cos\alpha$ equals

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

69. $\displaystyle\lim_{x\to 0}\frac{2^x-1}{\sqrt{1+x}-1}=$

(a) $\sqrt{2}\ln 2$ (b) $\ln 2$

(c) $\sqrt{2}$ (d) $\ln 4$

70. If $\tan\theta+\sin\theta=m$ and $\tan\theta-\sin\theta=n$, then

(a) $m^2-n^2=4mn$ (b) $m^2+n^2=4mn$

(c) $m^2-n^2=m^2+n^2$ (d) $m^2-n^2=4\sqrt{mn}$

NUMERICAL VALUE TYPE

71. The number of positive integer solutions of $x+y+z=10$, where x, y, z are unequal is $(20+K)$ then K is _____.

72. If $A=\begin{bmatrix}3 & -4\\ 1 & -1\end{bmatrix}$, then $\det(A^{2005})$ equals to _____.

73. If $\log_x y, \log_z x, \log_y z$ are in G.P., $xyz=64$ and x^3, y^3, z^3 are in A.P., then $x+y-z$ is _____.

74. Let $\vec{a},\vec{b},\vec{c}$ be non-zero vectors such that $(\vec{a}\times\vec{b})\times\vec{c}=\dfrac{1}{3}|\vec{b}||\vec{c}|\vec{a}$. If θ is the angle between $\vec{b}$ and $\vec{c}$, then $\dfrac{\sin\left(\dfrac{\pi}{4}\right)}{\sin\theta}=$ _____.

75. The value of $\displaystyle\int_0^{\sqrt{2}}[x^2]\,dx$, upto two decimal places, is _____.

Practice Test-3

- Use Blue/Black ball point pen only for marking responses.
- Mark only one choice for each question as indicated.

Correct marking ● ⓑ ⓒ ⓓ

Wrong marking ⊗ ⓐ ◐ ⓐ

1.	ⓐ	ⓑ	ⓒ	ⓓ	26.	ⓐ	ⓑ	ⓒ	ⓓ	51.	ⓐ	ⓑ	ⓒ	ⓓ
2.	ⓐ	ⓑ	ⓒ	ⓓ	27.	ⓐ	ⓑ	ⓒ	ⓓ	52.	ⓐ	ⓑ	ⓒ	ⓓ
3.	ⓐ	ⓑ	ⓒ	ⓓ	28.	ⓐ	ⓑ	ⓒ	ⓓ	53.	ⓐ	ⓑ	ⓒ	ⓓ
4.	ⓐ	ⓑ	ⓒ	ⓓ	29.	ⓐ	ⓑ	ⓒ	ⓓ	54.	ⓐ	ⓑ	ⓒ	ⓓ
5.	ⓐ	ⓑ	ⓒ	ⓓ	30.	ⓐ	ⓑ	ⓒ	ⓓ	55.	ⓐ	ⓑ	ⓒ	ⓓ
6.	ⓐ	ⓑ	ⓒ	ⓓ	31.	ⓐ	ⓑ	ⓒ	ⓓ	56.	ⓐ	ⓑ	ⓒ	ⓓ
7.	ⓐ	ⓑ	ⓒ	ⓓ	32.	ⓐ	ⓑ	ⓒ	ⓓ	57.	ⓐ	ⓑ	ⓒ	ⓓ
8.	ⓐ	ⓑ	ⓒ	ⓓ	33.	ⓐ	ⓑ	ⓒ	ⓓ	58.	ⓐ	ⓑ	ⓒ	ⓓ
9.	ⓐ	ⓑ	ⓒ	ⓓ	34.	ⓐ	ⓑ	ⓒ	ⓓ	59.	ⓐ	ⓑ	ⓒ	ⓓ
10.	ⓐ	ⓑ	ⓒ	ⓓ	35.	ⓐ	ⓑ	ⓒ	ⓓ	60.	ⓐ	ⓑ	ⓒ	ⓓ
11.	ⓐ	ⓑ	ⓒ	ⓓ	36.	ⓐ	ⓑ	ⓒ	ⓓ	61.	ⓐ	ⓑ	ⓒ	ⓓ
12.	ⓐ	ⓑ	ⓒ	ⓓ	37.	ⓐ	ⓑ	ⓒ	ⓓ	62.	ⓐ	ⓑ	ⓒ	ⓓ
13.	ⓐ	ⓑ	ⓒ	ⓓ	38.	ⓐ	ⓑ	ⓒ	ⓓ	63.	ⓐ	ⓑ	ⓒ	ⓓ
14.	ⓐ	ⓑ	ⓒ	ⓓ	39.	ⓐ	ⓑ	ⓒ	ⓓ	64.	ⓐ	ⓑ	ⓒ	ⓓ
15.	ⓐ	ⓑ	ⓒ	ⓓ	40.	ⓐ	ⓑ	ⓒ	ⓓ	65.	ⓐ	ⓑ	ⓒ	ⓓ
16.	ⓐ	ⓑ	ⓒ	ⓓ	41.	ⓐ	ⓑ	ⓒ	ⓓ	66.	ⓐ	ⓑ	ⓒ	ⓓ
17.	ⓐ	ⓑ	ⓒ	ⓓ	42.	ⓐ	ⓑ	ⓒ	ⓓ	67.	ⓐ	ⓑ	ⓒ	ⓓ
18.	ⓐ	ⓑ	ⓒ	ⓓ	43.	ⓐ	ⓑ	ⓒ	ⓓ	68.	ⓐ	ⓑ	ⓒ	ⓓ
19.	ⓐ	ⓑ	ⓒ	ⓓ	44.	ⓐ	ⓑ	ⓒ	ⓓ	69.	ⓐ	ⓑ	ⓒ	ⓓ
20.	ⓐ	ⓑ	ⓒ	ⓓ	45.	ⓐ	ⓑ	ⓒ	ⓓ	70.	ⓐ	ⓑ	ⓒ	ⓓ
21.					46.					71.				
22.					47.					72.				
23.					48.					73.				
24.					49.					74.				
25.					50.					75.				