MHT-CET 2019

Day 1 - Shift 2

Section : **Physics**

Q.1 In case of p-n junction diode, the width of depletion region is

Ans

✗ 1. decreased with light doping.

✗ 2. decreased with heavy doping.

✓ 3. increased by reverse biasing.

✗ 4. increased by forward biasing.

Q.2 What is the minimum energy required to launch a satellite of mass 'm' from the surface of the earth of mass 'M' and radius 'R' at an altitude 2 R?

Ans

✗ 1. $\frac{5GMm}{6R}$

✓ 2. $\frac{2GMm}{3R}$

✗ 3. $\frac{GMm}{2R}$

✗ 4. $\frac{GMm}{3R}$

Q.3 **A circular coil of wire consisting of 100 turns each of radius 9 cm carries a current of 0.4 A. The magnitude of the magnetic field at the centre of coil is [$\mu_0 = 12.56\times10^{-7}$ S.I. Unit]**

Ans

✗ 1. 2.79×10^{-5} T

✗ 2. 2.79×10^{-3} T

✓ 3. 2.79×10^{-4} T

✗ 4. 2.4×10^{-11} T

Q.4 The force 'F' acting on a body of density 'd' are related by the relation $F = \frac{y}{\sqrt{d}}$. The dimensions of 'y' are

Ans

✓ 1. $[L^{-\frac{1}{2}} M^{\frac{3}{2}} T^{-2}]$

✗ 2. $[L^{-1} M^{\frac{1}{2}} T^{-2}]$

✗ 3. $[L^{-1} M^{\frac{3}{2}} T^{-2}]$

✗ 4. $[L^{-\frac{1}{2}} M^{\frac{1}{2}} T^{-2}]$

Q.5 **A convex lens of focal length 'f' is placed in contact with a concave lens of the same focal length. The equivalent focal length of the combination is**

Ans

✗ 1. zero

✗ 2. f

✓ 3. infinity

✗ 4. f/2

Q.6 If 'x', 'V' and 'a' denote the displacement, velocity and acceleration of a particle respectively executing S.H.M. of periodic time 'T', then which one of the following does not change with time?

Ans

✔ 1. $\frac{aT}{x}$

✘ 2. $\frac{aT}{V}$

✘ 3. $aT + 4\pi^2 V^2$

✘ 4. $at + 2\pi V$

Q.7 Which one of the following statement is correct ?

Ans

✘ 1. Surface tension is work done per unit length.

✘ 2. Surface energy is potential energy per unit length.

✘ 3. Surface energy is work done per unit force.

✔ 4. Surface tension is work done per unit area.

Q.8 The excess of pressure, due to surface tension, on a spherical liquid drop of radius 'R' is proportional to

Ans

✘ 1. R

✘ 2. R^{-2}

✔ 3. R^{-1}

✘ 4. R^2

Q.9 A stretched string fixed at both ends has 'm' nodes, then the length of the string will be

Ans

✘ 1. $\frac{(m+1)\lambda}{2}$

✔ 2. $(m-1)\frac{\lambda}{2}$

✘ 3. $\frac{m\lambda}{2}$

✘ 4. $(m-2)\frac{\lambda}{2}$

Q.10 The equation of state for 2g of oxygen at a pressure 'P' and temperature'T', when occupying a volume 'V' will be

Ans

✔ 1. $PV = \frac{1}{16}RT$

✘ 2. PV = 16 RT

✘ 3. PV = 2RT

✘ 4. PV=RT

Q.11 The critical angle for light going from medium 'x' to medium 'y' is 'θ'. The speed of light in medium 'x' is 'V_x'. The speed of light in medium 'y' is

Ans

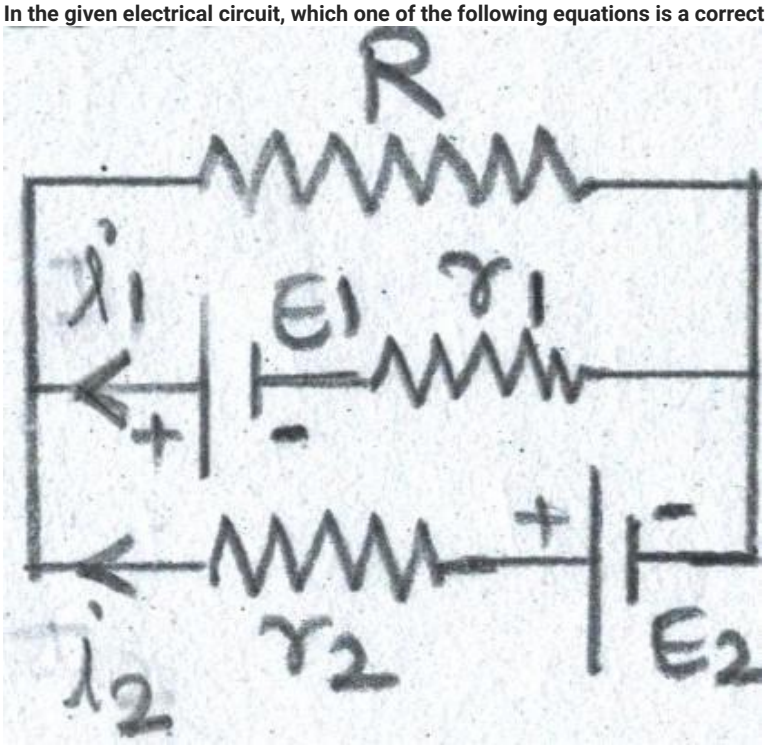
✗ 1. $V_x / \tan\theta$

✗ 2. $V_x \sin\theta$

✗ 3. $V_x \tan\theta$

✓ 4. $V_x / \sin\theta$

Q.12 In the given electrical circuit, which one of the following equations is a correct equation ?



Ans

1. $E_1 - (i_1 + i_2)R + i_1 r_1 = 0$

2. $E_1 - (i_1 + i_2)\,R - i_1 r_1 = 0$

3. $-E_2 - (i_1 + i_2)R + i_2 r_2 = 0$

4. $E_2 - i_2 r_2 - E_1 - i_1 r_1 = 0$

Q.13 With a resistance of 'X' in the left gap and a resistance of 9 Ω in the right gap of a meter bridge, the balance point is obtained at 40 cm from the left end. In what way and to which resistance 3 Ω resistance be connected to obtain the balance at 50 cm from the left end ?

Ans

1. parallel to 9 Ω
2. in series with X Ω
3. parallel to X Ω
4. in series with 9 Ω

Q.14 A particle is performing U.C.M. along the circumference of a circle of diameter 50 cm with frequency 2 Hz. The acceleration of the particle in m/s^2 is

Ans

1. $8\,\pi^2$
2. $4\,\pi^2$
3. $2\,\pi^2$
4. π^2

Q.15 The ratio of the dimensions of Planck's constant to that of moment of inertia is the dimensions of

Ans
- ✗ 1. angular momentum.
- ✗ 2. time.
- ✓ 3. frequency.
- ✗ 4. velocity.

Q.16 When light enters glass from vacuum, then the wavelength of light

Ans
- ✓ 1. decreases.
- ✗ 2. becomes zero.
- ✗ 3. increases.
- ✗ 4. remains same.

Q.17 A particle is performing a linear simple harmonic motion of amplitude 'A'. When it is midway between its mean and extreme position, the magnitudes of its velocity and acceleration are equal. What is the periodic time of the motion?

Ans
- ✗ 1. $\frac{1}{2\pi\sqrt{3}}$ s
- ✓ 2. $\frac{2\pi}{\sqrt{3}}$ s
- ✗ 3. $2\pi\sqrt{3}$ s

4. $\frac{\sqrt{3}}{2\pi}$ s

Q.18 The maximum wavelength of radiation emitted by a star is 289.8 nm. Then intensity of radiation for the star is (Given : Stefan's constant = 5.67×10^{-8} $Wm^{-2}K^{-4}$, Wien's constant, b = 2898 μ mK)

Ans
1. 10.67×10^{14} Wm^{-2}
2. 10.67×10^{7} Wm^{-2}
3. 5.67×10^{-12} Wm^{-2}
4. 5.67×10^{8} Wm^{-2}

Q.19 The range of an ammeter of resistance 'G' can be increased from 'I' to 'nI' by connecting

Ans
1. a shunt of $\frac{G}{n+1}\Omega$
2. a series resistance of $\frac{G}{n+1}\Omega$
3. a shunt of $\frac{G}{n-1}\Omega$
4. a series resistance of $\frac{G}{n-1}\Omega$

Q.20

In Balmer series, wavelength of first line is 'λ_1' and in Brackett series wavelength of first line is 'λ_2' then λ_1/λ_2 is

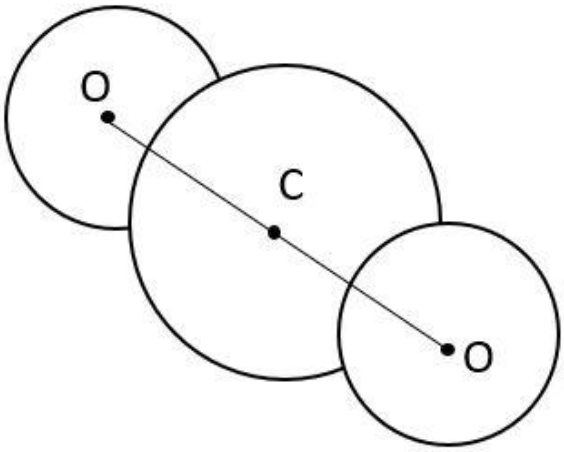
Ans
- ✗ 1. 0.138
- ✓ 2. 0.162
- ✗ 3. 0.124
- ✗ 4. 0.188

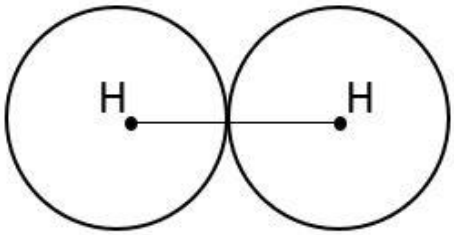
Q.2 1 The luminous border that surrounds the profile of a mountain just before sun rises behind it, is an example of

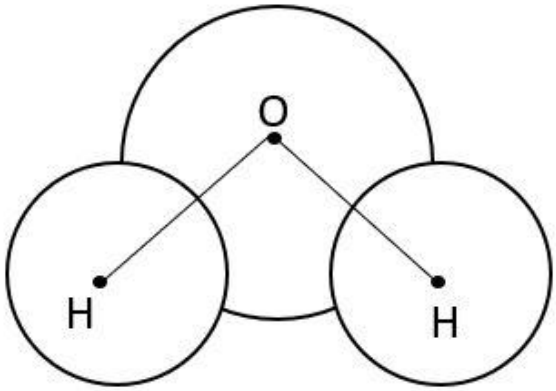
Ans
- ✓ 1. diffraction.
- ✗ 2. interference.
- ✗ 3. dispersion.
- ✗ 4. total internal reflection.

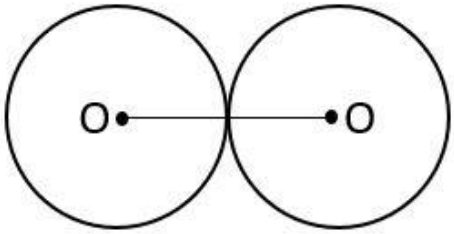
Q.2 2 Which of the following molecules is a polar molecule ?

Ans
- ✗ 1.



2. 

3. 

4. 

Q.2 The dimensions of self or mutual inductance are given as
3

Ans

1. $[L^2M^1T^{-2}I^{-2}]$

2. $[L^{-2}M^1T^{-2}I^{-2}]$

3. $[L^2M^2T^{-2}I^{-2}]$

4. $[L^2M^2T^{-2}I^{-1}]$

Q.24 Three point masses each of mass 'm' are kept at the corners of an equilateral triangle of side 'L'. The system rotates about the center of the triangle without any change in the separation of masses during rotation. The period of rotation is directly proportional to ($\cos 30^0 = \sin 60^0 = \sqrt{3}/2$)

Ans

1. L^{-2}
2. $L^{3/2}$
3. $\sqrt{L}$
4. L

Q.25 $\vec{P}$ and $\vec{Q}$ are two non-zero vectors inclined to each other at an angle 'θ'. '$\hat{P}$' and '$\hat{q}$' are unit vectors along $\vec{P}$ and $\vec{Q}$ respectively. The component of $\vec{Q}$ in the direction of $\vec{P}$ will be

Ans

1. $\vec{P}.\hat{q}$
2. $\hat{P}.\vec{Q}$
3. $\frac{\vec{P}.\vec{Q}}{Q}$
4. $\frac{\vec{P}\times\vec{Q}}{P}$

Q.26 When the electron in hydrogen atom jumps from fourth Bohr orbit to second Bohr orbit, one gets the

Ans
- ✗ 1. second line of Paschen series.
- ✗ 2. first line of Balmer series.
- ✗ 3. first line of Pfund series.
- ✓ 4. second line of Balmer series.

Q.27 Magnetic susceptibility of a paramagnetic substance is

Ans
- ✗ 1. large and negative.
- ✓ 2. small and positive.
- ✗ 3. small and negative.
- ✗ 4. large and positive.

Q.28 A rigid body is rotating with angular velocity 'ω' about an axis of rotation. Let 'v' be the linear velocity of particle which is at perpendicular distance 'r' from the axis of rotation. Then the relation 'v = rω' implies that

Ans
- ✗ 1. $\omega \propto \frac{1}{r}$
- ✗ 2. $\omega \propto r$
- ✓ 3. ω does not depend on r
- ✗ 4. ω = 0

Q.29 **In the study of transistor as an amplifier, the ratio of collector current to emitter current is 0.98 then the ratio of collector current to base current will be**

Ans
- ✗ 1. 98
- ✗ 2. 99
- ✗ 3. 50
- ✓ 4. 49

Q.30 **Find the wrong statement from the following about the equation of stationary wave given by Y = 0.04 cos (πx) sin (50 πt) m where t is in second. Then for the stationary wave.**

Ans
- ✗ 1. Wavelength = 2 m
- ✗ 2. Amplitude = 0.02 m
- ✗ 3. Velocity = 50 m/s
- ✓ 4. Time period = 0.02 s

Q.31 A force $(\vec{F}) = -5\hat{\imath} - 7\hat{\jmath} + 3\hat{k}$ acting on a particle causes a displacement $(\vec{s}) = 3\hat{\imath} - 2\hat{\jmath} + a\hat{k}$ in its own direction. If the work done is 14 J, then the value of 'a' is

Ans
- ✗ 1. 15
- ✓ 2. 5
- ✗ 3. 1
- ✗ 4. 0

Q.32 In U. C. M., when time interval $\delta t \to 0$, the angle between change in velocity $(\delta\vec{V})$ and linear velocity $(\vec{V})$ will be

Ans
✗ 1. 180°
✗ 2. 45°
✓ 3. 90°
✗ 4. 0°

Q.33 **Two pendulums begin to swing simultaneously. The first pendulum makes nine full oscillations when the other makes seven. The ratio of the lengths of the two pendulums is**

Ans
✗ 1. $\frac{64}{81}$
✓ 2. $\frac{49}{81}$
✗ 3. $\frac{7}{9}$
✗ 4. $\frac{8}{9}$

Q.34 An alternating voltage is given by E = 100 sin (wt + π/6) V. The voltage will be maximum for the first time when t = [T = periodic time]

Ans
✗ 1. $\frac{T}{12}$
✓ 2. $\frac{T}{6}$

3. $\frac{T}{2}$

4. $\frac{T}{3}$

Q.35 The magnetization of bar magnet of length 5 cm, cross sectional area 2 cm^2 and net magnetic moment 1 Am^2 is

Ans
1. 3×10^5 A/m
2. 1×10^5 A/m
3. 4×10^5 A/m
4. 2×10^5 A/m

Q.36 A wire of length 'L' and area of cross section 'A' is made of material of Young's modulus 'Y'. It is stretched by an amount 'x' The work done in stretching the wire is

Ans
1. $\frac{Yx^2A}{2L}$
2. $\frac{2Yx^2A}{L}$
3. $\frac{Yx^2A}{2}$

✗ 4. $\frac{YxA}{2L}$

Q.37 A block of mass 'm' moving on a frictionless surface at speed 'V' collides elastically with a block of same mass, initially at rest. Now the first block moves at an angle 'θ' with its initial direction and has speed 'V_1'. The speed of the second block after collision is

Ans

✗ 1. $\sqrt{V^2 + V_1^2}$

✗ 2. $\sqrt{V - V_1}$

✓ 3. $\sqrt{V^2 - V_1^2}$

✗ 4. $\sqrt{V_1^2 - V^2}$

Q.38 Three identical rods each of mass 'M' and length 'L' are joined to form a symbol 'H'. The moment of inertia of the system about one of the sides of 'H' is

Ans

✗ 1. $ML^2/2$

✗ 2. $2\,ML^2/3$

✗ 3. $ML^2/6$

✔ 4. $4\ ML^2/3$

Q.39 Light of wavelength 'λ' is incident on a single slit of width 'a' and the distance between slit and screen is 'D'. In diffraction pattern, if slit width is equal to the width of the central maximum then 'D' is equal to

Ans
✘ 1. a / λ
✔ 2. a^2 / 2 λ
✘ 3. a^2 / λ
✘ 4. a / 2 λ

Q.40 An aircraft is moving with uniform velocity 150 m/s in the space. If all the forces acting on it are balanced, then it will

Ans
✘ 1. escape in space.
✘ 2. fall down on earth.
✔ 3. keep moving with same velocity.
✘ 4. remain floating at its place.

Q.41 The magnetic dipole moment of a short magnetic dipole at a distant point along the equator of magnet has a magnitude of 'X' in S.I. units. If the distance between the point and the magnet is halved then the magnitude of dipole moment will be

Ans
✔ 1. X

2. $\frac{1}{8}$ X

3. 2 X

4. $\frac{1}{2}$ X

Q.4 2 In frequency modulated wave

Ans

1. both frequency and amplitude are constant.
2. both frequency and amplutude vary with time.
3. amplitude varies with time.
4. frequency varies with time.

Q.4 3 When a 12000 joule of work is done on a flywheel, its frequency of rotation inceases from 10 Hz to 20 Hz. The moment of inertia of flywheel about its axis of rotation is (π^2 =10)

Ans

1. 1 kgm^2
2. 1.688 kgm^2
3. 1.5 kgm^2
4. 2 kgm^2

Q.4 Torque acting on a rectangular coil carrying current 'I' situated parallel to magnetic field of

4 induction 'B', having number of turns 'n' and area 'A' is

Ans

✗ 1. $nI(\hat{A} \cdot \hat{B})$

✓ 2. $nI(\vec{A} \times \vec{B})$

✗ 3. $\frac{nBA}{I}$

✗ 4. $\frac{IBA}{n}$

Q.45 A simple harmonic progressive wave is represented as y = 0.03 $\sin\pi\ (2t - 0.01x)m$.
At a given instant of time, the phase difference between two particles 25 m apart is

Ans

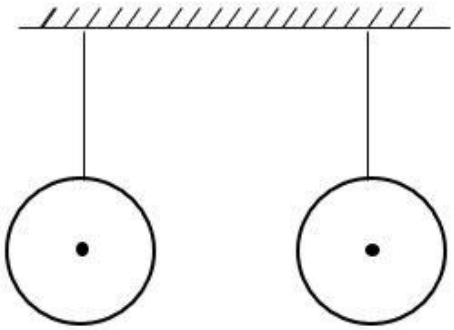
✗ 1. $\frac{\pi}{8}rad$

✗ 2. π *rad*

✗ 3. $\frac{\pi}{2}rad$

✓ 4. $\frac{\pi}{4}rad$

Q.46 Two light balls are suspended as shown in figure . When a stream of air passes through the space between them, the distance between the balls will



Ans
- ✗ 1. may increase or decrease, depending on speed of air.
- ✓ 2. decrease.
- ✗ 3. increase.
- ✗ 4. remain same.

Q.47 In a parallel plate air capacitor the distance between plates is reduced to one fourth and the space between them is filled with a dielectric medium of constant 2. If the initial capacity of the capacitor is 4μF, then its new capacity is

Ans
- ✓ 1. 32 μF
- ✗ 2. 18 μF
- ✗ 3. 8 μF
- ✗ 4. 44 μF

Q.48 A metal surface is illuminated by light of given intensity and frequency to cause photoemission. If the intensity of illumination is reduced to one fourth of its original value then the maximum K.E. of the emitted photoelectrons would be

Ans
- ✗ 1. one fourth of the original value.
- ✗ 2. twice the original value.
- ✓ 3. unchanged.
- ✗ 4. four times the original value.

Q.4 9 A lift is tied with thick iron ropes having mass 'M'. The maximum acceleration of the lift is 'a' m/s^2 and maximum safe stress is 'S' N/m^2. The minimum diameter of the rope is

Ans

✗ 1. $[M(g-a)/\pi S]^{1/2}$

✗ 2. $[6\,M(g+a)/\pi S]^{1/2}$

✗ 3. $[M(g+a)/\pi S]^{1/2}$

✓ 4. $[4\,M(g+a)/\pi S]^{1/2}$

Q.5 0 A stretched wire of length 260 cm is set into vibrations. It is divided into three segments whose frequencies are in the ratio 2:3:4. Their lengths must be

Ans

✗ 1. 120 cm, 60 cm, 80 cm

✗ 2. 60 cm, 80 cm, 120 cm

✓ 3. 120 cm, 80 cm, 60 cm

✗ 4. 80 cm, 60 cm, 120 cm

Section : **Chemistry**

Q.1 The number of σ and π bonds in 2-formylbenzoic acid are respectively

Ans

✗ 1. 14,3

✗ 2. 12,5

✓ 3. 17,5

✗ 4. 10,3

Q.2 Which of the following is NOT a broadspectrum anitibiotics ?

Ans

✗ 1. Chloramphenicol

✗ 2. Ampicillin

✓ 3. Penicillin

✗ 4. Amoxicillin

Q.3 The oxidation number of sulphur in S_8 molecule is

Ans

✓ 1. 0

✗ 2. 2

✗ 3. 3

✗ 4. 6

Q.4 α-Chlorosodium acetate on boiling with aqueous sodium nitrite gives

Ans

✗ 1. α-chloronitromethane

✓ 2. nitromethane

✗ 3. acetyl chloride

✗ 4. nitroethane

Q.5 Which of following elements does NOT react with hot concentrated sulphuric acid ?

Ans

✗ 1. Sb

✗ 2. P

✗ 3. As

✓ 4. N

Q.6 In which oxidation state, group 15 elements act as Lewis base ?

Ans

✓ 1. -3

✗ 2. +3

✗ 3. +5

✗ 4. +4

Q.7 The bond angle H-O-O in H_2O_2 in gaseous phase is

Ans

✗ 1. 111.5^0

✗ 2. 90.2^0

✓ 3. 94.8^0

✗ 4. 101.9^0

Q.8 Identify the amine formed when ethyltrimethyl ammonium iodide is treated with silver hydroxide and further heated strongly

Ans

✗ 1. $C_2H_5NH_2$

✓ 2. $(CH_3)_3N$

✗ 3. CH_3NH_2

✗ 4. $C_2H_5N(CH_3)_2$

Q.9 Propene when treated with cold conc. H_2SO_4 forms a compound which on heating with water gives

Ans
- ✗ 1. propan-1-ol
- ✗ 2. butan-1-ol
- ✗ 3. ethanol
- ✓ 4. propan-2-ol

Q.10 Which of the following sets of solutions of urea (mol. mass. 60 g mol^{-1}) and sucrose (mol. mass. 342 g mol^{-1}) is isotonic ?

Ans
- ✓ 1. 3.0 gL^{-1} urea and 17.1 gL^{-1} sucrose
- ✗ 2. 3.0 gL^{-1} urea and 3.0 gL^{-1} sucrose
- ✗ 3. 6.0 gL^{-1} urea and 9.0 gL^{-1} sucrose
- ✗ 4. 9.1 gL^{-1} urea and 6.0 gL^{-1} sucrose

Q.11 When a mixture of manganese dioxide, potassium hydroxide and potassium chlorate is fused , the product obtained is

Ans
- ✗ 1. K_2SO_4
- ✗ 2. K_2MnO_3
- ✓ 3. K_2MnO_4
- ✗ 4. $KMnO_4$

Q.12 The reaction in which 2 molecules of chlorobenzene reacts with metallic sodium in presence of dry ether forming diphenyl is an example of,

Ans

✗ 1. Wurtz reaction

✗ 2. Balz-Schiemann reaction

✗ 3. Rosenmund reaction

✓ 4. Wurtz -Fittig reaction

Q.13 If $C_{(s)}+O_{2(g)}\rightarrow CO_{2(g)}$ $\Delta H=-X$, $CO_{(g)}+\frac{1}{2}O_{2(g)}\rightarrow CO_{2(g)}$ $\Delta H=-Y$, Calculate $\Delta_f H$ for $CO_{(g)}$ formation

Ans

✓ 1. Y-X

✗ 2. -Y-X

✗ 3. X+Y

✗ 4. X-Y

Q.14 How many metameric ethers are represented by the molecular formula $C_4H_{10}O$?

Ans

✓ 1. 3

✗ 2. 4

✗ 3. 2

✗ 4. 5

Q.15 The ionic charges of manganate and permanganate ion are respectively

Ans
- ✗ 1. -1, -2
- ✗ 2. -1, -1
- ✓ 3. -2, -1
- ✗ 4. -2, -2

Q.16 Two moles of an ideal gas is expanded isothermally and reversibly at 300 K from 1L to 10 L . The enthalpy change in kJ is

Ans
- ✓ 1. Zero kJ
- ✗ 2. -11.4 kJ
- ✗ 3. 11.4 kJ
- ✗ 4. 4.8 kJ

Q.17 The monomers used in the preparation of dextron are

Ans
- ✗ 1. glycine and lactic acid
- ✓ 2. lactic acid and glycollic acid
- ✗ 3. glycine and ω- amino caproic acid
- ✗ 4. 3- Hydroxybutanoic acid and 3-hydroxy pentanoic acid

Q.18 In ozone molecule , the formal charge on the central oxygen atom is

Ans
- ✗ 1. +2

2. 0

3. +1

4. -1

Q.1 The enzyme which converts maltose to glucose is
9

Ans

1. lysine

2. maltase

3. zymase

4. insulin

Q.2 The percentage of unoccupied volume in simple cubic cell is
0

Ans

1. 52.40 %

2. 32.00 %

3. 47.60 %

4. 68.04 %

Q.2 Which of the following acts as oxidising agent in hydrogen - oxygen fuel cell ?
1

Ans

1. KOH

2. C

3. O_2

4. H_2

Q.2 Which of the following is also called as nitrogen sesquioxide ?
2

Ans
- ✗ 1. NO_2
- ✗ 2. N_2O_4
- ✓ 3. N_2O_3
- ✗ 4. N_2O_5

Q.2 How many isomers are possible for an alkane having molecular formula C_5H_{12}?
3

Ans
- ✗ 1. 4
- ✗ 2. 2
- ✓ 3. 3
- ✗ 4. 5

Q.2 According to Werners theory , the geometry of the complex is determined by
4

Ans
- ✗ 1. only from the position of secondary valence in space
- ✗ 2. number and position of the primary valences in space
- ✓ 3. number and position of the secondary valences in space
- ✗ 4. only from the primary valence in space

Q.25 Which of following elements does not form amide when reacted with ammonia ?

Ans
- ✗ 1. Rb
- ✓ 2. Li
- ✗ 3. Na
- ✗ 4. K

Q.26 Which of the following is a natural polymer ?

Ans
- ✗ 1. Orlon
- ✗ 2. Nylon
- ✗ 3. Teflon
- ✓ 4. Linen

Q.27 Which of following metals occurs in native state ?

Ans
- ✗ 1. Magnesium
- ✗ 2. Potassium
- ✗ 3. Sodium
- ✓ 4. Platinum

Q.28 Which among the following is a set of nucleophiles ?

Ans
✗ 1. $AlCl_3$, BF_3 ,NH_3

✗ 2. H^+ , NH_3 , Cl^-

✗ 3. BF_3 , H_2O , NH_3

✓ 4. CN^- , H_2O , R-OH

Q.29 **Which among the following is a neutral complex ?**

Ans
✗ 1. $K[Ag(CN)_2]$

✓ 2. $[Pt(NH_3)_2Cl_2]$

✗ 3. $[Ni(NH_3)_6]Cl_2$

✗ 4. $[Fe(H_2O)_6]Cl_3$

Q.30

$$\text{In the reaction, } H_2O_{2(aq)} \xrightarrow{I^-_{(aq)}} H_2O_{(l)} + \frac{1}{2}O_{2(g)} \text{ iodide ion acts as}$$

Ans
✗ 1. enzyme catalyst

✓ 2. homogenous catalyst

✗ 3. Heterogenous catalyst

✗ 4. acid catalyst

Q.31 **What is the density of water vapour at boiling point of water ?**

1

Ans
- 1. 1 g cm^{-3}
- 2. 4 x 10^{-4} g cm^{-3}
- 3. 1 x 10^{-4} g cm^{-3}
- ✓ 4. 6 x 10^{-4} g cm^{-3}

Q.3 Veronal is used as a/an
2

Ans
- 1. analgesic
- 2. antibiotic
- 3. antihistamine
- ✓ 4. tranquilizer

Q.3 What is the atomicity of aluminium phosphate ?
3

Ans
- 1. 13
- 2. 8
- 3. 5
- ✓ 4. 6

Q.3 Which of the following molecules form a zwitter ion ?
4

Ans
- ✓ 1. H_2NCH_2COOH
- 2. CH_3COOCH_3
- 3. $CH_3COC_2H_5$

4. CH_3CH_2COOH

Q.35 Which among the following compounds is obtained when ethanenitrile is acid hydrolysed?

Ans
1. Acetamide
2. Formic acid
3. Formamide
4. Acetic acid ✓

Q.36 9 gram anhydrous oxalic acid (Mol. Wt = 90) was dissolved in 9.9 moles of water. If vapour pressure of pure water is P_1^0, the vapour pressure of solution is

Ans
1. 1.1 P_1^0
2. 0.90 P_1^0
3. 0.1 P_1^0
4. 0.99 P_1^0 ✓

Q.37 Which among the following does not form polyhalide ion ?

Ans
1. Fluorine ✓
2. Bromine
3. Iodine
4. Chlorine

Q.38 How many gram of sodium (atomic mass 23 u) is required to prepare one mole of ethane from methyl chloride by wurtz reaction ?

Ans

✗ 1. 11.5

✗ 2. 23

✗ 3. 2

✓ 4. 46

Q.39 Identify the equation in which change in enthalpy is equal to change in internal energy

Ans

✗ 1. $2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$

✓ 2. $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$

✗ 3. $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$

✗ 4. $PCl_{5(g)} \rightarrow PCl_{3(g)} + Cl_{2(g)}$

Q.40 The correct representation of Nernst's equation for half-cell reaction $Cu^{2+}_{(aq)} + e^- \rightarrow Cu^{+}_{(aq)}$ is

Ans

1. $E^0_{Cu^+, Cu^{2+}} = E_{Cu^+, Cu^{2+}} + \frac{0.0592}{2} \text{Log} \frac{[Cu^+]}{[Cu^{2+}]}$

2. $E_{Cu^+, Cu^{2+}} = E^0_{Cu^+, Cu^{2+}} - \frac{0.0592}{1} \text{Log} \frac{[Cu^+]}{[Cu^{2+}]}$

3. $E_{Cu^+, Cu^{2+}} = E^0_{Cu^+, Cu^{2+}} - \frac{0.0592}{1} \text{Log} \frac{[Cu^+]}{[Cu^{2+}]}$

4. $E^0_{Cu^+, Cu^{2+}} = E_{Cu^+, Cu^{2+}} - \frac{0.0592}{2} \text{Log} \frac{[Cu^+]}{[Cu^{2+}]}$

Note: For this question, discrepancy is found in question/answer. Full Marks is being awarded to all candidates.

Q.4 1 **Which reaction is useful in exchange of halogen in alkyl chloride by iodide ?**

Ans

✗ 1. Williamson synthesis

✗ 2. Wurtz reaction

✗ 3. Reimer-Tiemann reaction

✓ 4. Finkelstein reaction

Q.4 2 **The oxidation state of sulphur in $H_2S_2O_7$ is**

Ans

✗ 1. +5

✓ 2. +6

✗ 3. +4

✗ 4. +7

Q.4 3 **The activation energy of a reaction is zero. Its rate constant at 280 K is 1.6×10^{-6} S^{-1}, the rate constant at 300 K is**

Ans

✓ 1. 1.6×10^{-6} S^{-1}

✗ 2. 1.6×10^{-5} S^{-1}

✗ 3. $3.2 \times 10^{-6}\ S^{-1}$

✗ 4. Zero

Q.4 How many total constituent particles are present in simple cubic unit cell ?
4

Ans

✗ 1. 4

✗ 2. 3

✗ 3. 2

✓ 4. 1

Q.4 Relationship between vant Hoff factor (i) and degree of dissociation (α) is
5

Ans

✗ 1. $i = \frac{\alpha - 1}{1 - n'}$

✓ 2. $\alpha = \frac{i - 1}{n' - 1}$

✗ 3. $\alpha = \frac{1 - i}{n' - 1}$

✗ 4. $i = \frac{\alpha - 1}{n' - 1}$

Q.46 For a chemical reaction rate law is, rate =k $[A]^2$ [B]. If [A] is doubled at constant [B], the rate of reaction

Ans
- ✗ 1. increases by a factor of 8
- ✗ 2. increases by a factor of 3
- ✗ 3. increases by a factor of 2
- ✓ 4. increases by a factor of 4

Q.47 The volume of 1 mole of any pure gas at standard temperature and pressure is always equal to

Ans
- ✗ 1. 2.2414 m^3
- ✓ 2. 0.022414 m^3
- ✗ 3. 22.414 m^3
- ✗ 4. 0.22414 m^3

Q.48 Isobutylene on hydroboration followed by oxidation with hydrogen peroxide in presence of base yields

Ans
- ✗ 1. sec-butyl alcohol
- ✗ 2. n-butyl alcohol
- ✓ 3. isobutyl alcohol
- ✗ 4. tert-butyl alcohol

Q.49 Limestone is used as a flux in the extraction of

Ans
✔ 1. iron
✘ 2. zinc
✘ 3. aluminium
✘ 4. copper

Q.5 **Standard Hydrogen electrode (SHE) is a**
0

Ans
✘ 1. Metal - Sparingly soluble salt eletrode
✔ 2. Primary reference electrode
✘ 3. Metal - Metal ion eletrode
✘ 4. Secondary reference electrode

Section : **Mathematics**

Q.1 The p.d.f of a random variable x is given by $f(x) = \frac{1}{4a}$, $0 < x < 4a$, $(a > 0)$

$= 0$, otherwise.

and $P\left(x < \frac{3a}{2}\right) = k\,P\left(x > \frac{5a}{2}\right)$ then k = ...

Ans
✔ 1. 1
✘ 2. $\frac{1}{8}$
✘ 3. $\frac{1}{4}$

4. $\frac{1}{2}$

Q.2 If lines represented by $(1+\sin^2\theta)\,x^2+2hxy+2sin\theta\ y^2=0$, $\theta \in [0,2\pi]$ are perpendicular to each other then $\theta =$ .....

Ans

1. π

2. $\frac{3\pi}{2}$

3. $\frac{\pi}{6}$

4. $\frac{\pi}{2}$

Q.3 The negation of "$\forall\, n \in N, n+7>6$" is ...

Ans 1.

$\exists n \in N$, such that $n+7 \geq 6$

2. $\forall n \in N, n + 7 \leq 6$

3. $\exists n \in N$, such that $n + 7 \leq 6$

4. $\exists n \in N$, such that $n + 7 < 6$

Q.4 Equations of planes parallel to the plane $x - 2y + 2z + 4 = 0$ which are at a distance of one unit from the point (1,2,3) are .....

Ans

1. $x - 2y - 6 = 0\,, x - 2y + z = 6$

2. $x + 2y + 2z = 6\,, x + 2y + 2z = 0$

3. $x + 2y + 2z = -6\,, x + 2y + 2z = 5$

4. $x - 2y + 2z = 0\,, x - 2y + 2z - 6 = 0$

Q.5 Which of the following is *NOT* equal to $\bar{w}.(\bar{u} \times \bar{v})$?

Ans

✗ 1. $\bar{u}.(\bar{v} \times \bar{w})$

✗ 2. $(\bar{u} \times \bar{v}).\bar{w}$

✓ 3. $\bar{v}.(\bar{u} \times \bar{w})$

✗ 4. $\bar{v}.(\bar{w} \times \bar{u})$

Q.6 If $f(x) = 3x + 6, g(x) = 4x + k$ and $fog(x) = gof(x)$ then $k =$ .....

Ans

✓ 1. 9

✗ 2. 18

✗ 3. -9

✗ 4. $\frac{1}{9}$

Q.7 If P(6,10,10), Q(1,0,-5) , R(6,-10, λ) are vertices of a triangle right angled at Q, then value of λ is .....

Ans

✗ 1. 2

✗ 2. 3

✓ 3. 0

✗ 4. 1

Q.8 **The maximum value of z = 6x + 8y subject to x - y ≥ 0 , x + 3y ≤ 12 , x ≥ 0 , y ≥ 0 is .....**

Ans

✗ 1. 42

✗ 2. 96

✓ 3. 72

✗ 4. 24

Q.9

If A = $\begin{bmatrix} 1+2i & i \\ -i & 1-2i \end{bmatrix}$, where $i = \sqrt{-1}$, then A(adjA)= .....

Ans

✓ 1. 4 I

✗ 2. -2 I

✗ 3. 5 I

✗ 4. 2 I

Q.10 The solution of the differential equation $ydx - xdy = xydx$ is .....

Ans

✗ 1. $x^2 = e^x y^2$

✗ 2. $x^2 y^2 = logx$

✔ 3. $x = ye^x$

✘ 4. $xy = e^x$

Q.11 If $x^y = e^{x-y}$, $then\ \frac{dy}{dx}\ at\ x = 1$ is .....

Ans

✘ 1. e

✘ 2. 1

✘ 3. -1

✔ 4. 0

Q.12 If R is the circumradius of ΔABC ,then $A(\Delta ABC)$= .....

Ans

✘ 1. $\frac{abc}{3R}$

✘ 2. $\frac{abc}{R}$

✗ 3. $\frac{abc}{2R}$

✓ 4. $\frac{abc}{4R}$

Q.13 The area of the region enclosed between pair of the lines $xy = 0$ and the lines $xy + 5x - 4y - 20 = 0$, is .....

Ans

✗ 1. $\frac{4}{5}$ square units

✓ 2. 20 square units

✗ 3. 10 square units

✗ 4. 6 square units

Q.14 If $\sum_{r=1}^{n}(2r + 1) = 440$, then $n =$.....

Ans

✗ 1. 19

✗ 2. 22

✓ 3. 20

✗ 4. 21

Q.15 If lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-\lambda}{2} = \frac{z}{1}$ intersect each other, then λ = ...

Ans

✗ 1. $\frac{5}{2}$

✗ 2. $\frac{7}{2}$

✗ 3. $\frac{3}{2}$

✓ 4. $\frac{9}{2}$

Q.16 $$\int_a^b \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a+b-x}}dx = \cdots$$

Ans ✗ 1. a+b

✗ 2. $\frac{a-b}{2}$

✗ 3. a-b

✓ 4. $\frac{b-a}{2}$

Q.17 The solution of the differential equation $\frac{d\theta}{dt} = -k(\theta - \theta_0)$ where k is constant, is .....

Ans

✗ 1. $\theta = 2\theta_0 - ae^{kt}$

✓ 2. $\theta = \theta_0 + ae^{-kt}$

✗ 3. $\theta = 2\theta_0 - ae^{-kt}$

✗ 4. $\theta = \theta_0 + ae^{kt}$

Q.18 **Which of the following statement is contingency?**

Ans

✗ 1. $(p \vee q) \vee \sim p$

2. $(p \vee q) \vee \sim q$

3. $(p \vee q) \wedge \sim q$

4. $p \longrightarrow (p \vee q)$

Q.19 If the vectors $x\hat{\imath} - 3\hat{\jmath} + 7\hat{k}$ and $\hat{\imath} + y\hat{\jmath} - z\hat{k}$ are collinear then the value of $\frac{xy^2}{z}$ is equal to

Ans

1. $\frac{9}{7}$

2. $\frac{-7}{9}$

3. $\frac{7}{9}$

4. $\frac{-9}{7}$

Q.20 The value of $sin18°$ is . . . . . .

Ans

1. $\frac{4}{\sqrt{5}+1}$

2. $\frac{4}{\sqrt{5}-1}$

3. $\frac{\sqrt{5}-1}{4}$

4. $\frac{\sqrt{5}+1}{4}$

Q.21 If $\int \tan(x-\alpha)\tan(x+\alpha).tan2x\,dx = plog|sec2x| + qlog|\sec(x+\alpha)| + rlog|\sec(x-\alpha)| + c$ then $p+q+r =$.....

Ans

1. $\frac{5}{2}$

✗ 2. $\frac{3}{2}$

✗ 3. $\frac{-5}{2}$

✓ 4. $\frac{-3}{2}$

Q.22 For L.P.P, maximize $z = 4x_1 + 2x_2$ subject to $3x_1 + 2x_2 \geq 9$, $x_1 - x_2 \leq 3$, $x_1 \geq 0, x_2 \geq 0$ has .....

Ans

✗ 1. One optimal solution

✗ 2. No solution

✗ 3. Infinite number of optimal solutions

✓ 4. Unbounded solution

Q.23 The equation of the circle concentric with the circle $x^2 + y^2 - 6x - 4y - 12 = 0$ and touching the Y-axis is .....

Ans

✗ 1.

$$x^2 + y^2 - 6x - 4y + 9 = 0$$

✔ 2.

$$x^2 + y^2 - 6x - 4y + 4 = 0$$

✘ 3.

$$x^2 + y^2 - 6x - 4y - 4 = 0$$

✘ 4.

$$x^2 + y^2 - 6x - 4y - 9 = 0$$

Q.24 If the function $f(x) = \frac{(e^{kx}-1)tankx}{4x^2}$, $x \neq 0$

$= 16$, $x = 0$

Is continuous at $x = 0$, then $k =$ .....

Ans

✘ 1. ± 2

✘ 2. ± 4

✔ 3. ± 8

✘ 4. $\pm \frac{1}{8}$

Q.25 In ΔABC, if $tanA + tanB + tanC = 6$ and $tanA.tanB = 2$ then $tanC =$ .....

Ans
✔ 1. 3

✗ 2. 1

✗ 3. 4

✗ 4. 2

Q.26 The function $f(x) = x^3 - 3x$ is .....

Ans
✗ 1.

decreasing in $(-\infty, -1) \cup (1, \infty)$ and increasing in (-1, 1)

✔ 2.

increasing in $(-\infty, -1) \cup (1, \infty)$ and decreasing in (-1, 1)

✗ 3.

increasing in $(0,\infty)$and decreasing in$(-\infty, 0)$.

✗ 4.

decreasing in $(0,\infty)$and increasing in$(-\infty, 0)$.

Q.27 If A = $\{ x \mid x \in N,\ x$ is a prime number less than 12 $\}$ and B = $\{ x \mid x \in N, x$ is a factor of 10 $\}$, then A ∩ B = ...

Ans
✗ 1. {2,5,10}

✗ 2. {2}

✗ 3. {1,2,5,10}

✓ 4. {2,5}

Q.28 if three dice are thrown then the probability that the sum of the numbers on their uppermost faces to be at least 5 is

Ans

✗ 1. $\frac{1}{53}$

✓ 2. $\frac{53}{54}$

✗ 3. $\frac{52}{53}$

✗ 4. $\frac{1}{54}$

Q.29

If function $f(x) = x - \frac{|x|}{x}$, $x < 0$

$= x + \frac{|x|}{x}$, $x > 0$

$= 1$, $x = 0$, then .....

Ans

✗ 1. $\lim_{x \to 0^-} f(x)$ does not exist

✓ 2.

f(x) is continuous at $x = 0$

✗ 3. $\lim_{x \to 0^-} f(x) \neq \lim_{x \to 0^+} f(x)$

✗ 4. $\lim_{x \to 0^+} f(x)$ does not exist

Q.30 The particular solution of the differential equation $\log(\frac{dy}{dx}) = x$, when $x = 0, y = 1$ is .....

Ans

✗ 1. $y = -e^x + 2$

✗ 2. $y = e^x + 2$

✓ 3. $y = e^x$

✗ 4. $y = -e^x$

Q.31 If p and q are true and r and s are false statements, then which of the following is true?

Ans

✗ 1. $(p \wedge \sim r) \wedge (\sim q \vee s)$

✓ 2. $(p \rightarrow q) \vee (r \leftrightarrow s)$

✗ 3. $(\sim p \rightarrow q) \leftrightarrow (r \wedge s)$

✗ 4. $(q \wedge r) \vee (\sim p \wedge s)$

Q.32 If $f(x) = [x]$, where $[x]$ is the greatest integer not greater than x , then $f'(1^+)$ = ...

Ans

✗ 1. 1

✗ 2. -1

✗ 3. 2

✓ 4. 0

Q.33 If the standard deviation of the random variable X is $\sqrt{3pq}$ and mean is $3p$ then $E(x^2)$ = ...

Ans

✗ 1. $3pq + 3q^2$

✗ 2. $3pq + 3p^2$

✓ 3. $3p (1 + 2p)$

✗ 4. $3q (1 + 2q)$

Q.3 In a bionomial distribution, mean is 18 and variance is 12 then p = …….
4

Ans

✗ 1. $\frac{1}{2}$

✗ 2. $\frac{2}{3}$

✗ 3. $\frac{3}{4}$

✓ 4. $\frac{1}{3}$

Q.3
5

$$\int_0^1 x(1-x)^5\,dx = \ldots\ldots$$

Ans

✔ 1. $\frac{1}{42}$

✘ 2. $\frac{1}{13}$

✘ 3. $\frac{1}{5}$

✘ 4. $\frac{13}{42}$

Q.36 Using Differentiation, approximate value of $f(x) = x^2 - 2x + 1$ at $x = 2.99$ is ……..

Ans

✘ 1. 5.98

✘ 2. 4.98

✘ 3. 9.96

✔ 4. 3.96

Q.37 The intercept on the line $y = x$ by the circle $x^2+y^2-2x = 0$ is AB. The equation of the circle with AB as a diameter is .....

Ans

✔ 1. $x^2+y^2-x-y=0$

✘ 2. $x^2+y^2+3x-y=0$

✘ 3. $x^2+y^2+x+y=0$

✘ 4. $x^2+y^2-3x+y=0$

Q.38 If $4\sin^{-1}x + 6\cos^{-1}x = 3\pi$ then $x =$ .....

Ans

✔ 1. 0

✘ 2. $\frac{-1}{2}$

✘ 3. $\frac{1}{2}$

✘ 4. $\frac{1}{\sqrt{2}}$

Q.39 If the sum of an infinite G.P be 9 and sum of first two terms be 5 then their common ratio is .....

Ans

✗ 1. 3

✗ 2. $\frac{3}{2}$

✓ 3. $\frac{2}{3}$

✗ 4. $\frac{1}{3}$

Q.40 $$\int \frac{x^2+1}{x^4-x^2+1}dx = \cdots$$

Ans

1. $\tan^{-1}\left(\frac{x^2+1}{2}\right)+c$

2. $\tan^{-1}(x^2)+c$

3. $\tan^{-1}(2x^2-1)+c$

4. $\tan^{-1}\left(\frac{x^2-1}{x}\right)+c$

Q.4 1 **If A,B,C and D are (3,7,4),(5,-2,3),(-4,5,6) and (1,2,3) respectively, then the volume of the parallelopiped with AB, AC and AD as the co-terminus edges, is ..... cubic units.**

Ans

1. 93
2. 94
3. 91
4. 92

Q.4 2 If $\int \frac{cosx-sinx}{8-sin2x}dx = \frac{1}{p}\log\left[\frac{3+sinx+cosx}{3-sinx-cosx}\right]$ + c , then p = ...

Ans

1. 12

✔ 2. 6

✗ 3. 1

✗ 4. 3

Q.43 **A particle moves so that x = 2 + 27t - t^3 . The direction of motion reverses after moving a distance of ……. units.**

Ans

✗ 1. 65

✗ 2. 60

✔ 3. 56

✗ 4. 80

Q.44 In ΔABC; with usual notations, $\frac{bSinB-cSinC}{Sin(B-C)}$ = ……

Ans

✗ 1. $a+b+c$

✗ 2. c

✔ 3. a

✗ 4. b

Q.45 **The y-intercept of the line passing through A(6,1) and perpendicular to the line x - 2y = 4 is ……**

Ans
1. 5
2. 13
3. -2
4. 26

Q.46 If $(-\sqrt{2}, \sqrt{2})$ are cartesian co-ordinates of the point, then its polar co-ordinates are …….

Ans

1. $(1, \frac{4\pi}{3})$
2. $(2, \frac{3\pi}{4})$
3. $(4, \frac{5\pi}{4})$
4. $(3, \frac{7\pi}{4})$

Q.47 If the foot of the perpendicular drawn from the point (0,0,0) to the plane is (4,-2,-5) then the equation of the plane is…….

Ans
1. 4x - 2y + 5z = -5
2. 4x + 2y - 5z = 37

✗ 3. 4x + 2y + 5z = -13

✓ 4. 4x - 2y - 5z = 45

Q.48 If $x = sin\theta$, $y = sin^3\theta$ then $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$ is .....

Ans

✗ 1. $\frac{1}{6}$

✗ 2. $\frac{1}{3}$

✗ 3. 3

✓ 4. 6

Q.49 If $\int_0^a \sqrt{\frac{a-x}{x}}\, dx = \frac{K}{2}$, then K = ...

Ans

✓ 1. πa

✗ 2. $\frac{3\pi a}{2}$

3. $\frac{\pi a}{2}$

4. $\frac{5\pi a}{2}$

Q.50 If A is non-singular matrix and $(A + I)(A - I) = 0$ then $A + A^{-1}$ =.....

Ans
1. 3 I
2. 0
3. I
4. 2A