MHT-CET 2019

Day 2 - Shift 1

Section : **Physics**

Q.1 **The refractive index of the material of crystal is 1.68 and that of castor oil is 1.2. When a ray of light passes from oil to glass, its velocity will change by a factor**

Ans

✗ 1. $3/4$

✗ 2. $5/6$

✓ 3. $5/7$

✗ 4. $2/3$

Q.2 A vector ' $\vec{P}$ ' has 'X' and 'Y' components of magnitude 2 units and 4 units respectively. A vector ' $\vec{Q}$ ', along negative X axis, has magnitude 6 units. The vector ($\vec{Q}$ - $\vec{P}$) will be

Ans

✗ 1. $4(2\hat{i} - \hat{j})$

✗ 2. $4(2\hat{i} + \hat{j})$

✓ 3. $-4(2\hat{i} + \hat{j})$

✗ 4. $-4(2\hat{i} - \hat{j})$

Q.3 **The magnifying power of a telescope is nine. When it is adjusted for parallel rays, the distance between the objective and eyepiece is 20cm. The focal length of objective and eyepiece are respectively**

Ans

✗ 1. 15 cm,5 cm

✗ 2. 10 cm,10 cm

✗ 3. 11 cm,9 cm

✓ 4. 18 cm,2 cm

Q.4 **A molecule of water on the surface experiences a net**

Ans

✓ 1. downward resultant unbalanced cohesive force.

✗ 2. downward resultant unbalanced adhesive force.

✗ 3. upward resultant unbalanced cohesive force.

✗ 4. upward resultant unbalanced adhesive force.

Q.5 In hydrogen emission spectrum, for any series, the principal quantum number is 'n'. Corresponding maximum wavelength 'λ' is (R=Rydberg's constant)

Ans

✗ 1. $\frac{R(2n+1)}{n^2(n+1)}$

✓ 2. $\frac{n^2(n+1)^2}{R(2n+1)}$

✗ 3. $\frac{n^2(n+1)}{R(2n+1)}$

✗ 4. $\frac{R(2n+1)}{n^2(n+1)^2}$

Q.6 A coil has inductance 2 H. The ratio of its reactance, when it is connected first to an a.c. source and then to d.c. source, is

Ans
- ✗ 1. 1
- ✗ 2. zero
- ✗ 3. less than1
- ✓ 4. infinity

Q.7 If the speed of an electron of hydrogen atom in the ground state is 2.2×10^6 m/s, then its speed in the third excited state will be

Ans
- ✓ 1. 5.5×10^5 m/s
- ✗ 2. 5.5×10^6 m/s
- ✗ 3. 6.8×10^6 m/s
- ✗ 4. 8.8×10^5 m/s

Q.8 Glass has refractive index 'μ' with respect to air and the critical angle for a ray of light going from glass to air is 'θ'. If a ray of light is incident from air on the glass with angle of incidence 'θ', corresponding angle of refraction is

Ans
- ✗ 1. $sin^{-1}(\mu)$
- ✓ 2. $sin^{-1}\left(\frac{1}{\mu^2}\right)$
- ✗ 3. $sin^{-1}\left(\frac{1}{\mu}\right)$
- ✗ 4. $sin^{-1}\left(\frac{1}{\sqrt{\mu}}\right)$

Q.9 **The stopping potential of the photoelectrons, from a photo cell is**

Ans
- ✔ 1. directly proportional to frequency of incident light.
- ✘ 2. inversely proportional to frequency of incident light.
- ✘ 3. directly proportional to intesity of incident light.
- ✘ 4. inversely proportional to intesity of incident light.

Q.10 **Which of the following is the dimensional formula for electric polarisation**

Ans
- ✘ 1. $[M^{-1} L^{-2} T^{-1} I^{-1}]$
- ✘ 2. $[M^{0} L^{-1} T^{1} I^{1}]$
- ✘ 3. $[M^{-1} L^{-2} T^{1} I^{1}]$
- ✔ 4. $[M^{0} L^{-2} T^{1} I^{1}]$

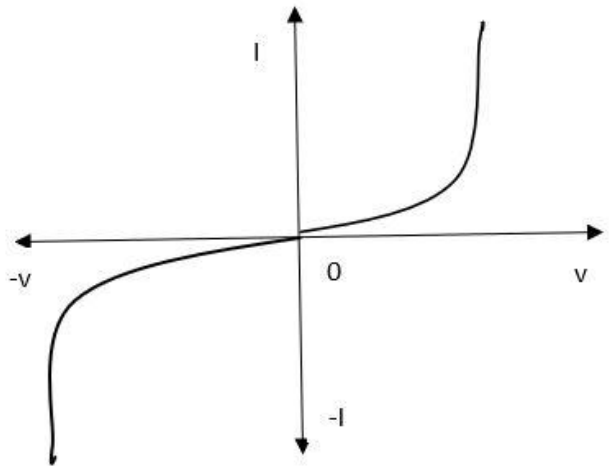
Q.11 A potentiometer wire has length 'L'. For given cell of e.m.f. 'E', the balancing length is '$L/3$' from the positive end of the wire. If the length of potentiometer wire is increased by 50% then for the same cell, the balance point is obtained at length

Ans
- ✔ 1. $\frac{L}{2}$ *from positive end*
- ✘ 2. $\frac{L}{3}$ *from positive end*
- ✘ 3. $\frac{L}{4}$ *from positive end*

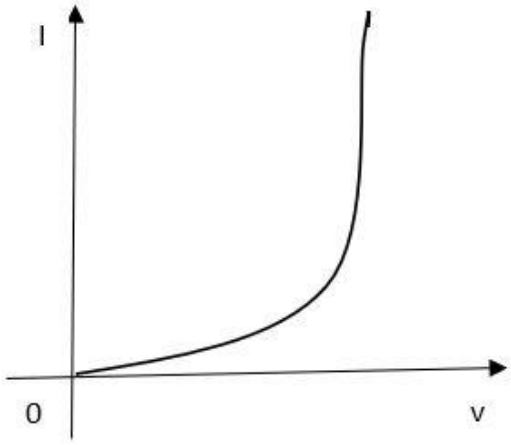
✗ 4. $\frac{L}{5}$ *from positive end*

Q.1 V-I characterstics of LED is shown correctly by graph
2

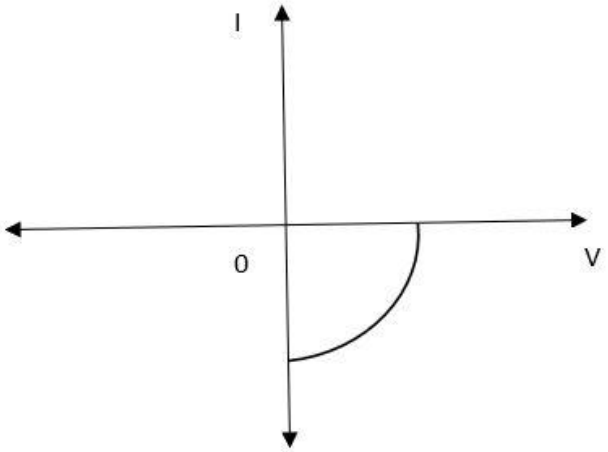
Ans ✗ 1.



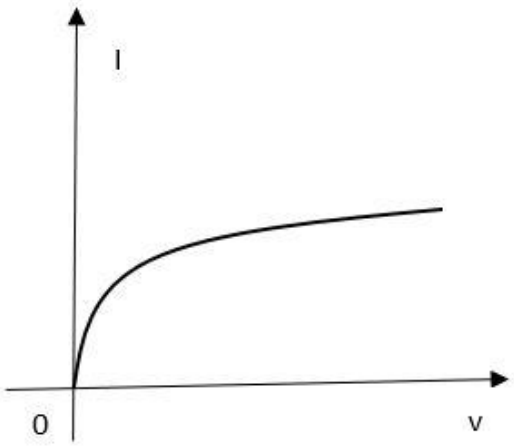
✔ 2.



✘ 3.



✘ 4.



Q.13 When a large bubble rises from bottom of a water lake to its surface, then its radius doubles. If the atmospheric pressure is equal to the pressure of height 'H' of a certain water column,then the depth of lake will be

Ans

- ✗ 1. 4H
- ✓ 2. 7H
- ✗ 3. H
- ✗ 4. 2H

Q.14 For homogeneous isotropic material, which one of the following can not be the value of Poisson's ratio?

Ans

- ✓ 1. 0.8
- ✗ 2. 0.5
- ✗ 3. -1

✗ 4. 0.1

Q.15 A magnetizing field of 5000 A/m produces a magnetic flux of 4×10^{-5} weber in an iron rod of cross sectional area 0.4 cm^2. The permeability of the rod in Wb / Am is

Ans

✗ 1. 1×10^{-3}

✓ 2. 2×10^{-4}

✗ 3. 3×10^{-5}

✗ 4. 4×10^{-6}

Q.16

A person measures a time period of a simple pendulum inside a stationary lift and finds it to be 'T'. If the lift starts accelerating upwards with an acceleration '$\left(\frac{g}{3}\right)$', the time period of the pendulum will be

Ans

✗ 1. $T/\sqrt{3}$

✗ 2. $\frac{T}{3}$

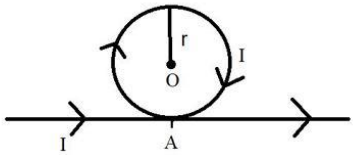
✓ 3. $\sqrt{3}\frac{T}{2}$

✗ 4. $\sqrt{3}\,T$

Q.17 In a hydrogen atom, an electron of charge 'e' revolves in a orbit of radius 'r' with speed 'v'. Then magnetic moment associated with electron is

Ans
1. 2evr
2. evr
3. $\frac{evr}{3}$
4. $\frac{evr}{2}$

Q.18 Figure show the circular coil carrying current 'I' kept very close but not touching at a point 'A' on a straight conductor carrying the same current 'I'. The magnitude of magnetic induction at the centre of the circular coil will be



Ans
1. $\frac{\mu_0 I}{2r}$
2. $\frac{\mu_0 I}{2\pi r}$
3. $zero$
4. $\frac{\mu_0 I}{2r}\left(1+\frac{1}{\pi}\right)$

Q.19 In Young's double slit experiment fifth dark fringe is formed opposite to one of the slit. If 'D' is the distance between the slits and the screen and 'd' is the separation between the slits then the wavelength of light used is

Ans

1. $\frac{d^2}{9D}$
2. $\frac{d^2}{15D}$
3. $\frac{d^2}{6D}$
4. $\frac{d^2}{5D}$

Q.20 A 220 V input is supplied to a transformer. The output circuit draws a current of 2.0 A at 440 V. If the ratio of output to input power is 0.8 then, the current drawn by primary windings is

Ans

1. 2.8 A
2. 5.0 A
3. 3.6 A
4. 2.5 A

Q.21 In damped S.H.M. , the SI unit of damping constant is

Ans

1. $\frac{N}{s}$
2. $\frac{kg}{s}$
3. $\frac{N}{m}$

✗ 4. $\frac{kg}{m}$

Q.2 2 A block of mass 'M' is pulled along a smooth horizontal surface with a rope of mass'm' by force 'F'. The acceleration of the block will be

Ans

✗ 1. $\frac{F}{M}$

✗ 2. $\frac{F}{(M-m)}$

✗ 3. $\frac{F}{m}$

✓ 4. $\frac{F}{(M+m)}$

Q.2 3 Eight identical drops of water falling through air with uniform velocity of 10 cm/s combine to form a single drop of big size, then terminal velocity of the big drop will be

Ans

✓ 1. 40 cm/s

✗ 2. 80 cm/s

✗ 3. 10 cm/s

✗ 4. 30 cm/s

Q.24 A wire of length 'L' and radius 'r' is rigidly fixed at one end. On stretching the other end of the wire with a force 'F', the increase in length is 'l'. If another wire of the same material but double the length and radius is stretched with a force '2F', then increase in length is

Ans

✗ 1. $l/2$

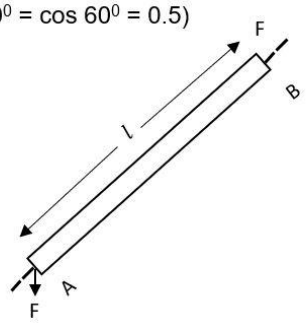
✓ 2. l

✗ 3. $l/4$

✗ 4. $2l$

Q.25 A rod 'l' m long is acted upon by a couple as shown in figure. The moment of couple is 'τ'Nm. If the force at each end of the rod, then magnitude of each force is

(sin 30^0 = cos 60^0 = 0.5)



Ans

✓ 1. $\frac{2\tau}{l}$

✗ 2. $\frac{l}{2\tau}$

✗ 3. $\frac{2l}{\tau}$

✗ 4. $\frac{\tau}{l}$

Q.26 Consider a particle of mass 'm' suspended by a string at the equator. Let 'R' and 'M' denote radius and mass of the earth. If 'ω' is the angular velocity of rotation of the earth about its own axis, then the tension on the string will be ($\cos 0^0 = 1$)

Ans

✗ 1. $\frac{GMm}{R^2}$

✗ 2. $\frac{GMm}{2R^2}$

✗ 3. $\frac{GMm}{2R^2} + m\omega^2 R$

✓ 4. $\frac{GMm}{R^2} - m\omega^2 R$

Q.27

A body of mass 'm' is performing a U.C.M. in a circle of radius 'r' with speed 'v'. The work done by the centripetal force in moving it through $\left(\frac{2}{3}\right)^{rd}$ of the circular path is

Ans

✗ 1. $\frac{2\pi m v^{2r}}{3}$

✗ 2. $\frac{2mv^2\pi}{3}$

✗ 3. $mv^2\pi r$

✓ 4. zero

Q.28 The vectors $(\vec{A}+\vec{B})$ and $(\vec{A}-\vec{B})$ are at right angles to each other. This is possible under the condition

Ans
✔ 1. $|\vec{A}| = |\vec{B}|$

✘ 2. $\vec{A} \bullet \vec{B} = 0$

✘ 3. $\vec{A} \bullet \vec{B} = 1$

✘ 4. $\vec{A} \times \vec{B} = 0$

Q.29 **A charged conductor produces an electric field of intensity 10^3 V/m just outside its surface in vacuum. Then it produces the electric field of intensity 'E' just outside its surface, when it is placed in a medium of dielectric constant 4. The value of 'E' will be**

Ans
✘ 1. 450 V/m

✘ 2. 400 V/m

✔ 3. 250 V/m

✘ 4. 150 V/m

Q.30 The S.I. unit and dimensions of Stefan's constant 'σ' in case of Stefan's law of radiation is

Ans
✘ 1. $J/m^2s^4K, [M^1L^0T^{-3}K^3]$

✔ 2. $J/m^2sK^4, [M^1L^0T^{-3}K^{-4}]$

✘ 3. $J/m^3sk^4, [M^1L^0T^{-3}K^4]$

✗ 4. $J/_{m^3s^4}, [M^1L^0T^{-3}K^{-4}]$

Q.31 **The total energy of a simple harmonic oscillator is proportional to**

Ans

✗ 1. frequency.

✗ 2. amplitude.

✓ 3. square of the amplitude.

✗ 4. square root of displacement.

Q.32 **Which of the following regions of a transistor are, respectively, heavily doped and lightly doped?**

Ans

✗ 1. Collector and emitter

✗ 2. Emitter and collector

✗ 3. Base and emitter

✓ 4. Emitter and base

Q.33 When certain metal surface is illuminated with a light of wavelength 'λ', the stopping potential is 'v'. When the same surface is illuminated by light of wavelength '2λ', the stopping potential is $\left(\frac{v}{3}\right)$. The threshold wavelength for the surface is

Ans

✗ 1. $\frac{4\lambda}{3}$

✗ 2. $\frac{8\lambda}{3}$

✔ 3. 4λ

✘ 4. 6λ

Q.34 A mass is whirled in a circular path with constant angular velocity and its linear velocity is 'V'. If the string is now halved keeping the angular momentum same, the linear velocity is

Ans

✘ 1. $V\sqrt{2}$

✔ 2. 2V

✘ 3. $\frac{V}{2}$

✘ 4. V

Q.35 Six very long insulated copper wires are bound together to form a cable. The currents carried by the wires are I_1 = +10 A, I_2 = -13 A, I_3 = +10 A, I_4 = +7 A, I_5 = -12 A and I_6 = 18 A. The magnetic induction at a perpendicular distance of 10 cm from the cable is ($\mu_0 = 4\pi \times 10^{-7}$ Wb/Am)

Ans

✘ 1. 35 μT

✘ 2. 30 μT

✘ 3. 37.5 μT

✔ 4. 40 μT

Q.36 The fundamental frequency of sonometer wire increases by 9 Hz if its tension is increased by 69 %, keeping the length constant. The frequency of the wire is

Ans

✔ 1. 30 Hz

2. 42 Hz

3. 24 Hz

4. 36 Hz

Q.37 For formation of beats, two sound notes must have

Ans
1. nearly equal frequencies and equal amplitudes.

2. different amplitudes and different frequencies.

3. exactly equal amplitudes only.

4. exactly equal frequencies only.

Q.38 The phenomenon of interference is based on

Ans
1. conservation of charge.

2. conservation of energy.

3. quantum nature of light.

4. conservation of momentum.

Q.39 If the radius of the circular path and frequency of revolution of a particle of mass 'm' are doubled then the change in its kinetic energy will be (E_i and E_f are the initial and final kinetic energies of the particle respectively.)

Ans
1. 8 E_f

2. 15 E_i

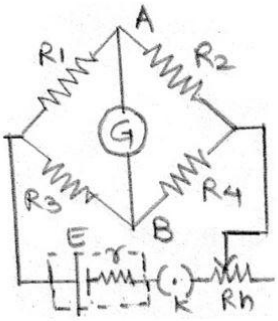
3. 16 E_i

4. 12 E_f

Q.40 In amplitude modulation, the amplitude of carrier wave is 'A_c' and that of the modulating signal is 'A_m'. In practice, the ratio of 'A_m' to 'A_c' is kept less than or equal to one, to avoid

Ans
- ✗ 1. noise
- ✗ 2. fading
- ✓ 3. distortion
- ✗ 4. attenuation

Q.41 In the network shown cell 'E' has internal resistance 'r' and the galvanometer shows zero deflection. If the cell is replaced by a new cell of emf'2E' and internal resistance '3r' keeping everything else identical then



Ans
- ✗ 1. current will flow from B to A.
- ✗ 2. the galvanometer will show deflection of 10 divisions.
- ✓ 3. the galvanometer will show zero deflection.
- ✗ 4. current will flow from A to B.

Q.4 2 In case of dimensions of electric field and electric dipole moment the power of mass is respectively

Ans
✗ 1. 0, 1
✗ 2. 1, 1
✗ 3. 0, 0
✓ 4. 1, 0

Q.4 3 A pipe open at both ends and a pipe closed at one end have same length. The ratio of frequencies of their P^{th} overtone is

Ans
✗ 1. $\frac{P+1}{2P}$
✗ 2. $\frac{P}{2P+1}$
✓ 3. $\frac{2(P+1)}{2P+1}$
✗ 4. $\frac{P+1}{2P+1}$

Q.4 4 A solid sphere rolls down from top of inclined plane, 7m high, without slipping. Its linear speed at the foot of plane is ($g = 10\ m/s^2$)

Ans
✗ 1. $\sqrt{\frac{280}{3}}$ m/s
✓ 2. $\sqrt{100}$ m/s
✗ 3. $\sqrt{70}$ m/s

✗ 4. $\sqrt{\frac{140}{3}}$ m/s

Q.45 A sonometer wire is in unison with a tuning fork, when it is stretched by weight 'W' and the corresponding resonating length is 'L_1'. If the weight is reduced to '$(\frac{W}{4})$', the corresponding resonating length becomes 'L_2'. The ratio '$(\frac{L_1}{L_2})$' is

Ans

✗ 1. 1:2

✗ 2. 1:4

✗ 3. 4:1

✓ 4. 2:1

Q.46 **A hole is drilled half way to the centre of the earth. A body weighs 300N on the surface of the earth. How much will it weigh at the bottom of the hole?**

Ans

✗ 1. 250 N

✗ 2. 120 N

✓ 3. 150 N

✗ 4. 200 N

Q.47 **A circular coil and a square coil is prepared from two identical metal wires and a current is passed through it. Ratio of magnetic dipole moment associated with circular coil to that of square coil is**

Ans

✗ 1. $\frac{2}{\pi}$

✔ 2. $\frac{4}{\pi}$

✘ 3. $\frac{\pi}{2}$

✘ 4. π

Q.48 **The r.m.s. speed of oxygen molecule in a gas is 'u'. If the temperature is doubled and the molecules dissociate into two atoms,the r.m.s. speed will be**

Ans

✘ 1. 4u

✘ 2. $u\sqrt{2}$

✘ 3. u

✔ 4. 2u

Q.49 **$[L^2 M^1 T^{-2}]$ are the dimensions of**

Ans

✔ 1. torque.

✘ 2. force.

✘ 3. angular momentum.

✘ 4. angular acceleration.

Q.50 **Maximum kinetic energy gained by the charged particle in the cylotron is independent of**

Ans

1. frequency of revolution.
2. mass.
3. radius of the dees.
4. charge.

Section : **Chemistry**

Q.1 The element which does not belong to group - 15 is

Ans
1. As
2. Se
3. P
4. Bi

Q.2 Which among the following salts, solubility decreases with increase in temperature?

Ans
1. Na_2SO_4
2. NaCl
3. NaBr
4. KCl

Q.3 The temperature of 32 ^{0}C is equivalent to

Ans
1. 89.6 ^{0}F
2. 70 ^{0}F
3. 85.6 ^{0}F
4. 69 ^{0}F

Q.4 The alkane formed on heating sodium butanoate with soda lime is

Ans

1. methane
2. propane
3. ethane
4. butane

Q.5 Which among the following statements is true about Schottky defect ?

Ans

1. In this regular cation is replaced by different cation.
2. In this cation or anion moves from regular site to place between lattice site.
3. Formation of metal alloy is example of this defect
4. In this defect cation and anion are lacking in stoichiometric proportion.

Q.6 "The mass and energy both are conserved in an isolated system", is the statement of

Ans

1. Third law of thermodynamics
2. Modified first law of thermodynamics
3. Second law of thermodynamics
4. First law of thermodynamics

Q.7 The correct order of boiling points of alkyl halides is

Ans

✗ 1. RF >RBr >RCl >RI

✗ 2. RI >RCl >RBr >RF

✗ 3. RI >RBr >RF >RCl

✓ 4. RI >RBr >RCl >RF

Q.8 The integrated rate equation for first order reaction, A → product, is

Ans

✗ 1. $K = \frac{2.303}{t} + \log_{10}\frac{[A]_0}{[A]_t}$

✗ 2. $K = 2.303\ t \log_{10}\frac{[A]_0}{[A]_t}$

✓ 3. $K = -\frac{1}{t}\ln\frac{[A]_t}{[A]_0}$

✗ 4. $K = \frac{1}{t}\ln\frac{[A]_t}{[A]_0}$

Q.9 What type of hybridization is present in carbocation formed during the alkaline hydrolysis of 1- Bromo-1- phenyl ethane?

Ans

✗ 1. sp^3

✗ 2. sp

✗ 3. d^2sp^3

✓ 4. sp^2

Q.10 Which among the following is correct for electrolysis of brine solution?

Ans
- ✔ 1. H_2 gas is liberated at cathode
- ✘ 2. Cl_2 gas is liberated at cathode
- ✘ 3. O_2 gas is liberated at cathode
- ✘ 4. Sodium metal is collected at anode

Q.11 Carbolic acid is oxidised by acidified sodium dichromate to give

Ans
- ✘ 1. Anthraquinone
- ✘ 2. Ethyl methyl ketone
- ✔ 3. Benzoquinone
- ✘ 4. Acetone

Q.12 How many primary amines are possible for molecular formula C_3H_9N?

Ans
- ✔ 1. 2
- ✘ 2. 4
- ✘ 3. 1
- ✘ 4. 3

Q.13 Which of the following metal halide is more covalent ?

Ans
- ✗ 1. $SnCl_2$
- ✗ 2. $SbCl_3$
- ✗ 3. $PbCl_2$
- ✓ 4. $SbCl_5$

Q.14 18 gram glucose (Molar mass = 180) is dissolved in 100 ml of water at 300 K. If R = 0.0821 L-atm $mol^{-1}K^{-1}$ what is the osmotic pressure of solution ?

Ans
- ✗ 1. 0.821 atm
- ✗ 2. 8.21 atm
- ✓ 3. 24.63 atm
- ✗ 4. 2.463 atm

Q.15 Based on first law of thermodynamics which of the following is correct

Ans
- ✗ 1. for an isothermal process, q = +w
- ✓ 2. for an isobaric process, $q_p = \Delta U + w$
- ✗ 3. for an adiabatic process, $\Delta U = -w$
- ✗ 4. for an isochoric process, $\Delta U = -q_v$

Q.16 The conversion of 2- methylpropan-1-ol to 2methylpropan-2-ol is

Ans
- ✓ 1. rearrangement reaction

2. addition reaction

3. elimination reaction

4. substitution reaction

Q.17 **The number of pi bonds present in benzoic acid molecule are**

Ans

1. 4

2. 6

3. 5

4. 3

Q.18 **The precipitation power of an electrolyte increases with**

Ans

1. charge of an ion

2. atomic radii

3. rise in temperature

4. ionic radii

Q.19 **In the electrolysis of aqueous sodium chloride with inert electrodes the products obtained at anode and cathode respectively are**

Ans

1. O_2 and Na

2. Cl_2 and Na

3. Cl_2 and H_2

4. Na and Cl_2

Q.20 The molar conductivities at infinite dilution for sodium acetate, HCl and NaCl are 91 S cm^2 mol^{-1}, 425.9 S cm^2 mol^{-1} and 126.4 S cm^2 mol^{-1} respectively. The molar conductivity of acetic acid at infinite dilution is

Ans
- ✗ 1. 930.5 S cm^2 mol^{-1}
- ✗ 2. 300.5 S cm^2 mol^{-1}
- ✗ 3. 530.9 S cm^2 mol^{-1}
- ✓ 4. 390.5 S cm^2 mol^{-1}

Q.21 The shape of BrF_5 molecule is

Ans
- ✗ 1. Trigonal bipyramidal
- ✓ 2. Square pyramidal
- ✗ 3. Trigonal pyramidal
- ✗ 4. Square planar

Q.22 Oxidation state of nitrogen in nitric oxide is

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

Q.2 In leaching of alumina from bauxite by Bayer's process, the ore is treated with
3

Ans
✔ 1. $NaOH_{(aq)}$

✘ 2. $Na_2CO_{3(aq)}$

✘ 3. $NaCN_{(aq)}$

✘ 4. $KCN_{(aq)}$

Q.2 A polymer which becomes soft on heating and hard on cooling, belongs to class of
4

Ans
✘ 1. fibers

✔ 2. thermoplastic polymer

✘ 3. elastomer

✘ 4. thermosetting polymer

Q.2 Which bond in a molecule of ethyl magnesium bromide is ionic in nature ?
5

Ans
✘ 1. C - C bond

✘ 2. C - Mg bond

✘ 3. C - H bond

✔ 4. Mg - Br bond

Q.26 Which of the following oxides can act both as an oxidising agent as well as reducing agent?

Ans

✗ 1. N_2O

✗ 2. P_2O_5

✗ 3. SO_3

✓ 4. SO_2

Q.27 For the elementary reaction, $3H_{2(g)} + N_{2(g)} \rightarrow 2NH_{3(g)}$ identify the correct relation among the following relations

Ans

✓ 1. $\frac{-2}{3}\frac{d[H_{2(g)}]}{dt} = \frac{d[NH_{3(g)}]}{dt}$

✗ 2. $\frac{d[NH_{3(g)}]}{dt} = \frac{-1}{3}\frac{d[H_{2(g)}]}{dt}$

✗ 3. $\frac{-d[H_{2(g)}]}{dt} = \frac{d[NH_{3(g)}]}{dt}$

✗ 4. $\frac{-3}{2}\frac{d[H_{2(g)}]}{dt} = \frac{d[NH_{3(g)}]}{dt}$

Q.28 If a metal crystallises in bcc structure with edge length of unit cell 4.29×10^{-8} cm the radius of metal atom is

Ans
✗ 1. 1.07×10^{-8} cm
✗ 2. 1.07×10^{-7} cm
✗ 3. 3.2×10^{-7} cm
✓ 4. 1.86×10^{-8} cm

Q.29 In which among the following compounds, oxidation number of nitrogen is +5?

Ans
✗ 1. NO_2
✗ 2. N_2O
✗ 3. N_2O_3
✓ 4. HNO_3

Q.30 Which of the following is NOT present in DNA ?

Ans
✗ 1. Guanine
✗ 2. Adenine
✓ 3. Uracil
✗ 4. Thymine

Q.31 The elevation in boiling point of 0.25 molal aqueous solution of a substance is (Kb = 0.52 K Kg mol^{-1})

Ans
✗ 1. 2.08 K
✗ 2. 0.50 K

3. 0.15 K

4. 0.13 K

Q.3 2 IUPAC name of the complex $Ba[CuCl_4]$ is

Ans

1. Tetrachlorobarium copper(II)

2. Barium tetrachlorocuprate(II)

3. Tetrachlorobariumcuprate(III)

4. Barium tetrachlorocuprate(III)

Q.3 3 Natalite is a mixture of

Ans

1. ethyl alcohol and dimethyl ether

2. acetic acid and diethyl ether

3. Ethyl bromide and diethyl ether

4. diethyl ether and ethyl alcohol

Q.3 4 Which element among the following is NOT present in saccharine ?

Ans

1. C

2. P

3. S

4. N

Q.3 5 What is the shape and magnetic nature of permanganate ion?

Ans

✗ 1. Tetrahedral, paramagnetic

✓ 2. Tetrahedral, diamagnetic

✗ 3. Planar, paramagnetic

✗ 4. Pyramidal, diamagnetic

Q.3 6 The combining ratios of hydrogen and oxygen in water and hydrogen peroxide are 1:8 and 1:16. Which law is illustrated in this example ?

Ans

✗ 1. Law of conservation of mass

✗ 2. Law of definite proportions

✗ 3. Gay Lussac's law of combining volumes of gases

✓ 4. Law of multiple proportions

Q.3 7 The diagonal relationship in Be and Al is due to

Ans

✗ 1. Similar electronegativity

✗ 2. Similar metallic character

✓ 3. Similar ionic size and charge/radius ratio

✗ 4. Similar ionization enthalpy

Q.38 Which of the following does not give yellow solid on treatment with sodium hypoiodite ?

Ans
- ✗ 1. Acetophenone
- ✗ 2. Pentan-2-one
- ✗ 3. Ethanal
- ✓ 4. Pentan-3-one

Q.39 A gas performs 0.320 kJ work on surrounding and absorbs 120 J of heat from the surrounding. Hence change in internal energy is

Ans
- ✓ 1. -200 J
- ✗ 2. 440 J
- ✗ 3. 200 J
- ✗ 4. 120.32 J

Q.40 Calculate E.M.F. of following cell at 298 K

$Zn_{(s)}|ZnSO_4(0.01\ M)|\ |CuSO_4(1.0\ M)|\ Cu_{(s)}$

if $E^0_{cell} = 2.0\ V$

Ans
- ✗ 1. 1.0508 V
- ✗ 2. 2.0296 V
- ✗ 3. 2.0 V
- ✓ 4. 2.0592 V

Q.41 Which among the following polymer does not show cross linking in it ?

Ans
- ✗ 1. Vulcanized Rubber

2. Bakelite

3. Nylon-6

4. Melamine

Q.4 Which of the following is NOT the mineral of iron ?
2

Ans

1. Haematite

2. Limonite

3. Corundum

4. Magnetite

Q.4 Hinsberg's reagent is
3

Ans

1. benzene sulphonamide

2. benzene sulphonic acid

3. benzene sulphonyl chloride

4. sodium benzene sulphonate

Q.4 Which mixture is used for respiration by deep sea divers?
4

Ans

1. $He+O_2$

2. $Ne+O_2$

3. $Ar+O_2$

4. $Kr+O_2$

Q.45 A flavouring agent found in oil of wintergreen is,

Ans

1. acetophenone
2. vanillin
3. methyl salicylate
4. menthol

Q.46 Soaps are the sodium or potassium salts of higher fatty acids, containing number of carbon atoms more than,

Ans

1. 12
2. 10
3. 6
4. 8

Q.47 The effective atomic number of Iron (Z = 26) in $[Fe(CN)_6]^{-3}$ is

Ans

1. 33
2. 35
3. 36
4. 34

Q.4 The vitamin that belongs to aromatic series is
8

Ans

✗ 1. A

✗ 2. B complex

✗ 3. C

✓ 4. K

Q.4 The SI unit of electrochemical equivalent is
9

Ans

✗ 1. $Kg\ m^{-1}\ s^{-2}$

✓ 2. $Kg\ C^{-1}$

✗ 3. $J\ s^{-1}$

✗ 4. $Kg\ m\ s^{-2}$

Q.5 The highest oxidation state in plutonium (At. no = 94) is
0

Ans

✗ 1. +5

✓ 2. +7

✗ 3. +6

✗ 4. +4

Section : **Mathematics**

Q.1 For a sequence (t_n), if $S_n = 5(2^n - 1)$ then $t_n =$ .....

Ans

✗ 1. $\frac{2 \times (2^{n-1})}{5}$

✗ 2. $\frac{5 \times 2^n}{4}$

✗ 3. $5(2^{n+1})$

✓ 4. $5(2^{n-1})$

Q.2 Which of the following statement pattern is a tautology?

Ans

✗ 1. $(p \vee q) \rightarrow q$

✓ 2. $p \rightarrow (q \vee p)$

✗ 3. $p \vee (q \rightarrow p)$

✗ 4. $(p \rightarrow q) \vee q$

Q.3

$$\frac{1-2[cos60^o - cos80^o]}{2sin10^0} = \ldots$$

Ans

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

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

3. 2

4. 1

Q.4 If $y = tan^{-1}\left(\frac{1-cos3x}{sin3x}\right)$, then $\frac{dy}{dx} = \ldots$

Ans

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

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

3. $-\frac{1}{2}$

4. $-\frac{3}{2}$

Q.5 Let X be the number of successes in 'n' independent Bernoulli trials with probability of success $p = \frac{3}{4}$. The least value of 'n' so that $P(X \geq 1) \geq 0.9375$ is .....

Ans

1. 3

2. 4

3. 1

4. 2

Q.6 If A = $\{x \in R / x^2 + 5|x| + 6 = 0\}$ then n(A) = ...

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

Q.7 In ΔABC, with the usual notations, if $\left(\tan \frac{A}{2}\right)\left(\tan \frac{B}{2}\right) = \frac{3}{4}$ then a+b=....

Ans
- ✗ 1. 3c
- ✗ 2. 2c
- ✓ 3. 7c
- ✗ 4. 4c

Q.8 If $y = log\left[\frac{x + \sqrt{x^2 + 25}}{\sqrt{x^2 + 25} - x}\right]$ then $\frac{dy}{dx}$ =.....

Ans
- ✗ 1. $\frac{-2}{\sqrt{x^2 + 25}}$
- ✗ 2. $\frac{1}{\sqrt{x^2 + 25}}$

3. $\frac{-1}{\sqrt{x^2+25}}$

4. $\frac{2}{\sqrt{x^2+25}}$

Q.9 If line $\frac{2x-4}{\lambda} = \frac{y-1}{2} = \frac{z-3}{1}$ and $\frac{x-1}{1} = \frac{3y-1}{\lambda} = \frac{z-2}{1}$ are perpendicular to each other then λ = ...

Ans

1. 7

2. $-\frac{6}{7}$

3. $-\frac{7}{6}$

4. 6

Q.1 The probability that three card drawn from a pack of 52 cards, are all red is...
0

Ans

1. $\frac{4}{17}$

2. $\frac{1}{17}$

3. $\frac{3}{17}$

4. $\frac{2}{17}$

Q.11 Let $a: \sim (p \wedge \sim r) \vee (\sim q \vee s)$ *and*

$b: (p \vee s) \leftrightarrow (q \wedge r)$. If the truth values of p and q are true and that of r and s are false, then the truth values of a and b are respectively .....

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

Q.12 If $z = ax + by$; $a, b > 0$ subject to $x \leq 2, y \leq 2, x + y \geq 3, x \geq 0, y \geq 0$ has minimum value at (2,1) only, then .....

Ans
- ✗ 1. $a > b$
- ✓ 2. $a < b$
- ✗ 3. a = 1 + b
- ✗ 4. $a = b$

Q.13 Area of the region bounded by $y = \cos x, x = 0, x = \pi$ and x-axis is....sq.units

Ans
- ✓ 1. 2
- ✗ 2. 4

✗ 3. 3

✗ 4. 1

Q.14 $\bar{a}$ and $\bar{b}$ are non-collinear vectors. If $\bar{c} = (x-2)\,\bar{a} + \bar{b}$ *and* $\bar{d} = (2x+1)\,\bar{a} - \bar{b}$ *are* collinear vectors, then the value of x =….

Ans

✗ 1. $\frac{1}{2}$

✗ 2. $\frac{1}{4}$

✓ 3. $\frac{1}{3}$

✗ 4. $\frac{1}{5}$

Q.15 If A and B are square matrices of order 3 such that $|A| = 2, |B| = 4$, then $|A\ (adj\ B)|$ =….

Ans

✗ 1. 8

✓ 2. 32

✗ 3. 64

✗ 4. 16

Q.1

6 In ΔABC, with the usual notations, if sin B sin C = $\frac{bc}{a^2}$, then the triangle is.....

Ans
✗ 1. obtuse angled triangle
✗ 2. Acute angled triangle
✗ 3. Equilateral triangle
✓ 4. Right angled triangle

Q.17 Which of the following can not be the direction cosines of a line ?

Ans
✓ 1. $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}$
✗ 2. $\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$
✗ 3. $\sqrt{\frac{1}{5}}, -\sqrt{\frac{1}{2}}, \sqrt{\frac{3}{10}}$
✗ 4. $\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, 0$

Q.18 If *r* is the radius of spherical balloon at time t and the surface area of balloon changes at a constant rate *K*, then .....

Ans
✓ 1. $4\pi r^2 = Kt + c$
✗ 2. $4\pi r^2 = \frac{Kt^2}{2} + c$
✗ 3. $\pi r^2 = \frac{Kt^2}{2} + c$
✗ 4. $8\pi r^2 = Kt + c$

Q.19

The solution of differential equation $(x^2+1)\frac{dy}{dx}+(y^2+1)=0$ is…

Ans

✔ 1. $tan^{-1}x + tan^{-1}y = c$

✘ 2. $x + y = c$

✘ 3. $x^2 = y^2 + c$

✘ 4. $(x^2+1)(y^2+1) = c$

Q.20

The acute angle between lines $x - 3 = 0$ and $x + y = 19$ is…

Ans

✘ 1. 30^0

✘ 2. 90^0

✔ 3. 45^0

✘ 4. 60^0

Q.21 If $f(x) = \left[\tan\left(\frac{\pi}{4}+x\right)\right]^{\frac{1}{x}}, x \neq 0$

$= k,$ $x = 0$, is continuous at $x = 0$

Then $k = \ldots.$

Ans
1. 1
2. e^2
3. e^{-2}
4. e

Q.22 The slope of normal to the curve $x = \sqrt{t}\ and\ y = t - \frac{1}{\sqrt{t}}$ at $t = 4$ is…

Ans
1. $\frac{17}{4}$
2. $\frac{-4}{17}$
3. $\frac{-17}{4}$
4. $\frac{4}{17}$

Q.23 The direction ratios of the normal to the plane passing through origin and the line of intersection of the planes $x + 2y + 3z = 4$ and $4x + 3y + 2z = 1$ are ...

Ans
1. 2,3,1

✗ 2. 3,1,2

✓ 3. 3,2,1

✗ 4. 1,2,3

Q.24 If $f(x)$ is continuous at $x = 3$, where

$f(x) = ax + 1$, for $x \leq 3$

$= bx + 3$, for $x > 3$ then....

Ans

✗ 1. $a + b = \frac{-2}{3}$

✗ 2. $a + b = \frac{2}{3}$

✓ 3. $a - b = \frac{2}{3}$

✗ 4. $a - b = \frac{-2}{3}$

Q.25 **The edge of a cube is decreasing at the rate of 0.04 cm/sec. If the edge of the cube is 10 cms, then rate of decrease of surface area of the cube is...**

Ans

✗ 1. $48cm^2/sec$

✓ 2. $4.8cm^2/sec$

✗ 3. $4.08cm^2/sec$

✗ 4. $4.008cm^2/sec$

Q.26

If the scalar triple product of the vectors $-3\hat{\imath}+7\hat{\jmath}-3\hat{k}$, $3\hat{\imath}-7\hat{\jmath}+\lambda\hat{k}$ and $7\hat{\imath}-5\hat{\jmath}-3\hat{k}$ is 272 then λ= .....

Ans
✓ 1. 11
✗ 2. 8
✗ 3. 9
✗ 4. 10

Q.27

$$\sin[3sin^{-1}(0.4)] = \ldots$$

Ans
✗ 1. 0.764
✗ 2. 0.256
✓ 3. 0.944
✗ 4. 0.466

Q.2

8

$$\int \frac{dx}{(sinx+cosx)(2cosx+sinx)} =$$

Ans

1. $log|sinx+cosx|+c$
2. $log\left|\frac{tanx+2}{tanx+1}\right|+c$
3. $log\left|\frac{tanx+1}{tanx+2}\right|+c$
4. $log\left|\frac{sinx+cosx}{2cosx-sinx}\right|+c$

Q.29 $\int_0^{\frac{\pi}{2}} \sqrt{cos\theta}\,.sin^3\theta d\theta$ = ...

Ans

1. $\frac{20}{21}$
2. $\frac{8}{21}$
3. $\frac{-20}{21}$
4. $\frac{-8}{21}$

Q.30

$$\int_{\frac{\pi}{18}}^{\frac{4\pi}{9}} \frac{2\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx = \cdots$$

Ans

1. $\frac{5\pi}{18}$
2. $\frac{7\pi}{18}$
3. $\frac{5\pi}{36}$
4. $\frac{7\pi}{36}$

Q.31

If w is a complex cube root of unity and

$$A = \begin{bmatrix} w & 0 & 0 \\ 0 & w^2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ then A^{-1}=...

Ans

1. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
2. $\begin{bmatrix} 0 & 0 & w \\ 0 & w^2 & 0 \\ 1 & 0 & 0 \end{bmatrix}$

3. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & w^2 & 0 \\ 0 & 0 & w \end{bmatrix}$

4. $\begin{bmatrix} w^2 & 0 & 0 \\ 0 & w & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Q.32 The joint equation of lines passing through origin and having slopes $(1+\sqrt{2})$ and $\frac{-1}{1+\sqrt{2}}$ is .....

Ans

1. $x^2 - 2\sqrt{2}xy + y^2 = 0$

2. $x^2 + 2xy - y^2 = 0$

3. $x^2 - 2\sqrt{2}xy - y^2 = 0$

4. $x^2 + 2xy + y^2 = 0$

Q.33

The p. d. f. of a random variable X is

$f(x) = 3(1 - 2x^2), \quad 0 < x < 1$

$= 0$, otherwise

Then P $(\frac{1}{4} < X < \frac{1}{3}) = \ldots$

Ans

1. $\frac{179}{864}$
2. $\frac{189}{864}$
3. $\frac{169}{864}$
4. $\frac{159}{864}$

Q.34 Derivative of $\sin^{-1}\left(\frac{t}{\sqrt{1+t^2}}\right)$ with respect to $\cos^{-1}\left(\frac{1}{\sqrt{1+t^2}}\right)$ is

Ans

1. $\cot t$
2. 0
3. 1
4. $\tan t$

Q.35

If $f(x)=x+\frac{1}{x}$, $x \neq 0$, then local maximum and minimum values of function f are respectively…

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

Q.36 The length of the latus rectum of an ellipse is $\frac{18}{5}$ and eccentricity is $\frac{4}{5}$, then equation of the ellipse is….

Ans
- ✗ 1. $\frac{x^2}{25}+\frac{y^2}{8}=1$
- ✗ 2. $\frac{x^2}{16}+\frac{y^2}{9}=1$
- ✓ 3. $\frac{x^2}{25}+\frac{y^2}{9}=1$
- ✗ 4. $\frac{x^2}{25}+\frac{y^2}{16}=1$

Q.37 The vector equation of the plane $\vec{r}=\left(2\hat{\imath}+\hat{k}\right)+\lambda(\hat{\imath})+\mu(\hat{\imath}+2\hat{\jmath}-3\hat{k})$ in scalar product form is $\vec{r}.\left(3\hat{\imath}+2\hat{k}\right)=\alpha$, then α = ……

Ans
- ✗ 1. 0
- ✓ 2. 2
- ✗ 3. 3

✗ 4. 1

Q.38 **The order of the differential equation of all circles which lie in the first quadrant and touch both the axes is…**

Ans

✗ 1. two

✗ 2. four

✗ 3. three

✓ 4. one

Q.39 If A, B, C are p^{th}, q^{th} and r^{th} terms of a G. P. respectively then $A^{q-r}.B^{r-p}.C^{p-q} = \ldots\ldots$

Ans

✗ 1. -1

✗ 2. 3

✓ 3. 1

✗ 4. 0

Q.40 **A player tosses 2 fair coins. He wins Rs. 5 if 2 heads appear, Rs. 2 if 1 head appear and Rs.1 if no head appears, then variance of his winning amount is….**

Ans

✗ 1. $\frac{17}{2}$

✗ 2. 6

✗ 3. $\frac{5}{2}$

✔ 4. $\frac{9}{4}$

Q.41 The eccentricity of the hyperbola $25x^2 - 9y^2 = 225$ is…

Ans
✘ 1. $\sqrt{34}$

✘ 2. $\frac{\sqrt{34}}{5}$

✔ 3. $\frac{\sqrt{34}}{3}$

✘ 4. 4

Q.42 The maximum value of $Z = 5x + 4y$,
Subject to $y \leq 2x,\ x \leq 2y,\ x + y \leq 3,\ x \geq 0,\ y \geq 0$ is…

Ans
✘ 1. 18

✔ 2. 14

✘ 3. 12

✘ 4. 13

Q.43 If sum of the slopes of the lines given by $x^2 - 4pxy + 8y^2 = 0$ is three times their product then p = ……

Ans

✔ 1. $\frac{3}{4}$

✗ 2. 4

✗ 3. $\frac{1}{4}$

✗ 4. 3

Q.44 For any non zero vectors $\bar{a}, \bar{b}, \bar{c}$
$\bar{a}.[(\bar{b}+\bar{c}) \times (\bar{a}+\bar{b}+\bar{c})] = \ldots.$

Ans

✔ 1. 0

✗ 2. $[\bar{a}\ \bar{b}\ \bar{c}]$

✗ 3. $[\bar{a}\ \bar{c}\ \bar{b}]$

✗ 4. $2[\bar{a}\ \bar{b}\ \bar{c}]$

Q.45 $\int \log x \,.\, [\log(ex)]^{-2} dx = \cdots$

Ans

✗ 1. $x(1 - logx) + c$

✗ 2. $\frac{x}{1 - logx} + c$

3. $x(1+logx)+c$

4. $\frac{x}{1+logx}+c$

Q.46 The domain of the real valued function $f(x)=\sqrt{\frac{x-2}{3-x}}$ is...

Ans
1. (2,3]
2. [2,3)
3. (2,3)
4. [2,3]

Q.47 "If two triangles are congruent, then their areas are equal " is the given statement then the contrapositive of, the inverse of the given statement is

Ans
1. If two triangles are not congruent then their areas are equal
2. If two triangles are not congruent then their areas are not equal
3. If areas of two triangles are not equal then they are congruent
4. If areas of two triangles are equal then they are congruent

Q.48 If $\int \frac{1}{1-\cot x}\,dx = Ax + B\log|sinx - cosx| + c$ then A + B = ...

Ans
1. -2

2. -1

3. 1

4. 0

Q.49 **Which of the following function has period 2?**

Ans

1. $cos\left[\left(\frac{\pi}{2}\right)x\right]$

2. $cos\left[\left(\frac{\pi}{3}\right)x\right]$

3. $\cos(\pi x)$

4. $\cos(2\pi x)$

Q.50 The polar coordinates of P are $\left(2,\frac{\pi}{6}\right)$. If Q is the image of P about the X-axis then the polar coordinates of Q are….

Ans

1. $\left(2,\frac{5\pi}{6}\right)$

2. $\left(2,\frac{\pi}{6}\right)$

3. $\left(2,\frac{\pi}{3}\right)$

4. $\left(2,\frac{11\pi}{6}\right)$