MHT-CET 2019

Day 2 - Shift 2

Section : **Physics**

Q.1 L-C-R series circuit contains a resistance of 10 Ω and self inductance 0.4 H connected in series with variable capacitor across 60 V and 50 Hz supply.

The value of capacity at resonance will be [$\pi^2 = 10$]

Ans

✔ 1. 25 μF

✗ 2. 24 μF

✗ 3. 26 μF

✗ 4. 22 μF

Q.2 The compressibility of water is 6×10^{-10} $N^{-1}m^2$. If one litre of water is subjected to a pressure of 4×10^{7} Nm^{-2}, the decrease in its volume is

Ans

✗ 1. 24×10^{-3} m^3

✗ 2. 24 m^3

✔ 3. 24 cc

✗ 4. 24×10^{-6} cc

Q.3 **The magnetic field at a point due to a current carrying conductor is '3T'. If the current flowing through a conductor is doubled then magnetic field will be**

Ans
1. 6 T
2. 2 T
3. 8 T
4. 4 T

Q.4 A capacitor of capacitance 'C_1' is charged upto potential 'V' and is then disconnected from the battery. It is then connected to uncharged capacitor, in parallel, whose capacitance is 'C_2'. The potential difference across each capacitor is

Ans
1. $\frac{C_2 V}{C_1 + C_2}$
2. $\frac{C_1 + C_2}{C_1 V}$
3. $\frac{C_1}{C_1 + C_2} V$
4. $\frac{C_1 + C_2}{C_2 V}$

Q.5 The ratio of R.M.S. velocities of hydrogen molecules to oxygen molecules at 273^{o} C is (molecular wt. of hydrogen and oxygen is 2 and 32 respectively)

Ans
1. 4:1
2. 1:4
3. 16:1
4. 1:8

Q.6 A wire of mass 'M' , density 'ϱ', radius 'R' and original length 'L' is stretched by a certain force. If 'r' is the change in its radius and 'l' is the chnge in its length, then its Poisson's ratio is

Ans

✗ 1. $\frac{Mr\varrho}{\pi R^2 l}$

✗ 2. $\frac{MR\varrho}{\pi r^3 l}$

✓ 3. $\frac{Mr}{\pi R^3 \varrho l}$

✗ 4. $\frac{MR}{\pi r^2 l \varrho}$

Q.7 The range for line of sight of propogation that is the distance of coverage of transmitting antenna is 12.8 km. The height of the antenna is (Radius of earth =6400 km)

Ans

✗ 1. 16.0 m

✗ 2. 3.2 m

✓ 3. 12.8 m

✗ 4. 6.4 m

Q.8 For destructive interference to take place between two monochromatic light waves of wavelength ' λ',the path difference should be , (Where n=1,2,3,_ _ _ _ _)

Ans
✔ 1. (2n-1) λ/2

✘ 2. (2n-1) λ/4

✘ 3. (2n+1) λ/2

✘ 4. nλ

Q.9 In phase difference between two S.H.M.s of same amplitude 'a' is '$\frac{\pi}{2}$' radian, then the resultant amplitude will be $[sin0° = cos90° = 0]$

Ans
✘ 1. 0.7071 a

✔ 2. 1.414 a

✘ 3. $\frac{a}{1.732}$

✘ 4. 0.866 a

Q.10 If the angle between the vectors $\vec{P}$ and $\vec{Q}$ is θ, then the value of the product $(\vec{Q} \times \vec{P}) \bullet \vec{P}$ is

Ans
✔ 1. zero

✘ 2. $P^2Q^2\cos\theta$

✘ 3. P^2Q^2

✘ 4. $PQ\sin\theta$

Q.11 **A clock 'S' is working on oscillations of a spring and a clock 'P' is working on pendulum motion. Both clocks are running at the same rate on earth. What will happen to their functioning on a planet which has the same density as that of earth, but the radius is twice that of earth?**

Ans

✔ 1. 'S' will run faster than 'P'

✘ 2. both will run at the same rate as on the earth

✘ 3. P will run faster than S

✘ 4. both will run at the same rate, but not the same as on earth

Q.12 A ray of light is incident on a medium of refractive index 'μ' at an angle of incidence 'i'. After refraction the angle of deviation is 'δ'. Then $\frac{1}{\mu}$ is

Ans

✔ 1. cos δ - sin δ cot i

✘ 2. cos δ - sin δ tan i

✘ 3. sin δ - cos δ tan i

✘ 4. sin δ - cos δ cot i

Q.13 **An open pipe is suddenly closed so that the second overtone of the closed pipe is observed to be higher in frequency by 100Hz than the first overtone of the original pipe. The fundamental frequency of the open end pipe will be**

Ans

✘ 1. 100 Hz

✘ 2. 50 Hz

✔ 3. 200 Hz

✘ 4. 300 Hz

Q.14 **If N_o is the original number of nuclei of radioactive element having half life period of 4 years,**

4 then the number of nuclei left after 12 years is

Ans

1. $\frac{N_0}{2}$

2. $\frac{N_0}{4}$

3. $\frac{N_0}{8}$

4. $\frac{N_0}{16}$

Q.15 For a planet, the accelaeration due to gravity is half the acceleration due to gravity on the earth.Also the radius of the planet is half the radius of the earth. Then the mass of the planet in terms of mass of earth 'M' is

Ans

1. M/8

2. M/7

3. M/5

4. M/6

Q.16 Absolute refractive indices of glass and water are $\frac{3}{2}$ and $\frac{4}{3}$ respectively. The ratio of velocity of light in glass and water will be

Ans

1. 8:7

2. 4:3

3. 3:4

4. 8:9

Q.17 If the kinetic energy per unit volume of an ideal gas is 'E', then the pressure exerted by the gas is

Ans

1. $\frac{3E}{2}$
2. $\frac{E}{2}$
3. $\frac{E}{3}$
4. $\frac{2E}{3}$

Q.18 By considering frictional force for a vehicle of mass '*m*' moving along rough curved road, banked at an angle 'θ', the maximum safety speed of a vehicle is (*R* = radius of circular path, *g* = acceleration due to gravity)

Ans

1. $V_m = \sqrt{\frac{1}{Rg}\left[\frac{1+\mu_s tan\theta}{\mu_s + tan\theta}\right]}$
2. $V_m = \sqrt{Rg\left[\frac{\mu_s + tan\theta}{1+\mu_s tan\theta}\right]}$
3. $V_m = \sqrt{Rg\left[\frac{\mu_s + tan\theta}{1-\mu_s tan\theta}\right]}$
4. $V_m = \sqrt{Rg\left[\frac{\mu_s + tan\theta}{1+tan\theta}\right]}$

Q.19 In the equation,force F=A/Linear density, the dimensions of 'A' are

Ans
✗ 1. $[L^1M^0T^{-2}]$
✓ 2. $[L^0M^2T^{-2}]$
✗ 3. $[L^1M^0T^{-1}]$
✗ 4. $[L^0M^1T^{-1}]$

Q.20 The mass of a body on the surface of the earth is 10 kg. The mass of the same body on the surface on the moon is
[$g_m = \frac{1}{6}\, g_e$, where g_m, g_e are acceleration due to gravity on the surface of the moon and the earth respectively]

Ans
✗ 1. 20 kg
✗ 2. 5 kg
✗ 3. 15 kg
✓ 4. 10 kg

Q.21 A plano convex lens fits exactly into a plano -concave lens with plane surfaces parallel to each other. The radius of curvature of the curved surface of the lenses is 'R'. If the lenses are made of different materials of refractive indices 'μ_1' and 'μ_2' respectively, then the focal length of the combination is

Ans
✗ 1. $\frac{R}{2(\mu_1 + \mu_2)}$

2. $\frac{R}{2(\mu_1 - \mu_2)}$

3. $\frac{2R}{(\mu_1 - \mu_2)}$

4. $\frac{R}{(\mu_1 - \mu_2)}$

Q.2 2 Photoelectrons are obtained by irraditing zinc with radiation of 3100 A.U. In order to increase the K.E. of ejected photoelectrons

Ans

1. both wavelength and intensity of incident radiation should be increased.
2. the wavelength of incident radiation should be increased.
3. the wavelength of incident radiation should be decreased.
4. the intensity of incident radiation should be increased.

Q.2 3 The ratio of the angular speed of the hour hand of a clock to that of its minute hand is

Ans

1. 1:12
2. 3600:1
3. 12:1
4. 1:24

Q.24 A pendulum swings at depth 'd' below the surface of the earth with period 'T'. Same pendulum oscillates with same period 'T' at height 'h' above the surface of the earth. The ratio '$\frac{d}{h}$' will be

Ans
✗ 1. 1:4
✗ 2. 1:2
✗ 3. 1:1
✓ 4. 2:1

Q.25 If bullet of mass 'm_1' is fired from a gun of mass 'm_2' with a speed of 'V_1', then the recoil velocity of gun is

Ans
✗ 1. $-\frac{m_2}{m_1 V_1}$
✓ 2. $-\frac{m_1 V_1}{m_2}$
✗ 3. $\frac{m_2}{m_1 V_1}$
✗ 4. $\frac{m_1 V_1}{m_2}$

Q.26 A simple harmonic progressive wave travelling through a medium is represented by $y = a \sin 2\pi (nt - \frac{x}{\lambda})$. If the maximum velocity of particle of medium is 'P' times the wave velocity, then the wave length 'λ' of the wave is given by

Ans

1. $\frac{2\pi a}{P}$

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

3. $P\pi a$

4. $\frac{\pi a}{P}$

Q.27 In parallel plate capacitor, electric field between the plates is 'E'. If the charge on the plates is 'Q' then the force on each plate is

Ans

1. $QE^2/_2$

2. QE

3. QE^2

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

Q.28 The magnetic induction at a point near end of a current carrying solenoid is (I = current, n = number of turns per unit length, μ_0 = permeanability)

Ans

1. $\mu_0 nI$

2. $\frac{1}{4}\mu_0 nI$

✗ 3. $2\mu_0 nI$

✓ 4. $\frac{1}{2}\mu_0 nI$

Q.29 **A sonometer wire is vibrating in third overtone.There are**

Ans

✓ 1. 5 nodes and 4 antinodes.

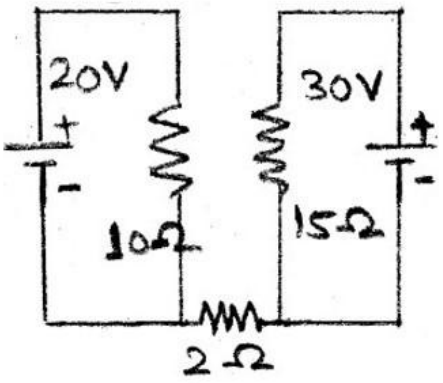
✗ 2. 4 nodes and 5 antinodes.

✗ 3. 5 nodes and 5 antinodes.

✗ 4. 4 nodes and 4 antinodes.

Q.30

The current through 2Ω resistance for the given circuit is



Ans

✗ 1. 2 A

✗ 2. 4 A

✗ 3. 5 A

✓ 4. zero

Q.31 Two perpendicular forces of magnitude 1N and 4N are inclined to positive X axis and positive Y axis at 45° respectively. Another force of magnitude 2N acts in opposite direction of 4N force. To have the resultant force only along Y axis, the minimum force which should be added to this system of forces is. ($sin45° = cos45° = \frac{1}{\sqrt{2}}$)

Ans

✗ 1. $-\frac{\sqrt{3}}{2}\hat{\imath}$

✗ 2. $-\frac{1}{\sqrt{2}}\hat{\imath}$

✓ 3. $+\frac{1}{\sqrt{2}}\hat{\imath}$

✗ 4. $+\frac{1}{2}\hat{\imath}$

Q.32 An electron of mass 'm' is rotating in first Bohr orbit of radius 'r' in hydrogen atom. The orbital acceleration of the electron in first orbit is (h=Planck's constant)

Ans

✗ 1. $h/2\pi^2m^2r^2$

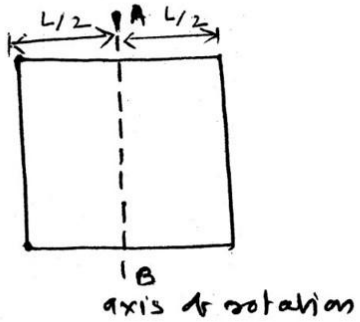
✓ 2. $h^2/4\pi^2m^2r^3$

✗ 3. $h/4\pi^2mr^3$

✗ 4. $h^2/2\pi^2m^2r^2$

Q.33

Four metal rods each of mass'M' and length 'L' are welded to form a square as shown. What is M.I. of the system about axis 'AB'?



Ans

✗ 1. $\frac{ML^2}{6}$

✓ 2. $\frac{2}{3}ML^2$

✗ 3. $\frac{ML^2}{2}$

✗ 4. $\frac{ML^2}{3}$

Q.34 The radii of two columns of a u-tube are r_1 and r_2 respectively. When the tube is filled with water, the difference in level of two arms is '*h*'. The surface tension of water in dyne/cm is

Ans

✗ 1. $hg(r_2 - r_1)$

2. $\frac{hg(r_2 - r_1)}{2r_1r_2}$

3. $\frac{hgr_1r_2}{2(r_2 - r_1)}$

4. $\frac{hgr_1r_2}{(r_1 - r_2)}$

Q.35 **Which one of the following is a diamagnetic substance?**

Ans

1. Manganese
2. Water
3. Aluminium
4. Chromium

Q.36 **An alternating current of frequency 200 rad/s and peak value 1A is applied to the primary of a transformer. If the coefficient of mutual induction between the primary and the secondary is 1.5 H, then the voltage induced in the secondary will be approximately (π=22/7)**

Ans

1. 220 V
2. 300 V
3. 191 V
4. 471 V

Q.37 A disc and a solid sphere having same mass and radius roll down on the same inclined plane. The ratio of their linear speeds is

Ans

✗ 1. $\frac{15}{14}$

✗ 2. $\frac{14}{15}$

✗ 3. $\sqrt{\frac{15}{14}}$

✓ 4. $\sqrt{\frac{14}{15}}$

Q.38 The energy of a photon having frequency 'ν' is $E = h\,\nu$ and the momentum of the photon having wavelength 'λ' is p $= \frac{h}{\lambda}$ .From this statement, one may conclude that the wave velocity of light is equal to

Ans

✗ 1. $E\mathrm{p}$

✓ 2. $\frac{E}{\mathrm{p}}$

✗ 3. $\sqrt{\frac{E}{\mathrm{p}}}$

✗ 4. $\left(\frac{E}{p}\right)^2$

Q.39 **A large vessel completely filled with water has two holes 'A' and 'B' at depths 'h' and '4h' from the top. Hole 'A' is a square of side'L' and hole 'B' is circle of radius 'R'. If from both the holes same quantity of water is flowing per second then side of square hole is**

Ans

✗ 1. $2\pi R$

✗ 2. $R/2$

✗ 3. $\sqrt{2\pi R}$

✓ 4. $\sqrt{2\pi}.R$

Q.40 A capillary tube is vertically immersed in water, water rises up to height 'h_1'. When the whole arrangement is taken upto depth 'd' in a mine, the water level rises upto height 'h_2'.

The ratio $\frac{h_1}{h_2}$ is (R = radius of earth)

Ans

✗ 1. $\left(1+\frac{d}{R}\right)$

✗ 2. $\left(1-\frac{2d}{R}\right)$

✗ 3. $\left(1+\frac{2d}{R}\right)$

✓ 4. $\left(1-\frac{d}{R}\right)$

Q.41 **Two moving coil galvanometers 'P' and 'Q' have all features same except that number of turns of 'P' are 50 and that of galvanometer 'Q' are 20. The ratio of the current sensitivities of 'P' to 'Q' is**

Ans

✗ 1. 0.4:1

✗ 2. 1:2.5

✗ 3. 1:4

✓ 4. 2.5:1

Q.42 A slit of width 'a' is illuminated by monochromatic light of wavelength $4714\ \text{Å}$. Then the value of 'a' for which first maximum falls at 45° is

$[\sin 45^0 = \cos 45^0 = \frac{1}{\sqrt{2}} = 0.7071]$

Ans

✗ 1. 10^6Å

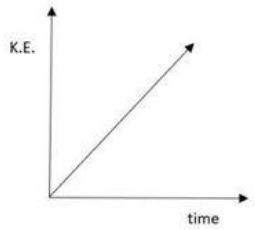
✗ 2. 10^5Å

✓ 3. 10^4Å

✗ 4. 10^3Å

Q.43

A body moves along a straight line and the variation of its kinetic energy with time is linear as shown in the figure below. Then the force acting on the body is



Ans
1. directly proportional to velocity.
2. zero.
3. constant greater than zero.
4. inversely proportional to velocity.

Q.4 Above curie temprature, the susceptibility of a ferromagnetic material is
4

Ans
1. small and negative.
2. very high and positive.
3. high and negative.
4. small and positive.

Q.4 In a junction transistor , the doping is
5

Ans
1. maximum in emitter,moderate in base and very small in collector.
2. maximum in emitter, moderate in collector and very small in base.
3. maximum in collector , moderate in base and very small in emitter.
4. maximum in base, moderate in emitter and very small in collector.

Q.4 6 According to Berkhausen criterion (A= voltage gain without feedback β= feedback factor)

Ans

✗ 1. Aβ = ∞ for a transistor amplifier.

✗ 2. Aβ = ∞ for an oscillator.

✗ 3. Aβ = 1 for a transistor amplifier.

✓ 4. Aβ = 1 for an oscillator.

Q.4 7 A molecule consists of two atoms each of mass 'm' and seperated by a distance 'd'. At room temperature the average rotational kinetic energy is 'E', then its angular frequency is

Ans

✗ 1. $\sqrt{\frac{m}{Ed}}$

✗ 2. $\frac{d}{2}\sqrt{\frac{m}{E}}$

✗ 3. $\sqrt{\frac{Ed}{m}}$

✓ 4. $\frac{2}{d}\sqrt{\frac{E}{m}}$

Q.4 8 A circular coil of radius 0.1m and 40 turns, carries current of 2.5 A. The magnetic moment of the coil is

Ans

✗ 1. 0.25 Am^2

✔ 2. 3.142 Am^2

✘ 3. 2.5 Am^2

✘ 4. 6.284 Am^2

Q.49 **If a resonance tube is immersed in water of density (ϱ_w) and then in liquid of density(ϱ_L) [$\varrho_L > \varrho_W$] , then its frequency in liquid will**

Ans

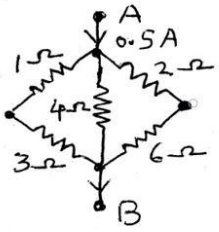
✘ 1. depend on density of liquid.

✔ 2. remain the same.

✘ 3. decrease.

✘ 4. increase.

Q.50 The potential difference between the points A and B in the electric circuit shown is



Ans

✔ 1. $\frac{4}{3}V$

✘ 2. $\frac{2}{3}V$

✘ 3. $\frac{1}{3}V$

✘ 4. $1\,V$

Section : **Chemistry**

Q.1 **Number of gram atoms of an element present in one atom of the element is**

Ans

✔ 1. 1.66×10^{-24}

✘ 2. 6.022×10^{22}

✘ 3. 6.022×10^{23}

✘ 4. 1.66×10^{-23}

Q.2 How many carbon-oxygen bonds are present in the gaseous sample obtained by decomposition of 10g of calcium carbonate (molecular mass of calcium carbonate = 100 u)

Ans

✘ 1. 12.044×10^{23}

✔ 2. 1.2044×10^{23}

✘ 3. 6.022×10^{23}

✘ 4. 6.022×10^{22}

Q.3 **The volume of a given mass of a gas at 0° C is 2 dm^3 . What is the new volume of the gas if the temperature is decreased by 10°C ?**

Ans

✔ 1. 1.93 dm^3

✘ 2. 1.86 dm^3

✘ 3. 1.79 dm^3

✘ 4. 1.44 dm^3

Q.4 Anisole when treated with cold and concentrated hydroiodic acid gives

Ans

✗ 1. Iodobenzene and methanol

✗ 2. Iodobenzene and iodomethane

✓ 3. phenol and iodomethane

✗ 4. phenol and methanol

Q.5 Which among the following is cationic detergent?

Ans

✗ 1. sodium lauryl sulphate

✓ 2. n - hexadecyl trimethyl ammonium chloride

✗ 3. pentaerythrityl stearate

✗ 4. sodium - n - dodecylbenzene sulphonate

Q.6

Consider the following reaction $H_{2(g)}+Cl_{2(g)}\rightarrow 2HCl_{(g)}$ + 44 Kcal. Calculate heat of formation for 36.5 g of HCl

Ans

✓ 1. -22 K Cal

✗ 2. -44 K Cal

✗ 3. -88 K Cal

✗ 4. 11 K Cal

Q.7 What is the abnormal molecular mass of benzoic acid when added in benzene? (Given, atomic mass H = 1, 0=16, C = 12)

Ans
- ✔ 1. 244
- ✘ 2. 122
- ✘ 3. 61
- ✘ 4. 366

Q.8 Which of the following is water soluble vitamin?

Ans
- ✘ 1. Vitamin A
- ✘ 2. Vitamin D
- ✔ 3. Vitamin C
- ✘ 4. Vitamin E

Q.9 Identify the pair of flux and the slag respectively in the extraction process of iron .

Ans
- ✘ 1. Ferrous silicate and sand
- ✘ 2. Calcium silicate and lime stone
- ✔ 3. Lime stone and calcium silicate
- ✘ 4. Sand and ferrous silicate

Q.10 Consider the reaction 2A+B → product when conc. of ' B ' alone was doubled, the half life did not change . When conc. of ' A ' alone was doubled, the rate increases by two times, order of reaction is

Ans
- ✘ 1. 1.5
- ✔ 2. 2

3. 1

4. 0

Q.11 Lithium combines with ammonia to form, lithium

Ans

1. imide
2. nitride
3. amine
4. amide

Q.12 Which among the following statements is NOT true about amorphous solids?

Ans

1. These are pseudo solids
2. These behave like fluids
3. Values of physical properties change with direction of measurement
4. These are super cooled liquids

Q.13 What is the number of sigma (σ) and pi (π) bonds respectively in a molecule of bromobenzene?

Ans

1. seven and three
2. thirteen and three
3. six and three
4. twelve and three

Q.14 What is the denticity of Ethylene diamine tetra acetato ion?

Ans

- ✔ 1. 6
- ✘ 2. 2
- ✘ 3. 1
- ✘ 4. 4

Q.15 Which of the following hydroxides is used in preparation of antacids?

Ans

- ✘ 1. KOH
- ✔ 2. $Mg(OH)_2$
- ✘ 3. $Ca(OH)_2$
- ✘ 4. NaOH

Q.16 Identify the compound in which oxygen exists in the oxidised state ?

Ans

- ✔ 1. OF_2
- ✘ 2. SO_2
- ✘ 3. CO_2
- ✘ 4. O_3

Q.17 What type of unit cell crystal system is present in potassium dichromate?

Ans
- ✔ 1. Primitive triclinic
- ✘ 2. Primitive monoclinic
- ✘ 3. Primitive tetragonal
- ✘ 4. Primitive hexagonal

Q.18 Instruments used for making electrical measurements are obtained from alloy

Ans
- ✔ 1. Manganin
- ✘ 2. Spiegeleisen
- ✘ 3. Duralumin
- ✘ 4. Stainless steel

Q.19 Which of following elements is a non-conductor of heat and electricity?

Ans
- ✘ 1. Sb
- ✘ 2. Bi
- ✔ 3. p
- ✘ 4. As

Q.20 Which among the following elements does NOT show allotropy?

Ans
- ✘ 1. Sb

✔ 2. Bi

✘ 3. As

✘ 4. N

Q.2 The ion which has the highest precipitation power is
1

Ans

✘ 1. K^+

✘ 2. Na^+

✘ 3. Mg^{++}

✔ 4. Al^{+++}

Q.2 Select the ion which has maximum effective magnetic moment.
2

Ans

✘ 1. Cu^{2+} (z=29)

✘ 2. Mn^{3+} (z=25)

✘ 3. V^{3+}(z=23)

✔ 4. Fe^{3+} (z=26)

Q.2 Evaporation of a liquid and condensation of its vapour is the principle used in
3

Ans

✘ 1. Sublimation

✔ 2. Distillation

✘ 3. Chromatogarphy

4. Crystallization

Q.24 The monomers used to prepare dextron are,

Ans
1. glycine and Ɛ- amino caproic acid
2. isobutylene and isoprene
3. 2- chlorobuta -1,3-diene
4. latic acid and glycolic acid

Q.25 Which among the following ligands is used for the estimation of hardness of water ?

Ans
1. Ammonia
2. Ethylene diamine
3. Ethylene diamine tetra-acetato
4. Diethylene triamine

Q.26 Which of the following polymers is prepared by using Zieglar-Natta catalyst?

Ans
1. Low density polythene
2. High density polythene
3. Poly tetra fluoro ethylene
4. Polyacrylonitrile

Q.27 Which among the following metals is refined by zone refining process?

Ans
- ✗ 1. Bismuth
- ✓ 2. Germanium
- ✗ 3. Zirconium
- ✗ 4. Copper

Q.28 What amount of sodium carbonate is required to prepare 250 ml of a molar solution in water? (At. mass Na =23, H = 1, C = 12, O = 16)

Ans
- ✗ 1. 39.75 g
- ✓ 2. 26.5 g
- ✗ 3. 13.25 g
- ✗ 4. 10.6 g

Q.29 Which of the following elements belongs to the first inner transition series?

Ans
- ✗ 1. Americium
- ✗ 2. Curium
- ✓ 3. Promethium
- ✗ 4. Protactinium

Q.30

What is the structure of $PCl_{5(g)}$?

Ans
- ✔ 1. Trigonal bipyramidal
- ✘ 2. Pyramidal
- ✘ 3. Square Planer
- ✘ 4. Octahedral

Q.31 The extent of polarisation in an ionic bond is greater when

Ans
- ✘ 1. density of positive charge on cation is less
- ✔ 2. cation is smaller and anion is larger in size
- ✘ 3. density of negative charge on anion is less
- ✘ 4. cation is larger and anion is smaller in size

Q.32 In Salicylaldehyde benzene ring is attached with

Ans
- ✘ 1. one -OH group and two -CHO group
- ✔ 2. One -OH group and one -CHO group
- ✘ 3. two -OH groups and one -CHO group
- ✘ 4. two -OH groups and two -CHO groups

Q.3 Nicol's prism is made of
3

Ans

✗ 1. $CaSiO_3$

✗ 2. $Ca_3(PO_4)_2$

✓ 3. $CaCO_3$

✗ 4. $CaSO_4$

Q.3 Replacement of diazo group by -Cl using cuprous chloride is known as
4

Ans

✗ 1. Swarts reaction

✗ 2. Wurtz reaction

✓ 3. Sandmeyer's reaction

✗ 4. Reimer-Tiemann reaction

Q.3 The correct IUPAC name of Glyceraldehyde is?
5

Ans

✗ 1. 3 - Hydroxypropanal

✗ 2. Hydroxy ethanal

✗ 3. 2,3 - Dihydroxybutanal

✓ 4. 2 , 3- Dihydroxypropanal

Q.3 Which among the following amines has highest boiling point?
6

Ans

✔ 1. $CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\,NH_2$

✘ 2. $(C_2H_5)_2NH$

✘ 3. $C_2H_5N(CH_3)_2$

✘ 4. $(CH_3)_3C\,NH_2$

Q.37 Super heavy water freezes at

Ans

✘ 1. 4° C

✔ 2. 9° C

✘ 3. 0° C

✘ 4. -4°C

Q.38 The standard emf of $Cu|Cu^{2+}_{(1m)}||Ag^{+}_{(1m)}|Ag$ cell is 0.463 V.
If the standard electrode potential of 'Cu' electrode is 0.337 V, what is the standard electrode potential of 'Ag' electrode ?

Ans

✔ 1. 0.800 V

✘ 2. -0.860 V

✘ 3. -0.126 V

✘ 4. 0.626 V

Q.39 The molar conductivity of 0.05M HCl solution is 163.3 Ω^{-1} cm^2 mol^{-1} at 298K. What is the conductivity of the solution at the same temperature?

Ans

1. ✗ $0.8165\ \Omega^{-1}\ cm^{-1}$
2. ✗ $8.165\ \Omega^{-1}\ cm^{-1}$
3. ✓ $0.008165\ \Omega^{-1}\ cm^{-1}$
4. ✗ $0.08165\ \Omega^{-1}\ cm^{-1}$

Q.40 Which of the following oxyacids has phosphorus in +3 oxidation state?

Ans

1. ✗ $H_4P_2O_6$
2. ✓ $H_4P_2O_5$
3. ✗ H_3PO_4
4. ✗ $H_4P_2O_7$

Q.41 Which of followng terpenes belongs to the class tetraterpenes?

Ans

1. ✗ Squalene
2. ✗ α-Phellandrene
3. ✗ Cembrene
4. ✓ β-Carotene

Q.42 In H_2-O_2 fuel cell, reaction taking place at negative electrode is?

Ans

✔ 1. $2H_{2(g)}+4OH^-_{(aq)} \rightarrow 4H_2O_{(l)}+4e^-$

✘ 2. $O_{2(g)}+2H_2O_{(l)} \rightarrow 4OH^-_{(aq)}$

✘ 3. $2H_{2(g)}+2OH^-_{(aq)} \rightarrow 2H_2O_{(l)}+2e^-$

✘ 4. $4OH^-_{(aq)} \rightarrow O_{2(g)}+2H_2O_{(l)}+4e^-$

Q.43 **Which cyclic alkane is present as a common component of the mangoes ?**

Ans

✘ 1. Cyclopentane

✘ 2. Cyclobutane

✘ 3. Cyclopropane

✔ 4. Cyclohexane

Q.44 One mole methanol is formed from its elements under standard condition with liberation of 238.9 kJ of heat energy. What is the value of ΔS_{surr}. ?

Ans

✔ 1. 801.7 J

✘ 2. 711.7 J

✘ 3. 472.8 J

✘ 4. 238.9 J

Q.4 5 Which of the following is manufactured by lead chamber process?

Ans

✗ 1. HNO_3

✓ 2. H_2SO_4

✗ 3. NH_3

✗ 4. HCl

Q.4 6 The IUPAC name of neopentyl alcohol is

Ans

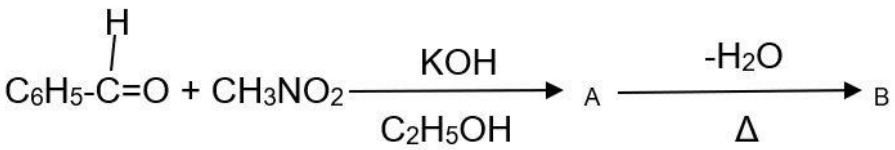
✗ 1. 2-Methylpropan-1-ol

✗ 2. 2-Methylpropan-2-ol

✓ 3. 2,2-Dimethylpropan-1-ol.

✗ 4. Butan-2-ol

Q.4 7 Identify the product 'B' in following reaction



Ans

✓ 1. $C_6H_5CH{=}CH{-}NO_2$

✗ 2. $C_6H_5CH_2{-}\underset{\displaystyle OH}{\underset{|}{CH}}{-}NO_2$

✗ 3. $C_6H_5CH_2NO_3$

✗ 4. $C_6H_5CH_2NH_2$

Q.48 **For a reaction to be non spontaneous at all temperatures, values of ΔH and ΔS respectively are**

Ans

✗ 1. positive ,positive

✓ 2. negative ,positive

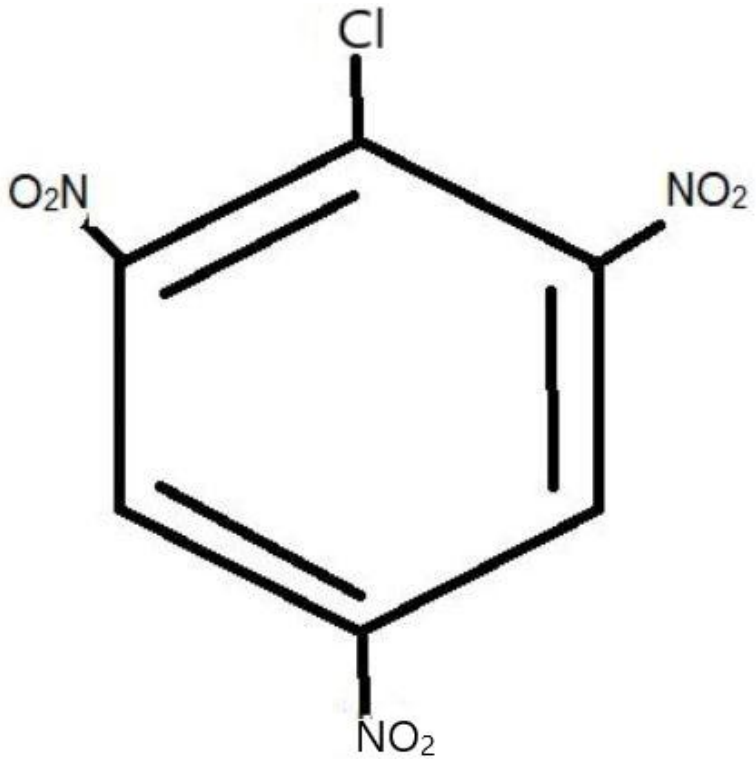
✗ 3. negative, negative

✗ 4. positive ,negative

Q.49 **The compound which shows highest reactivity towards nucleophilic displacement reaction is**

Ans

✓ 1.



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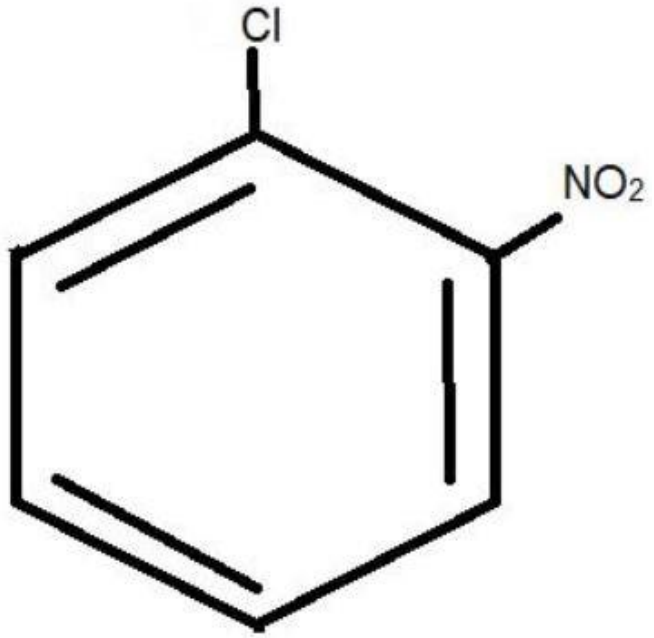

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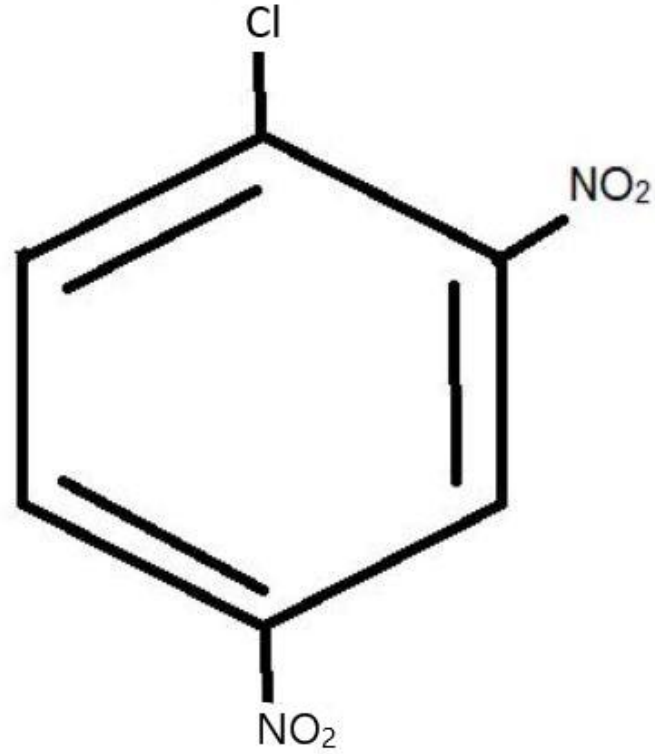
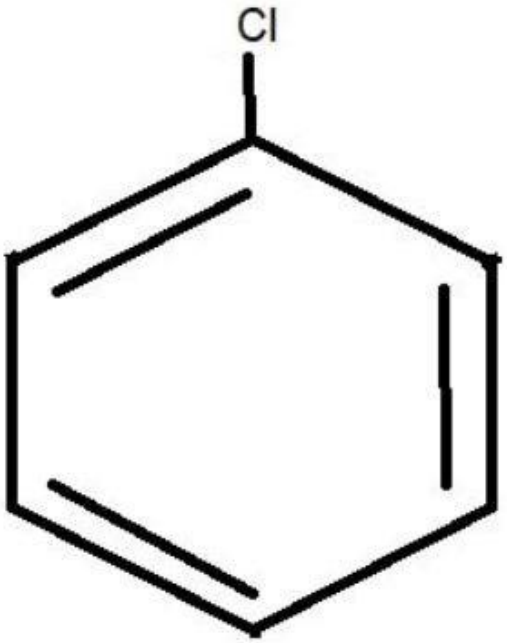


4. 

Q.5 Order of which among the following reactions is NOT one?
0

Ans

1. $Cyclopropane \rightarrow CH_3\text{-}CH{=}CH_{2(g)}$
2. $CHCl_{3(g)} + Cl_{2(g)} \rightarrow CCl_{4(g)} + HCl_{(g)}$
3. $2H_2O_{2(l)} \rightarrow 2\,H_2O_{(l)} + O_{2(g)}$
4. $2\,N_2O_{5(g)} \rightarrow 2N0_{2(g)} + O_{2(g)}$

Section : **Mathematics**

Q.1

The diameter of a circle is increasing at the rate of 1cm/sec. When its radius is πcm then rate of increase of its area, is...

Ans

✔ 1. $\pi^2 cm^2/sec$

✘ 2. $2\pi cm^2/sec$

✘ 3. $2\pi^2 cm^2/sec$

✘ 4. $\pi cm^2/sec$

Q.2 The maximum value of $Z = 75x + 50y$,
Subject to $8x + 5y \leq 60$,
$4x + 5y \leq 40$,
$x \geq 0, y \geq 0$ is...

Ans

✘ 1. 400

✘ 2. 580

✔ 3. 575

✘ 4. 600

Q.3 Using differentiation, the approximate value of sin46°,
Given that $1° = 0.0175^c$, is...

Ans

✘ 1. 0.07194

✘ 2. $\frac{0.0175}{\sqrt{2}}$

✘ 3. 0.7194

✔ 4. $\frac{1.0175}{\sqrt{2}}$

Q.4 The value of $21^2 + 22^2 + \cdots + 30^2$ is...

Ans
1. 6855
2. 6585
3. 8565
4. 6558

Q.5

The general solution of the equation $\cot 4x = -1$ is...

Ans
1. $\frac{n\pi}{4} + \frac{13\pi}{7}, n\epsilon z$
2. $\frac{n\pi}{4} + \frac{4\pi}{15}, n\epsilon z$
3. $\frac{n\pi}{4} + \frac{11\pi}{9}, n\epsilon z$
4. $\frac{n\pi}{4} + \frac{3\pi}{16}, n\epsilon z$

Q.6 If the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{\lambda}z + 4 = 0$ is such that $sin\theta = \frac{1}{3}$ then the value of λ is .....

Ans
1. $\frac{-5}{3}$

2. $\frac{3}{5}$

3. $\frac{-3}{5}$

4. $\frac{5}{3}$

Q.7 $\int_{\frac{-\pi}{4}}^{\frac{\pi}{4}} \frac{1}{1-\sin x}\, dx$ ...

Ans
1. -1
2. 1
3. 2
4. -2

Q.8 Function $f: R \to R$ defined by $f(x) = x^2 + 5$ is...

Ans
1. many-one and into
2. one-one and onto
3. many-one and onto
4. one-one and into

Q.9

If $f(x)=\frac{\sqrt{2}-\sqrt{1+sinx}}{cos^2x}, x\neq\frac{\pi}{2}$ is continuous at $x=\frac{\pi}{2}$, then $f\left(\frac{\pi}{2}\right)=\ldots$

Ans

✗ 1. $\sqrt{2}$

✗ 2. $\frac{1}{\sqrt{2}}$

✗ 3. $\frac{1}{2\sqrt{2}}$

✓ 4. $\frac{1}{4\sqrt{2}}$

Q.10

The parametric equations of the circle $x^2+y^2+2x-4y-4=0$ are…

Ans

✓ 1. $x=-1+3\,cos\theta, y=2+3sin\theta$

✗ 2. $x=-1+3\,cos\theta, y=-2+3sin\theta$

✗ 3. $x=1+3\,cos\theta, y=-2+3sin\theta$

✗ 4. $x=1+3\,cos\theta, y=2+3sin\theta$

Q.11

If $q\rightarrow p$ is false then the truth values of $p\wedge\sim q$ and $\sim p\vee q$ are respectively…..

Ans

✓ 1. F,T

✗ 2. F,F

✗ 3. T,T

✗ 4. T,F

Q.12 The probability that a basket-ball player makes the basket is 0.4 ; the probability that he makes exactly three baskets in four attempts is…

Ans
- ✗ 1. 0.256
- ✗ 2. 0.0384
- ✗ 3. 0.064
- ✓ 4. 0.1536

Q.13 If $y = \log(sec\theta + tan\theta), x = sec\theta$, then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is…

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

Q.14 Which of the following quantified statement is true?

Ans
- ✗ 1. $\forall\, x \in N,\ x^2 - 1$ is positive
- ✗ 2. $\exists\, x \in N$, such that $x^2 - 3=0$
- ✗ 3. $\forall\, x \in N,\ x^2 - 4 \geq 0$

✔ 4. $\forall x \in N, x^2 - 1$ is not negative

Q.15 A particle is moving in a straight line with velocity $\frac{ds}{dt} = s + 1$, then the time required by a particle to travel a distance of 99 meters is …..

Ans

✘ 1. log 200

✘ 2. log 10

✔ 3. log 100

✘ 4. 2

Q.16 If $f(x)$ is odd and differentiable function such that $f'(1) = 4$ then $f'(-1) =$…

Ans

✘ 1. -4

✘ 2. -1

✘ 3. 1

✔ 4. 4

Q.17 If the line passing through the origin makes angles $\theta_1, \theta_2, \theta_3$ with the planes XOY, YOZ, ZOX respectively then

Ans

✘ 1. $sin^2\theta_1 + sin^2\theta_2 + sin^2\theta_3 = -1$

✔ 2. $sin^2\theta_1 + sin^2\theta_2 = cos^2\theta_3$

✗ 3. $\cos 2\theta_1 + \cos 2\theta_2 + \cos 2\theta_3 = -1$

✗ 4. $\cos^2\theta_1 + \cos^2\theta_2 + \cos^2\theta_3 = 1$

Q.18

The cumulative distribution function $F(x)$ of a p.d.f $f(x) = 3(1-2x^2)$,$0 < x < 1$
$= 0$, otherwise

is…

Ans

✓ 1. $3x - 2x^3$

✗ 2. $3(x - 2x^3)$

✗ 3. $3(x - 2x^2)$

✗ 4. $3x - 2x^2$

Q.19

$$\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{3-\tan x}{3+\tan x}\right) dx = \cdots$$

Ans

✓ 1. 0

✗ 2. -1

✗ 3. 1

✗ 4. 6

Q.20 $\int_1^e \frac{e^x}{x}(1+x\,logx)dx = \cdots$

Ans
1. $e^e - 1$
2. $e - 1$
3. e^e
4. $e^e + e$

Q.21 In ΔABC; with usual notations, if $\frac{a}{cosA} = \frac{b}{cosB} = \frac{c}{cosC}$ and one of its side is 4 then the area of ΔABC =…sq. unit

Ans
1. $2\sqrt{3}$
2. $4\sqrt{3}$
3. $\sqrt{3}$
4. $16\sqrt{3}$

Q.22 The integrating factor of the differential equation $(1+y^2)dx + (x - e^{-tany})dy = 0$ is…

Ans
1. $xe^{\tan^{-1}y}$

2. $ye^{\tan^{-1}y}$

3. $-ye^{\tan^{-1}y}$

4. $e^{\tan^{-1}y}$

Q.23 If $A = \begin{bmatrix} 4 & 3 & 2 \\ -1 & 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ -1 & 0 \\ 1 & -2 \end{bmatrix}$ then $(AB)^{-1}$ = ...

Ans

1. $\frac{1}{6}\begin{bmatrix} 2 & -4 \\ -3 & 3 \end{bmatrix}$

2. $\frac{1}{6}\begin{bmatrix} -2 & -4 \\ 3 & 3 \end{bmatrix}$

3. $\frac{1}{6}\begin{bmatrix} 2 & 4 \\ 3 & 3 \end{bmatrix}$

4. $\frac{1}{6}\begin{bmatrix} -2 & 4 \\ 3 & -3 \end{bmatrix}$

Q.24 $\cos(36° - A).\cos(36° + A) + \cos(54° + A).\cos(54° - A) = \ldots$

Ans

1. $\cos 2A$

2. $\cos 3A$

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

4. $\cos A$

Q.25 If the acute angle between the lines $ax^2 + 2hxy + by^2 = 0$ is $60°$ then $(a + 3b)(3a + b) = \ldots$

Ans
1. 0
2. $2h^2$
3. h^2
4. $4h^2$

Q.26 Let $y : \sim p \rightarrow q$ and $x: \sim p \vee q$. The inverse of $x \rightarrow y$ is.

Ans
1. $(p \wedge \sim q) \rightarrow \sim(p \vee q)$
2. $(p \vee \sim q) \rightarrow (\sim p \vee \sim q)$
3. $(p \wedge \sim q) \rightarrow \sim(p \wedge q)$
4. $(\sim p \wedge \sim q) \rightarrow (p \wedge \sim q)$

Q.27 If $\sin\left[\sin^{-1}\frac{1}{5} + \cos^{-1}x\right] = 1$,

then $x = \ldots\ldots\ldots$

Ans
1. 0

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

3. 1

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

Q.28

If $y = \sin\left(2tan^{-1}\left(\sqrt{\frac{1-x}{1+x}}\right)\right)$ then $\frac{dy}{dx} = \ldots$

Ans

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

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

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

4. $\frac{x}{\sqrt{1-x^2}}$

Q.29 If the scalar triple product of vectors represented by $-12\hat{\imath} + \alpha\hat{k}, 3\hat{\jmath} - \hat{k}, 2\hat{\imath} + \hat{\jmath} - 15\hat{k}$ is 546, then α is equal to…

Ans

1. 3

2. -2

3. 2

4. -3

Q.30 If $\int e^x[f(x)-f'(x)]\,dx = g(x)$, then $\int e^x f(x)\,dx = \ldots.$

Ans

✔ 1. $\frac{1}{2}[g(x)+e^x f(x)]+c$

✘ 2. $g(x)-e^x f(x)+c$

✘ 3. $\frac{1}{2}[g(x)+e^x f'(x)]+c$

✘ 4. $g(x)+e^x f(x)+c$

Q.31 If the points $(1,1,\lambda)$ and $(-3,0,1)$ are equidistant from the plane $\bar{r}.(3\hat{\imath}+4\hat{\jmath}-12\hat{k}) = -13$, then $\lambda = \ldots$

Ans

✘ 1. 0

✔ 2. $\frac{7}{3}$ or 1

✘ 3. ± 8

✘ 4. ± 13

Q.32 The equation of the line passing through $A(\bar{a})$ and parallel to $\bar{b}$ is…

Ans

✘ 1. $(\bar{r}+\bar{a}).\bar{b} = 0$

2. $\bar{r} = \bar{b} + \lambda\bar{a}$

3. $\bar{r} \times \bar{b} = \bar{a} \times \bar{b}$

4. $\bar{r}.\bar{b} = \bar{a}.\bar{b}$

Q.33

The minimum value of $z = 5x + 4y$ subject to $y \leq 2x, x \leq 2y, x + y \geq 3 \ , x \geq 0, y \geq 0$ is…

Ans

1. 10
2. 14
3. 13
4. 12

Q.34

The ratio in which the $XZ -$ plane cuts the line segment joining the points $(-2,4,7)$ and $(3,-5,8)$ is…

Ans

1. 5:4
2. 2:3
3. 3:2
4. 4:5

Q.3

5

If the function $f(x) = (1+3tan^2x)^{\frac{cot^2x}{4}}$, $x \neq 0$

$= K$, $x = 0$

is continous at $x = 0$ then $K =$ .....

Ans

✔ 1. $e^{\frac{3}{4}}$

✘ 2. e^3

✘ 3. $e^{\frac{4}{3}}$

✘ 4. e^4

Q.3 6 If the function $f(x)$ defined by $f(x) = Kx^2(1-x)$, $o < x < 1$

$= 0$, otherwise

is p.d.f. of a random variable x then the value of P($X < \frac{1}{2}$) is...

Ans

✘ 1. $\frac{7}{16}$

✘ 2. $\frac{3}{16}$

✔ 3. $\frac{5}{16}$

✘ 4. $\frac{1}{16}$

Q.3 7 The differential equation of all lines making intercept 3 on the X-axis is

Ans

✘ 1. $x\frac{dy}{dx} = 3y$

2. $\frac{dy}{dx} = x + 3$

3. $(x - 3)\frac{dy}{dx} = y$

4. $\frac{dy}{dx} = x - 3$

Q.38 Points A (2,6) and C (6,4) are opposite vertices of a rectangle. If other two vertices of the rectangle lie on the line $y = x + k$ then $k =$…

Ans

1. 2
2. 3
3. 5
4. 1

Q.39 **The radius of circular plate is increasing at the rate of 3cm/sec. The rate of change of its circumference is…**

Ans

1. 4π cm/sec
2. 6π cm/sec
3. 6 cm/sec
4. 4 cm/sec

Q.40 $tan\left(\frac{7\pi}{6}\right)+tan\left(\frac{9\pi}{4}\right)+tan\left(\frac{10\pi}{3}\right)=\cdots$

Ans

✗ 1. $2+\frac{1}{\sqrt{3}}$

✗ 2. $2-\frac{1}{\sqrt{3}}$

✓ 3. $1+\frac{4}{\sqrt{3}}$

✗ 4. $1-\frac{4}{\sqrt{3}}$

Q.41 If the sum of n terms of a sequence is $4(3^n-1)$, then the sequence is…

Ans

✗ 1. A.P.

✓ 2. G.P.

✗ 3. H.P

✗ 4. A.G.P

Q.42

If $\int \frac{f(x)}{\sqrt{tan^3x^2}}dx=-\frac{1}{\sqrt{tanx^2}}+C$ then $f(x)=\ldots$

Ans

✗ 1. $x\,sec^2(x)$

✗ 2. $x^2\,sec^2(x^2)$

✗ 3. $x^2\,sec(x^2)$

4. $x\,sec^2(x^2)$

Q.43 $\int \frac{cosx + xsinx}{x(x + cosx)}\,dx = \ldots$

Ans
1. $-log|1 + x\,secx| + c$
2. $-log\left|1 + \frac{cosx}{x}\right| + c$
3. $log|1 + x\,secx| + c$
4. $log\left|1 + \frac{cosx}{x}\right| + c$

Q.44 If P(A) = $\frac{1}{4}$, P(B) = $\frac{2}{5}$ and P(A ∩ B) = $\frac{3}{20}$ then (A'∩B') = ...

Ans
1. $\frac{1}{2}$
2. $\frac{17}{20}$
3. $\frac{13}{20}$
4. $\frac{1}{3}$

Q.45 If lines represented by the equation $e^{\alpha}x^2 + 2hxy + e^{-\alpha}y^2 = 0$ are coincident then $h = \ldots$

Ans
1. ✗ e^2
2. ✓ ± 1
3. ✗ ± 2
4. ✗ $e^{2\alpha}$

Q.46 The equation of the directrix of the parabola $y^2 = 2(x + 2)$ is…

Ans
1. ✗ $2x - 1 = 0$
2. ✗ $2x + 1 = 0$
3. ✓ $2x + 5 = 0$
4. ✗ $2x + 3 = 0$

Q.47 If matrix B is the inverse of $A = \begin{bmatrix} 2 & 0 & -1 \\ 2 & 1 & 2 \\ 3 & 1 & 2 \end{bmatrix}$, then $B\ (adj\ B) = \ldots$

Ans
1. ✓ I
2. ✗ $2I$
3. ✗ $3I$

✗ 4. $4I$

Q.48 In ΔABC, with usual notations; if $cosA = sinB - cosC$ then $cosA.cosC = \ldots.$

Ans

✗ 1. $\frac{1}{4}$

✗ 2. $\frac{\sqrt{3}}{4}$

✗ 3. $\frac{1}{2}$

✓ 4. 0

Q.49 The range of function $f(x) = sinx + cosecx$ is ....

Ans

✗ 1. $R - [-2,2]$

✗ 2. $(-1,1)$

✗ 3. $[-1,1]$

✓ 4. $R - (-2,2)$

Q.50 If $P\ (1,2,3), R\ (4,5,-1)$ are the vertices and $G(2,3,-1)$ is the centroid ofΔPQR, then coordinates of midpoint of PQ are

Ans

✗ 1. $(1, 2, 1)$

✗ 2. $(1, 2, 2)$

✓ 3. $(1, 2, -1)$

✗ 4. $(1, -2, -1)$