Particulars	VITEEE paper pattern
Examination Mode	Online - Computer Based Test
Duration of Exam	2 hours 30 minutes
Sections	• Mathematics - 40 Questions • Physics - 35 Questions • Chemistry - 35 Questions • Aptitude - 10 Questions • English - 5 Questions
Type of Questions	Objective - Multiple Choice Questions (MCQs)
Total Number of Questions	125 questions
VITEEE total marks	125
VITEEE Marking Scheme	For each correct response, one mark will be awarded
VITEEE Negative Marking	There is no provision for negative marking in VITEEE 2024

PHYSICS

1. In a photoelectric experiment, for different incident frequencies of same intensities, we have

A. same saturation current but different stopping potentials

B. same stopping potential but different value of saturation current

C. same saturation current value and same stopping potential value

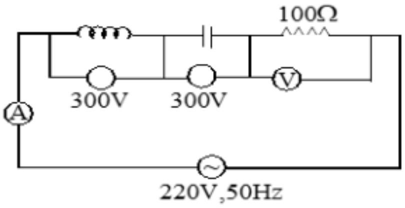
D. both saturation current and stopping potential are different for different frequencies

Key: A

Solution: Saturation current is directly proportional to intensity.

Stopping potential increases linearly with frequency

2. In the circuit shown below what will be the reading of the voltmeter and ammeter?



A. 200V, 1A

B. 800 V, 2 A

C. 100 V, 2 A

D. 220 V, 2.2 A

Key: D

Solution: $v = 220V$

$$v = \frac{\sqrt{V_R^2 + (V_L - V_C)^2}, i = \frac{V}{Z}}{220} =$$

$= 2.2A$

3. A refrigerator with coefficient of performance 1/3 releases 200 J of heat to a hot reservoir, then the work done on the working substance is:

A. $\frac{100}{3}$ Joule

B. 100 Joule

C. $\frac{200}{3}$ Joule

D. 150 Joule

Key: D

Solution: Coefficient of performance

$$\beta = \frac{Q_2}{Q_1 - Q_2} = \frac{1}{3}$$

$3Q_2 = Q_1 - Q_2$

$4Q_2 = Q_1 = 200$

$Q_2 = 50J$

$W = Q_1 - Q_2 = 200 - 50 = 150J$

4. Magnetic field at a distance a from long current carrying wire is proportional to

A. $\frac{1}{a^{3/2}}$

B. $\frac{1}{a^2}$

C. $\frac{1}{\sqrt{a}}$

D. $\frac{1}{a}$

Key: D

Solution: Magnetic field due to a long current carrying wire is given by

$B = \frac{\mu_0 i}{2\pi r}$, where 'r' is the distance from the centre of wire.

5. A full-wave rectifier is used to convert ‘n’Hz a.c into d.c, then the number of pulses per second present in the rectified voltage is

A. n

B. n/2

C. 2n

D. 4n

Key: C

Solution:

- Now, a full-wave rectifier produces one pulse per half cycle.
- We thus receive 2 pulses for each cycle.
- The output pulses for an input of n cycles will be 2n.

Draw a circuit diagram of a full wave rectifier. Explain its working and draw input and output waveforms.

Hence the correct answer is 2n.

6. The Mean Free Path ℓ for a gas molecule depends upon diameter, d of the molecule as

A. $\ell \propto \frac{1}{d}$

B. $\ell \propto \frac{1}{d^2}$

C. $\ell \propto d$

D. $\ell \propto d^2$

Key: B

Solution: Mean free path of a gas molecule can be written as

$$\lambda = \frac{1}{\sqrt{2}\pi d^2 n}$$

where n is the number of molecules per unit volume, d is the diameter of the molecule

So, $\lambda \propto \frac{1}{d^2}$

7. In SHM for how many times potential energy is equal to kinetic energy during one complete oscillation

A. 1

B. 2

C. 8

D. 4

Key: D

Solution: In each oscillation K.E =P.E for

$x = \frac{A}{\sqrt{2}}$ by 2 times, $x = \frac{-A}{\sqrt{2}}$ by 2 times

8. The electric field in a region of space is given by $\vec{E} = 5\hat{i} + 2\hat{j} \quad NC^{-1}$. The electric flux due to this field through an area $2\,m^2$ lying in the yz - plane in S.I. units is

A. 10

B. 20

C. 30

D. 40

Key: A

Solution: We know

$$\Phi = \vec{E} \cdot \vec{A}$$

$$= (5\hat{\mathbf{i}} + 2\hat{\mathbf{j}}) \cdot (2\hat{\mathbf{i}})$$

$$= 10 \text{ Vm}$$

9. The displacement y of a particle in a medium can be expressed as $y = 10^{-6} \sin\left(100t + 20x + \frac{\pi}{4}\right) m$ where ‘t' is in seconds and x in metre. The speed of wave is

A. 200 ms^{-1}

B. $5\ ms^{-1}$

C. $20\ ms^{-1}$

D. $5\pi\ ms^{-1}$

Key: B

Solution: $V_{wave} = \frac{\omega}{k} = \frac{100}{20} = 5\,ms^{-1}$

10. The angle between the electric lines of force and the equipotential surface is

A. 45°

B. 90°

C. 180°

D. 0°

Key: B

Solution: Electric lines of force are always perpendicular to the equipotential surface.

11. Two resistors of resistance, 100Ω and 200Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100Ω to that in 200Ω in a given time is :

A. 2:1

B. 1:4

C. 4:1

D. 1:2

Key: A

Solution: We know, thermal energy developed is

Given by, $H = \frac{v^2}{R} \cdot t$

where, v is voltage.

R is resistance

t is time.

Since the resistors are connected in parallel,

there will be same voltage accross them.

∴ The ratio of heat dissipated is

$$H_1 : H_2 = \frac{v^2t}{R_1} : \frac{v^2t}{R_2}$$

$$= \frac{1}{R_1} : \frac{1}{R_2}$$

$$= \frac{1}{100} : \frac{1}{200}$$

=2: 1

12. A charged particle enters in a magnetic field B with its initial velocity making an angle of 45° with B. The path of the particle will be

A. straight line

B. a helical

C. a circle

D. an ellipse

Key: B

Solution: When a charged particle enters a magnetic field, the particle experiences a Lorentz force given by which acts in a direction perpendicular to both vectors A and B .

Now since the initial velocity of the particle makes an angle 45° with the magnetic field, it will be having a velocity component parallel to vector B and another component perpendicular to vector B.

The parallel component of velocity is going to experience no force, so it will remain the same but as the perpendicular component will experience a constant force in the normal plane, hence the particle will finally move in a helical path.

13. A smooth sphere is moving on a horizontal surface with velocity vector $3\hat{i}+3\hat{j}$ immediately before it hits a vertical wall. The wall is parallel to $\hat{j}$ vector and the coefficient of restitution between the sphere and the wall is $e=\frac{1}{3}$ The velocity vector of the sphere after it hits the wall is

A. $\hat{i}-\hat{j}$

B. $\hat{i}-2\hat{j}$

C. $-\hat{i}+3\hat{j}$

D. $-\hat{i}-\hat{j}$

Key: C

Solution: velocity perpendicular to the wall becomes $-\frac{v}{e}$ so x component will change but the y component will remain unchanged so velocity after collision $-\hat{i}+3\hat{j}$

14. An aeroplane in which the distance between the tips of wings is 50 m is flying horizontally with a speed of 360 km/hr over a place where the vertical components of earth magnetic field is 2.0×10^{-4} weber / m^2. The potential difference between the tips of wings would be

A. 0.1V

B. 1.0V

C. 0.2V

D. 0.01V

Key: B

Solution: $e = B_v \cdot v.l = 2\times10^{-4}\times\left(\frac{360\times1000}{3600}\right)\times50$

$\Rightarrow e = 1V$

15. A 100Ω resistance and a capacitor of 100Ω reactance are connected in series across a 220 V source. When the capacitor is 50 % charged, the peak value of the displacement current is

A. 2.2 A

B. 11 A

C. 4.4 A

D. $11\sqrt{2}$ A

Key: A

Solution: Reactance $x_C = \omega C$

It does not depend on charge. It depends on angular frequency ω and capacity C.

Given reactance $X_C = 100\Omega$

$\therefore$ Impedence $Z = \sqrt{R^2 + X_c^2}$

$\therefore Z=\sqrt{100^2+100^2}$

$Z=100\sqrt{2}\Omega$

Given, $V_{rms}=220=\frac{V_0}{\sqrt{2}}$

Peak value of displacement current

$i_0=\frac{V_0}{Z}=\frac{220\sqrt{2}}{100\sqrt{2}}=2.2\,A$

16. An electromagnetic radiation has an energy 14.4 eV. To which region of electromagnetic spectrum does it belong?

A. Ultraviolet region

B. Visible region

C. X-ray region

D. γ-ray region

Key: A

Solution: $\lambda=\frac{12400}{14.4}=861\overset{0}{A}$ whichliesintheUVregion

17. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16V. The final pressure of the gas $\left(\gamma=\frac{5}{3}\right)$

A. 64 P

B. 32P

C. $\frac{P}{64}$

D. 16P

Key: C

Solution: For isothermal process,

$P^{I}\times 2v==Pv\Rightarrow P^{'}=\frac{P}{2}$

For adiabatic process,

$$P'' \times (V'')^{\gamma} = P^{1}V^{\gamma}$$

$$\Rightarrow P'' = P'\left(\frac{v}{v''}\right)^{\gamma}$$

$$\Rightarrow P'' = \frac{P}{2}\left(\frac{2v}{16v}\right)^{\frac{5}{3}} = \frac{P}{2} \times \frac{1}{32}$$

$$\Rightarrow P'' = \frac{P}{64}$$

18. The maximum number of possible interference minima can be observed on screen for slit separation equal to twice the wavelength in Young's double slit experiment is

A. Infinite

B. Five

C. Three

D. Four

Key: D

Solution: As the distance between the slit is twice the wave length on both the side of the central maxima two maxima will form in between two maxima two minima on either side and total five maxima including central and four minima

19. The threshold wavelength for certain metal is λ_0. When a light of wavelength $\lambda_0/2$ is incident on it, the maximum velocity of photoelectrons is $10^6\ m/s$. If the wavelength of the incident radiation is reduced to $\lambda_0/5$, then the maximum velocity of the photo-electrons in m/s will be

A. 2.5×10^6

B. 5×10^6

C. 4×10^6

D. 2×10^6

Key: D

Solution: $\phi = \frac{hc}{\lambda_0}$ for wavelength $\frac{\lambda_0}{2} hv = 2\phi$ for

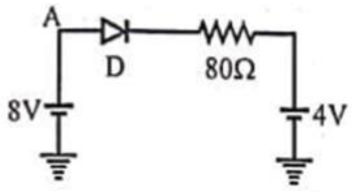
$$\frac{\lambda_0}{5} hv = 5\phi$$

$2\phi - \phi = K_1$

$5\phi - \phi = K_2$

$\frac{K_1}{K_2} = \frac{1}{4}\frac{v_1}{v_2} = \frac{1}{2}$

20. The resistance of the given diode in F.B. condition is 20Ω and in R.B. condition it is 2500Ω the current in the circuit is



A. 20 mA

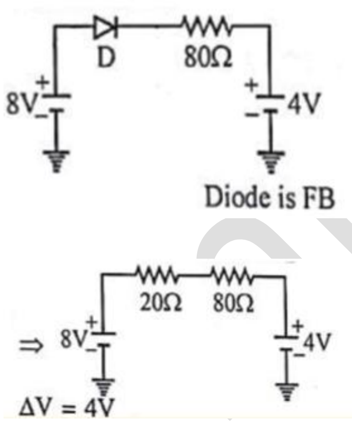
B. 40 mA

C. 50 mA

D. 10 mA

Key: B

Solution:



$I = \frac{\Delta V}{R} = \frac{4}{100} = 40\,mA$

21. A steel wire of length L has a magnetic moment M. It is then bent into a semi-circular arc; the new magnetic moment will be :

A. M

B. $2M/\pi$

C. M/L

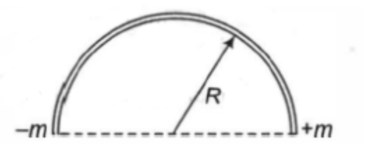
D. M x L

Key: B

Solution: M = mL

$$\pi R = L \Rightarrow R = \frac{L}{\pi} M/ = m(2R) = 2m$$

$$\left(\frac{L}{\pi}\right) = \frac{2}{\pi}(mL) = \frac{2M}{\pi}$$



22. The distance of the closest approach of an alpha particle fired at a nucleus with kinetic energy K is ‘r’. Then the distance of closest approach if it is fired with a kinetic energy 2K is

A. 2r

B. 4r

C. r/2

D. r/4

Key: C

Solution: the distance of closest approach can be obtained by using the conservation of energy principle is $\frac{1}{2}mv^2 = \frac{1}{4\pi\varepsilon_0}\frac{Ze2e}{r}$ so r is the distance of closest approach is inversely proportional to kinetic energy of the alpha particle

23. A wooden block is placed on an inclined plane. The block just begins to slide down when the angle of the inclination is increased to 450. What is the coefficient of the friction?

A. 0.25

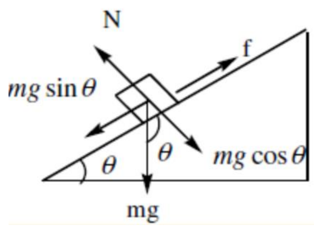
B. 0.75

C. 1

D. 0.5

Key: C

Solution:



$$mg\sin\theta = \mu_k N = \mu_k mg\cos\theta$$

$$\tan\theta = \mu_k \Rightarrow \mu_k = \tan 45^\circ = 1$$

24. A car is going due north at $10\sqrt{2}\text{m/s}$ turns right through an angle 90° and moves with same velocity. The change in the velocity of the car is

A. 20m/s in South – East direction

B. $20\sqrt{2}\text{m/s}$ in South – East direction

C. 20m/s in North – East direction

D. 20m/s in North – West direction

Key: A

Solution: $V_1 = 10\sqrt{2}j \quad V_2 = 10\sqrt{2}i$

$$\Delta V = 10\sqrt{2}i - 10\sqrt{2}j = 20\text{m/s} \quad S-E$$

25. A body moves along a circular path of radius 10 m and the coefficient of friction is 0.5. What should be its angular speed in rad/s if it is not to slip from the surface $\left(g = 9.8ms^2\right)$

A. 5

B. 10

C. 0.1

D. 0.7

Key: D

Solution: For moving on circular path without slipping centripetal force must equal frictional force

$$\frac{mv^2}{r} = \mu mg$$

$\Rightarrow mr\omega^2 = \mu mg$

$[\therefore v = r\omega]$

$\Rightarrow r\omega^2 = \mu g$

$\therefore \omega = \sqrt{\frac{\mu g}{r}} = \sqrt{\frac{0.5\times 9.8}{10}} = 0.7 rad/s$

26. A ring of diameter 0.4 m and mass 10 kg is rotating about its axis perpendicular to plane and passing through its center at the rate of 1200 rpm. The angular momentum of the ring is

A. $60.28 kg{\cdot}m^2 s^{-1}$

B. $55.26 kg{\cdot}m^2 s^{-1}$

C. $40.28 kg.m^2 s^{-1}$

D. $50.28 kg.m^2 s^{-1}$

Key: D

Solution: Here, r = 0.2 m, M = 10 kg, v = 1200 rpm = 20 rps

$\therefore$ Angular momentum, $L = I\omega = (Mr^2)(2\pi v)$

$= 10\times(0.2)^2\times 2\times\frac{22}{7}\times 20 = 50.28 kg - m^2 s^{-1}$

27. An eye specialist prescribes spectacles having a combination of convex lens of focal length 40 cm in contact with a concave lens of focal length 25 cm. The power of this lens combination in dioptre is

A. + 1.5

B. – 6.67

C. +6.67

D. – 1.5

Key: D

Solution: $p = p_1 + p_2 = 2.5 - 4 = -1.5 D$

28. When a ball is released from rest in a very long column of viscous liquid, its downward acceleration is 'a' (just after release). Then its acceleration when it has acquired two third of the maximum velocity:

A. $\frac{a}{3}$

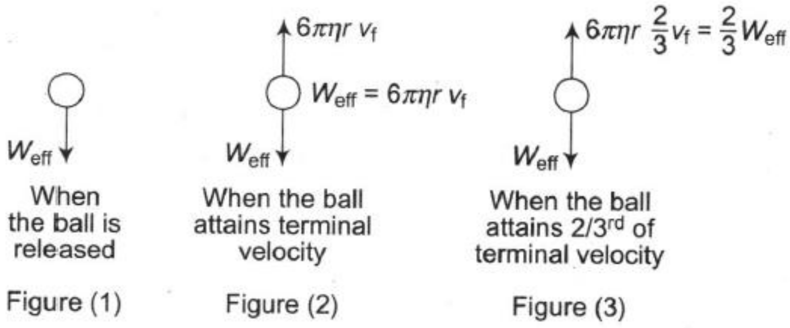
B. $\frac{2a}{3}$

C. $\frac{a}{6}$

D. none of these

Key: A

Solution:



When the ball is just released, the net force on ball is $W_{eff}\left(= mg - buoyant\ force\right)$

The terminal velocity $'v_f'$ of the ball is attained when net force on the ball is zero

$\therefore$ Viscous force $6\pi\eta r\, v_f = W_{eff}$

When the ball acquires $\frac{2}{3}$ rd of its maximum velocity

v_f

The viscous force is = $\frac{2}{3} W_{eff}$

Hence net force is $W_{eff} - \frac{2}{3} W_{eff} = \frac{1}{2} W_{eff}$

$\therefore$ Required acceleration = $\frac{a}{3}$

29. In the case of diatomic gas, the heat given at constant pressure is that part of energy which is used for the expansion of gas, is

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

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

C. $\frac{2}{7}$

D. $\frac{5}{7}$

Key: C

Solution: $\Delta W =$ energy used for expansion

$= PdV = RdT$

$\Delta Q =$ heat supplied to diatomic gas at constant P

$$= C_p dT = \frac{7}{2} RdT \left(\because C_p = \frac{7}{2} R \right)$$

$$\therefore \frac{\Delta W}{\Delta Q} = \frac{RdT}{\frac{7}{2} RdT} = \frac{2}{7}$$

30. A $10\mu F$ capacitor is fully charged to a potential difference of 50 V. After removing the source voltage it is connected to an uncharged capacitor in parallel. Now the potential difference across them becomes 20 V. The capacitance of second capacitor is

A. $30\mu F$

B. $20\mu F$

C. $15\mu F$

D. $10\mu F$

Key: C

Solution: $C_1 = 10\mu F$ (Given) Potential difference before removing the source voltage, $V_1 =$ 50 V.

If C_2 be the capacitance of uncharged capacitor, then common potential is

$$V = \frac{C_1V_1 + C_2V_2}{C_1 + C_2} \Rightarrow 20 = \frac{10 \times 50 + 0}{10 + C} \therefore C = 15\mu F$$

31. A thin prism having refracting angle 10° is made glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be :

A. 10°

B. 4°

C. 6°

D. 8°

Key: C

Solution: When $d = d_1 + d_2 = 0$,

$$(\mu-1)A+(\mu'-1)A'=0$$

$$(1.42-1)10=(1.7-1)A' \Rightarrow 4.2=(0.7)A' \Rightarrow A'=6^0.$$

32. A magnetic pole of strength 1Am is moved 10 times around a long straight wire carrying a steady current of π A. The work done is (assume $\pi^2 \approx 10$)

A. 0 J

B. 40 μ J

C. 400 μ J

D. 4 mJ

Key: B

Solution: work done to make one unit north pole once around the conduction is $\mu_0 i$ joules (Ampere's circuital law) for ten rotations 10 $\mu_0 i$ joules

$$W = 10\times 4\pi\times 10^{-7}\times\pi = 4\pi^2\times 10^{-6} = 40\mu J \quad (\because \pi^2\approx 10)$$

33. The ratio for the speed of the electron in the 3rd orbit of He^+ to the speed of the electron in the 3rd orbit of hydrogen atom will be

A. 1:1

B. 1:2

C. 4:1

D. 2:1

Key: D

Solution: $v \propto \frac{Z}{n}$

$\Rightarrow$ Required ratio $= \frac{\frac{2}{3}}{\frac{1}{3}}$

= 2:1

34. The acceleration due to gravity at a depth 10 km below the earth is the same as at a height h above the surface of earth. Then:

A. h = 10 km

B. h = 20 km

C. h = 5 km

D. h = 15 km

Key: C

Solution: The acceleration due to gravity at a height h is given as:

$$g_h = g\left(1 - \frac{2h}{R_e}\right)$$

where R_e is radius of earth.

The acceleration due to gravity at a depth d is given as:

$$g_d = g\left(1 - \frac{d}{R_e}\right)$$

Given, $g_h = g_d$

$$\therefore g\left(1 - \frac{2h}{R_e}\right) = g\left(1 - \frac{d}{R_e}\right)$$

$$\therefore \mathrm{d} = 2\mathrm{h} \Rightarrow \mathrm{h} = \frac{\mathrm{d}}{2} \Rightarrow \mathrm{h} = \frac{10}{2} = 5\,km$$

35. Two charges +5 µC and +10 µC are placed 20 cm apart. The net electric field at the mid-point between the two charges is

A. 4.5×10^{6} N/C directed towards +5 μC

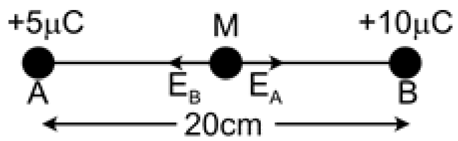
B. 4.5×10^{6} N/C directed towards +10 μC

C. 13.5×10^{6} N/C directed towards +5 μC

D. 13.5×10^{6} N/C directed towards +10 μC

Key: A

Solution: From following figure,



E_A = Electric field at mid point M due to $+5\mu C$ charge

$$=9\times10^{9}\times\frac{5\times10^{-6}}{(0.1)^{2}}=45\times10^{5}\,N/C$$

E_B = Electric field at M due to $+10\mu C$ charge

$$=9\times10^{9}\times\frac{10\times10^{-6}}{(0.1)^{2}}=90\times10^{5}\,N/C$$

$$E_{net}=\left|\vec{E}_B\right|-\left|\vec{E}_A\right|=45\times10^{5}\,N/C=4.5\times10^{6}\,N/C$$

CHEMISTRY

36. Consider the following sets of quantum numbers

	n	*l*	m	s
a)	3	0	0	$+\frac{1}{2}$
b)	2	2	1	$+\frac{1}{2}$
c)	4	3	-2	$-\frac{1}{2}$
d)	1	0	-1	$-\frac{1}{2}$

e)	3	2	3	$+\frac{1}{2}$

Which of the following sets of quantum number is not possible?

A. a and c

B. b,c and d

C. a, b, c and d

D. b, d and e

Key: D

Solution:

a) 3,0,0 corresponds to 3s, possible

b) Not possible, as value of $\ell = O \text{ to} (n-1)$ only

c) 4,3,-2 corresponds to 4f, possible

d) Not possible, as value of $m = -\ell$ to $+\ell$ only

e) Not possible, value of $m = -\ell$ to $+\ell$ only

37. Which of the following order(s) of atomic /ionic radius is/are correct ?

A. $I^- > I > I^+$

B. $Mg^{2+} > Na^+ > F^-$

C. $P^{5+} < P^{3+}$

D. $Li > Be > B$

Key: B

Solution: $Size \, \alpha \frac{z}{e} \, ratio$

38. The enthalpy of combustion of $H_2(g)$ at 298 K to give H_2O is –298 kJ mol^{-1} and bond enthalpies of H–H and O=O are 433 kJ mol^{-1} and 492 kJ mol^{-1} respectively. The bond enthalpies of O–H is

A. $464 \, kJ \, mol^{-1}$

B. $488.5 \, kJ \, mol^{-1}$

C. $232 \, kJ \, mol^{-1}$

D. $-232 \, kJ \, mol^{-1}$

Key: B

Solution: $H_2 + 1/2O_2 \rightarrow H_2O, \Delta H = -298 kJmol^{-1}$

$$\Delta H = \left[\Delta H_{H-H} + \frac{1}{2}\Delta H_{O=O}\right] - [2\Delta H_{O-H}]$$

$$-298 = \left[433 + \frac{1}{2} \times 492\right] - [2\Delta H_{O-H}]$$

$$\Delta H_{O-H} = \frac{433 + 246 + 298}{2} = 488.5 kJ/mol$$

39. Which is the weakest acid?

A. ascorbic acid $\left(K_a = 8.0 \times 10^{-5}\right)$

B. boric acid $\left(K_a = 5.8 \times 10^{-10}\right)$

C. butyric acid $\left(K_a = 1.5 \times 10^{-5}\right)$

D. hydrocyanic acid $\left(K_a = 4.9 \times 10^{-10}\right)$

Key: D

Solution: Lower the k_a value, weaker the acid.

Here, the value of k_a of hydrocyanic acid is less among the given options.

Thus, it is weaker acid compare to other.

40. Diborane undergoes addition reactions with

I) $(CH_3)_3N$ II) CO III) H_3BO_3 IV) O_2

A. I & iv only

B. II & IV only

C. I & II only

D. II & III only

Key: C

Solution: $B_2H_6 + 2(CH_3)_3 N \rightarrow 2BH_3.N(CH_3)_3$

$B_2H_6 + 2CO \rightarrow 2BH_3.CO$

41. CH_3COCH_3 and $CH_2 = COH - CH_3$ represent

A. Metamers

B. Position isomers

C. Keto-enol tautomers

D. Chain isomers

Key: C

Solution: Keto – enol Tautomers

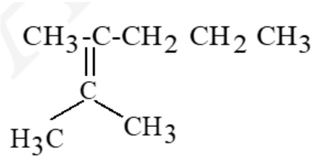
42. The major product B.in the following sequence of reaction is .

$$\mathbf{CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{C} = CH - CH_2\,CH_3} \rightarrow \text{(ii) H2O2, -OH(i) B2 H6 [A]} \rightarrow \text{(i) dil . H2 SO4[B]}$$

A. $CH_3 - \underset{\underset{C(CH_3)_3}{|}}{C} = CH\text{-}CH_2\,CH_3$

B. $CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{C} -CH_2\,CH_2\,CH_3$

C. $CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{CH} -CH=CH-CH_3$

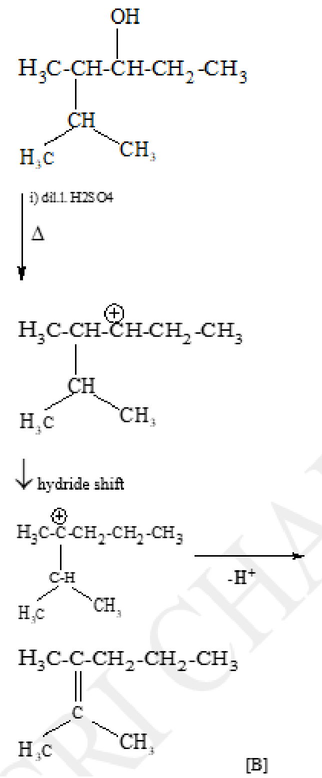


D.

Key: D

Solution:

$$CH_3 - \underset{\underset{CH(CH_3)_2}{|}}{C} =CH-CH_2-CH_3 \xrightarrow[\text{(ii) } H_2O_2,\ \bar{O}H]{\text{(i) } B_2H_6}$$



43. Which of the following compounds shows both Schottky and Frenkel defect

A. AgCl

B. NaCl

C. AgBr

D. CsCl

Key: C

Solution: Both Frankel and Schottky defect shown by AgBr.

AgBr has ccp lattice, where atoms of Br occupies all octahedral sites along with the atoms of Ag. Ag moves from octahedral to tetrahedral sites thereby causing only cations to precipitate. This indicates that Frankel defect shown by AgBr. Also, AgBr shows schottky defect because of the precipitation of both cations and anions. In AgBr, Ag ion is small, therefore when removed from lattice point they can occupy interstitial sites.

44. Copper crystallizes in fcc unit cell with cell edge length of $3.60\times10^{-8}cm$. The density of copper is $8.92\,gcm^{-3}$. Calculate the atomic mass of copper (approx.)

A. 63.1 u

B. 31.55 u

C. 60 u

D. 65 u

Key: A

Solution: Given a $= 3.608 \text{ x } 10^{-8}$ cm

Number of atoms per fcc unit cell (z)= 4

Atomic mass of Cu (M) = ?

Density of Cu $(d) = 8.929 \text{ cm}^{-3}$

$$d = \frac{zM}{a^3 N_A}$$

$$M = \frac{da^3 N_A}{z}$$

$$= \frac{8.92\left(3.608\times10^{-8}\right)^3\left(6.023\times10^{23}\right)}{4}$$

Atomic mass of Cu (M)=63.1 g/mol = 63.1 u

45. One faraday of electricity is passed separately through one litre of one molar aqueous solution +Of

$I)AgNO_3$.

$II)SnCl_4$ and

$iii)CuSO_4$.

The number of moles of Ag, Sn and Cu deposited at cathode are respectively

A. 1.0, 0.25, 0.5

B. 1.0, 0.5, 0.25

C. 0.5, 1.0, 0.25

D. 0.25, 0.5, 1.0

Key: A

Solution: $Ag^+ : Sn^{+4} : Cu^{+2} \frac{1}{1} : \frac{1}{4} : \frac{1}{2}$

46. At 25° C, molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 Ohm^{-1} cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 Ohm^{-1} cm^2 mol^{-1}. The percent degree of ionisation of ammonium hydroxide at the same concentration and temperature is

A. 4.008 %

B. 40.008 %

C. 2.080 %

D. 20.800 %

Key: A

Solution: Degree of dissociation, $\alpha = \frac{\wedge_m^c}{\wedge_m^o}$

Where $\wedge_m^c$ = molar conductivity at given concentration

$\wedge_m^o$ = molar conductivity at infinite dilution

$$\alpha = \frac{9.54}{238} = 0.04008 = 4.008\%$$

47. Find the rate law that corresponds to the data shown for the following reaction ?

Expt	**A.**	**(B)**	**Rate**
1	0.012	0.035	0.1
2	0.024	0.070	0.8
3	0.024	0.035	0.1
4	0.1	0.070	0.070

A. Rate = $K(A)^0(B)^3$

B. Rate = $K(B)^4$

C. Rate = $K(A)(B)^3$

D. Rate = $K(A)^2(B)^2$

Key: A

Solution: $\frac{r_4}{r_1} = \frac{[A_4]^x}{[A_1]^x}\frac{[B_4]^y}{[B_1]^y}$

$$\frac{0.8}{0.1} = \left(\frac{0.012}{0.012}\right)^x\left(\frac{0.070}{0.035}\right)^y \Rightarrow 2^3 = (2)^y$$

$$\Rightarrow y = 3$$

$$\frac{r_3}{r_1} = \left[\frac{A_3}{A_1}\right]^x \left[\frac{B_3}{B_1}\right]^y$$

$$\frac{0.1}{0.1} = \left(\frac{0.024}{0.012}\right)^x \left(\frac{0.035}{0.035}\right)^y$$

$$1 = (2)^x (1)^3$$

$$2^\circ = 2^x \Rightarrow x = 0$$

$$\therefore rate = K[A]^x [B]^y$$

$$= K[A]^\circ [B]^3$$

48. The minimum amount of energy that the reacting molecules must possess at the time of collisions in order to produce effective collision is called

A. Activation energy

B. Threshold energy

C. Internal energy

D. Free energy

Key: B

Solution: The collisions in which molecules collide with sufficient kinetic energy (called threshold energy*) and proper orientation, to facilitate breaking of bonds between reacting species and formation of new bonds to form products are called as effective collisions.

49. White phosphorus is heated at 473 K under high pressure, what will happen?

A. α -black phosphorus is formed

B. β -black phosphorus is formed

C. Red phosphorus is formed

D. No charge would be observed

Key: B

Solution: White phosphorous will be converted to black β phosphorous.

The reaction is:

$P_4 \rightarrow \beta$ Black Phosphorous (At high pressure and 473K)

50. The ratio of σ and π bonds present in XeO_4 molecule is

A. 2:3

B. 1:2

C. 2:1

D. 1:1

Key: D

Solution: Conceptual

51. In following pairs, the one in which both transition metal ions are colourless is:

A. Sc^{3+}, Zn^{2+}

B. Ti^{4+}, Cu^{2+}

C. V^{2+}, Ti^{3+}

D. Zn^{2+}, Mn^{2+}

Key: A

Solution:

$$A)\begin{matrix} Sc^{3+}, & Zn^{2+} \\ 3d^0 & 3d^{10} \end{matrix} \quad B)\begin{matrix} Ti^{4+}, & Cu^{2+} \\ 3d^0 & 3d^9 \end{matrix} \quad C)\begin{matrix} V^{2+}, & Ti^{3+} \\ 3d^3 & 3d^1 \end{matrix} \quad D)\begin{matrix} Zn^{2+}, & Mn^{2+} \\ 3d^{10} & 3d^5 \end{matrix}$$

52. Which one of the following elements shows maximum number of different oxidation states in its compounds?

A. La

B. Gd

C. Am

D. Eu

Key: C

Solution: Am (Actinoid)

53. The complex ion $\left[Cu(NH_3)_4\right]^{+2}$ is

A. Tetrahedral and paramagnetic

B. Tetrahedral and diamagnetic

C. Square planar and paramagnetic

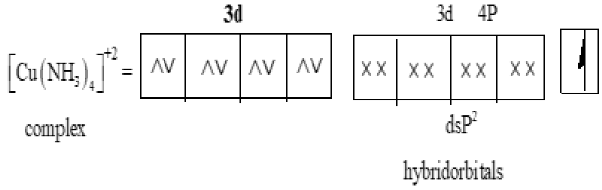
D. Square planar and diamagnetic

Key: C

Solution: In the complex $\left[Cu\left(NH_3\right)_4\right]^{+2}$

Hybridization $- dsP^2 \rightarrow$ squareplannar

(Due to strong field ligand Rearrangement)



Due to unpaired e- paramagnetic nature

54. The complex that can show facial and meridonial isomers is :

A. $\left[Pt\left(NH_3\right)_2 Cl_2\right]$

B. $\left[Co\left(NH_3\right)_3\left(NO_2\right)_3\right]$

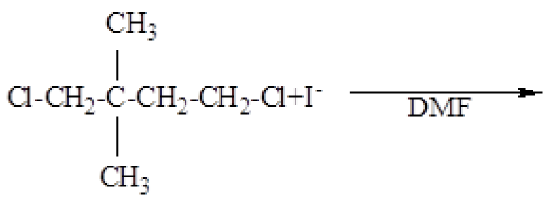
C. $\left[Co\left(NH_3\right)_4 Cl_2\right]^{+}$

D. $\left[CoCl_2\left(en\right)_2\right]$

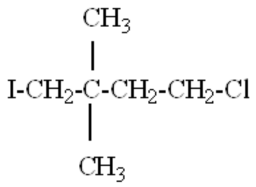
Key: B

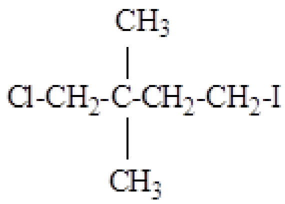
Solution: $\left[Ma_3b_3\right]$ shows facial and meridonial isomers

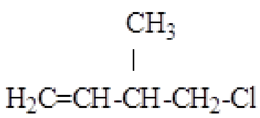
55.

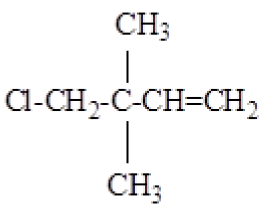


product; Major product of this reaction is:

A. 

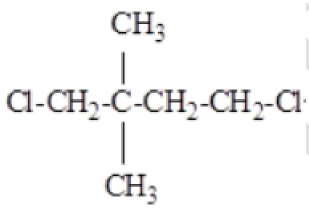
B. 

C. 

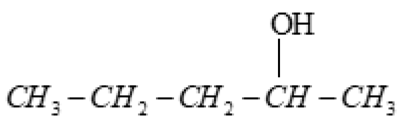
D. 

Key: B

Solution: In the given compound, the Cl present on the left side substituted by -I.



56. In the Lucas test, turbidity is not given by (at room temperature)

A. 

B.
$$\begin{array}{c} \quad\quad\quad\quad\quad\quad\quad\quad\quad CH_3 \\ \quad\quad\quad\quad\quad\quad\quad\quad\quad | \\ CH_3-CH_2-CH_2-C-OH \\ \quad\quad\quad\quad\quad\quad\quad\quad\quad | \\ \quad\quad\quad\quad\quad\quad\quad\quad\quad CH_3 \end{array}$$

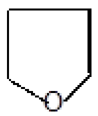
C. $CH_3-CH_2-CH_2-CH_2-CH_2-OH$

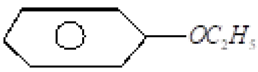
D.
$$\begin{array}{l} CH_3-CH_2-CH-OH \\ \quad\quad\quad\quad\quad\quad\;\; | \\ \quad\quad\quad\quad\quad\quad CH_3 \end{array}$$

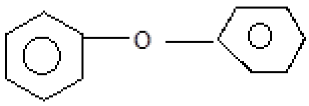
Key: C

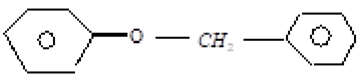
Solution: Primary alcohols does not give turbidity at room temperature by Lucas reagent

57. Which of the following compound can not be prepared by William son ether synthesis

A. 

B. 

C. 

D. 

Key: C

Solution: conceptual

58. Sodium Benzoate $\xrightarrow[\Delta]{NaOH+CaO} A \xrightarrow[Anh.AlCl_3]{CH_3Cl} B \xrightarrow[(ii)\ H_3O^+]{(i)\ CrO_2Cl_2/CS_2} C$

In the reaction sequence, conversion of B to C is known as

A. Stephen's reaction

B. Rosenmund reduction

C. Etard reaction

D. Gatterman reaction

Key: C

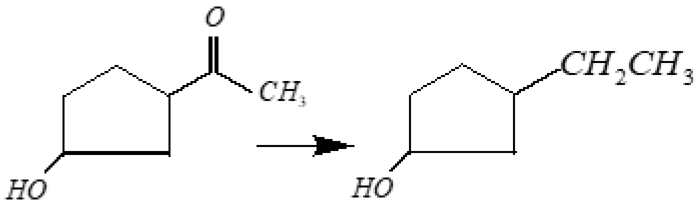
Solution: $\underset{\text{Sodium benzoate}}{C_6H_5COO^-Na^+} \xrightarrow[\Delta]{NaOH+CaO} \underset{A}{C_6H_6}$

$$\underset{A}{C_6H_6} \xrightarrow[Anh.AlCl_3]{CH_3Cl} \underset{B}{C_6H_5 - CH_3}$$

$$\underset{B}{C_6H_5 - CH_3} \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } CrO_2Cl_2/CS_2} \underset{C}{C_6H_5 - CHO}$$

Etard reaction

59. the appropriate reagent for the transformation



A. $Zn(Hg), HCl$

B. NH_2NH_2, OH^-

C. H_2 / Ni

D. $NaBH_4$

Key: B

Solution: $H_2N - NH_2 \,|\, OH^{(-)}$

60. Arrange the following bases in decreasing order of basicity

1) Aniline
2) o-nitroaniline
3) m – nitroaniline
4) P- nitroaniline

A. 1>2>4>3

B. 1>3>4>2

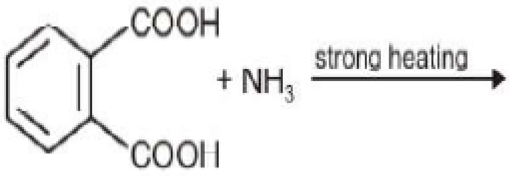
C. 4>3>2>1

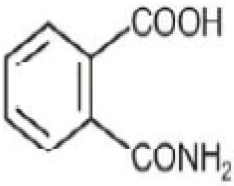
D. 3>2>1>4

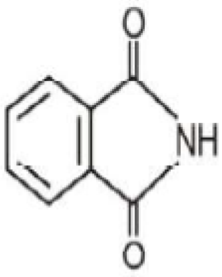
Key: B

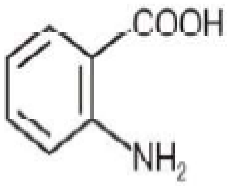
Solution: Conceptual

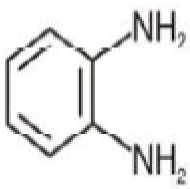
61. The major product of the following reaction is:



A. 

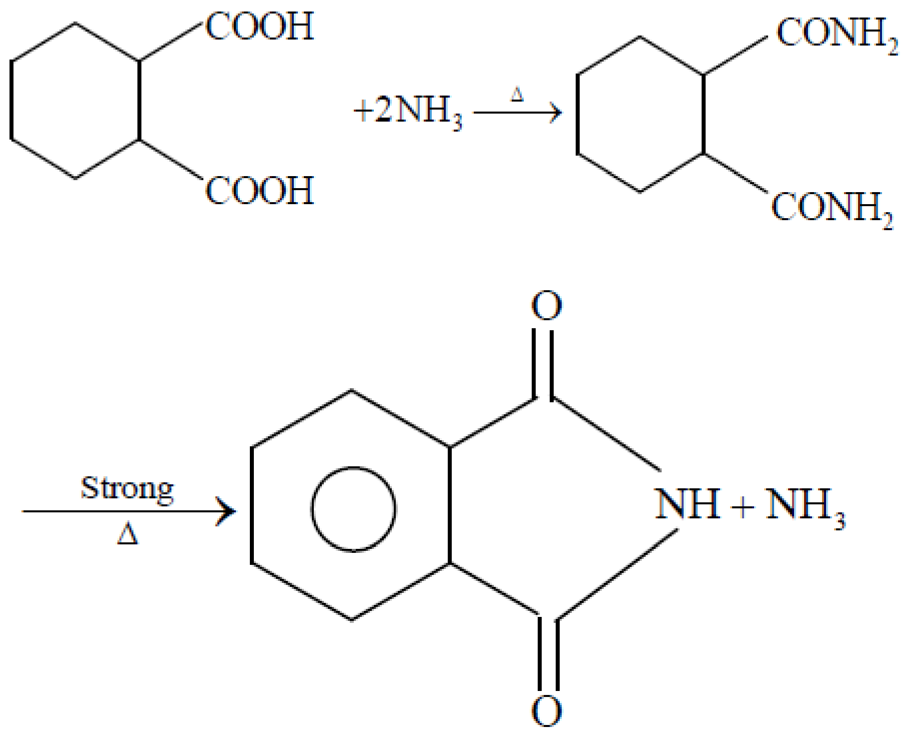
B. 

C. 

D. 

Key: B

Solution: Preparation of phthalimide



62. Regarding electrolytic refining of blister copper, incorrect statement is

A. Pure strip of copper is the cathode

B. Impure block copper is the anode

C. Gold and silver form anode mud

D. Antimony and selenium dissolve in the electrolyte

Key: D

Solution: During copper metal refining by electrolytic method, Anode is made of pure metal while cathode is made of impure metal. Anode mud is made up of Pt,Au,Ag,Sb,Se, Te and so on.

63. p_A and p_B are the vapour pressure of pure liquid components A and B respectively of an ideal binary solution. If x_A represents the mole fraction of component A, the total pressure of the solution will be

A. $p_A + x_A(p_B - p_A)$

B. $p_A + x_A(p_A - p_B)$

C. $p_B + x_A(p_B - p_A)$

D. $p_B + x_A(p_A - p_B)$

Key: D

Solution: Total pressure, $p_T = p'_A + p'_B$

We know that $P'_A = p_A x_A$ and $p'_B = p_B x_B$

$$p_T = p_A x_A + p_B(1 - x_A) = p_A x_A + p_B - p_B x_A$$

$$p_T = p_B + x_A(p_A - p_B)$$

64. A square planar complex is formed by hydridization of which of the following atomic orbitals ?

A. s, p_x, p_y, d_{z^2}

B. $s, p_x, p_y\ d_{x^2-y^2}$

C. s, p_x, p_y, d_{xy}

D. $s, p_y, p_X\ d_{zx}$

Key: B

Solution: Square planar compound involves dsp^2 hybridization with the orbitals combination $s.p_x, p_y, d_{x^2-y^2}$

65. Among the following which species has same number of σ and π bonds?

A. C_7H_8

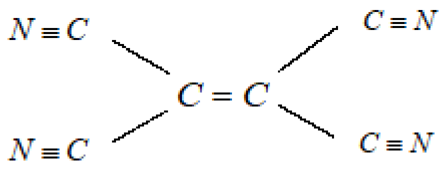
B. $C_2(CN)_4$

C. C_2H_4

D. $HC^{\circ}\ CH$

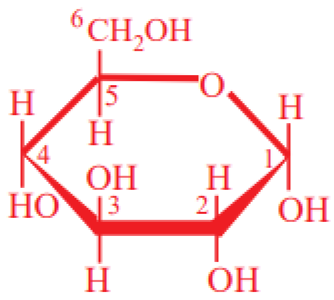
Key: B

Solution:



$(9\sigma, and\, 9\pi\, bonds)$

66. The following structure represents



A. α-D-glucose

B. ß-D-glucose

C. ß-D-glucose

D. α--D-glucose

Key: A

Solution: α-D-glucose

67. Sucrose on hydrolysis gives

A. β−D− glucose +α−D−fructose

B. α−D−glucose +β−D−glucose

C. α−D−glucose +β−D−fructose

D. α−D−fructose +β−D−fructose

Key: C

Solution: Sucrose on hydrolysis gives
α−D Glucose and β−D−fructose

68. Among the following which species has same number of σ and π bonds ?

A. C_7H_8

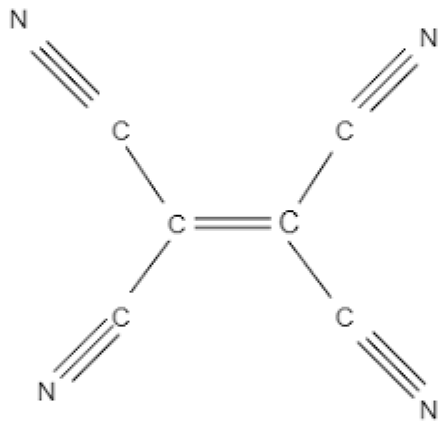
B. $C_2(CN)_4$

C. C_2H_4

D. HC° CH

Key: B

Solution: 9 sigma and 9 pi bonds



69. Which of the following are isostructural pairs?

A) SO_4^{-2} & CrO_4^{-2} B) NH_3 & PH_3

C) $SiCl_4$ & $TiCl_4$ D) BCl_3 & $BrCl_3$

A. A & B only

B. C & D only

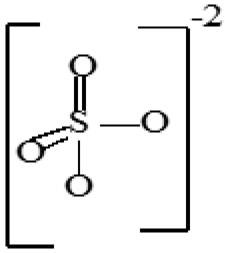
C. A, B & C only

D. All

Key: C

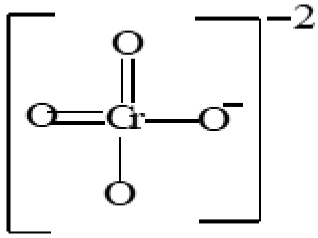
Solution:

SO_4^{2-} –



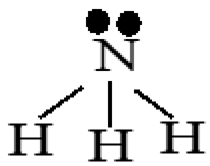
sp^3 tetrahedral

CrO_4^{2-}



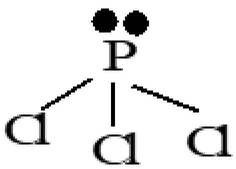
sp^3 tetrahedral

NH_3 –



sp^3 - 3B.P + 1.P - pyramidal

PCl_3 –



sp^3 - 3B.P + 11.P - pyramidal

$SiCl_4$&$Ticl_4$ - tetrahedral

BCl_3&$BrCl_3$ - trigonal planar \& T-shape

70. The process with negative entropy change is

A. dissociation of CaCO3(s) in to a CaO(s) and CO2(s)

B. synthesis of NH3 from N2 and H2 gases

C. Dissociation of CaSO4 (s) in to Cao(S) and SO3(g)

D. Sublimation of dryice

Key: B

Solution: $N_2 + 3H_2 \rightleftharpoons 2NH_3; \Delta n = -ve; \Delta S = -ve$

MATHEMATICS

71. If $z = \frac{(1+i)(1+2i)(1+3i)}{(1-i)(2-i)(3-i)}$ then, argument of z is ____

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

B. $-\frac{\pi}{2}$

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

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

Key: C

Sol:
$$\begin{aligned}
\arg z &= \arg(1+i) + \arg(1+2i) + \arg(1+3i) \\
&- \arg(1-i) - \arg(2-i) - \arg(3-i) \\
&= \tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) \\
&- \tan^{-1}(-1) - \tan^{-1}\left(\frac{-1}{2}\right) - \tan^{-1}\left(\frac{-1}{3}\right) \\
&= \pi + \frac{\pi}{2} = \frac{3\pi}{2}
\end{aligned}$$

72. The value of $'k'$ if the straight lines $3x+6y+7=0$ and $2x+ky=5$ are perpendicular to each other is

A. 1

B. -1

C. 2

D.0.5

Key: B

Sol: Given lines are $3x+6y+7=0$

The equation of a line $ax+by+c=0$

Slope $m_1 = -\frac{a}{b} = -\frac{3}{6} = -\frac{1}{2}$

$2x+ky=5$

Slope $m_2=\frac{-2}{k}$

Given lines are perpendicular then product of slopes =-1

$$m_1\times m_2=-1$$

$$-\frac{1}{2}\times-\frac{2}{k}=-1$$

$$\frac{1}{k}=-1$$

$$k=-1$$

73. If a card is drawn from a pack of cards then the probability of selecting a club card or king card is

A. $\frac{17}{52}$

B. $\frac{4}{13}$

C. $\frac{14}{52}$

D. $\frac{15}{52}$

Key: B

Sol: A is probability of selecting club card

$$P(A)=\frac{13}{52}$$

B is the probability of selecting king card

$$p(B)=\frac{4}{52}$$

$$P(A\cap B)=\frac{1}{52}$$

$$P(A\cup B)=P(A)+P(B)-P(A\cap B)$$

$$=\frac{13}{52}+\frac{4}{52}-\frac{1}{52}$$

$$=\frac{4}{13}$$

74. If $n(A)=8, n(B)=5$ then the maximum number of elements in $(A\cap B)$ is

A. 13

B. 3

C. 8

D. 5

Key: D

Sol: $n(A)=8, n(B)=5$

The maximum number of elements is $(A\cap B)$ is 5

75. For $x \in R$ if $f(x)=\sqrt{\log_{10}\left(\frac{3-x}{x}\right)}$ then the domain of f is

A. $\left[0,\frac{3}{2}\right]$

B. $\left(0,\frac{3}{2}\right]$

C. $[0,1]$

D. $(0,1]$

Key: B

Sol: We have

$$f(x)=\sqrt{\log_{10}\left(\frac{3-x}{x}\right)}$$

Clearly, f (x) is defined, if

$$\log_{10}\left(\frac{3-x}{x}\right)\geq 0 \text{ and } \frac{3-x}{x}>0$$

$$\Rightarrow \frac{3-x}{x}\geq 10^0 \text{ and } \frac{x-3}{x}<0$$

$$\Rightarrow \frac{3-x}{x}\geq 1 \text{ and } \frac{x-3}{x}<0$$

$$\Rightarrow \left(\frac{2x-3}{x}\right)\leq 0 \text{ and } \frac{x-3}{x}<0$$

$$\Rightarrow 0<x\leq\frac{3}{2}\Rightarrow x\in\left(0,\frac{3}{2}\right]$$

76. If $\cos\theta - \sin\theta = \frac{1}{5}$ where $0 < \theta < \frac{\pi}{4}$ then $\sin 2\theta =$

A. 24/25

B. 7/25

C. 5/13

D. 12/13

Key: A

Sol: The given equation is $\cos\theta - \sin\theta = \frac{1}{5}$

squaring on both sides and then simplify

$1 - \sin 2\theta = \frac{1}{25}$

$\sin 2\theta = \frac{24}{25}$

77. If $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}\begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 6 & 7 \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ then $a_{22} =$

A. 12

B. 25

C. 42

D. 79

Key: D

Sol: $12 + 25 + 42 = 79$

78. $\sin^{-1}\left(\sin\frac{2\pi}{3}\right) + \cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal to

A. $\frac{31\pi}{12}$

B. $\frac{11\pi}{12}$

C. $\frac{-3\pi}{4}$

D. $\frac{17\pi}{12}$

Key: B

Sol: Given $=\frac{\pi}{3}+\frac{5\pi}{6}-\frac{\pi}{4}=\frac{11\pi}{12}$

79. If $A=\begin{bmatrix}1 & -1\\2 & 3\end{bmatrix}$ $B=\begin{bmatrix}2 & 1\\1 & 0\end{bmatrix}$ then $(A+B)^2$ is not equal to

A. $(B+A)^2$

B. $\begin{bmatrix}9 & 0\\18 & 9\end{bmatrix}$

C. $9\begin{bmatrix}1 & 0\\2 & 1\end{bmatrix}$

D. $A^2+2AB+B^2$

Key: D

Sol: If A and B are a square matrices of 2 x 2 order then $(A+B)^2 \neq A^2+B^2+2AB$

80. $\begin{vmatrix}a+b & a & b\\a & a+c & c\\b & c & b+c\end{vmatrix}$ is equal to

A. $4abc$

B. abc

C. $a^2b^2c^2$

D. $4a^2bc$

Key: A

$$\begin{vmatrix} a+b & a & b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$$

$R_1 \to R_1 - R_2 - R_3$

$$\begin{vmatrix} 0 & -2c & -2b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$$

Sol : $\begin{vmatrix} 0 & -2c & -2b \\ a & a+c & c \\ b & c & b+c \end{vmatrix}$

$= 2c\left(ab+b^2-bc\right)-2b\left(bc-c^2-ac\right)$

$= 2abc+2cb^2-2bc^2-2b^2c+2bc^2+2abc$

$= 4abc$

81. If $A=\begin{bmatrix} 2 & -3 \\ -4 & 1 \end{bmatrix}$ and $adj\left(3A^2+12A\right)=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then $b+c$ is

A. -147

B. -174

C. 147

D. 144

Key: C

Sol: $3A^2+12A=\begin{bmatrix} 72 & -63 \\ -84 & 51 \end{bmatrix}$

$\therefore adj\left(3A^2+12A\right)=\begin{bmatrix} 51 & 63 \\ 84 & 72 \end{bmatrix}$

82. If $y=\sin\left(2x+3\right)$ then $\frac{dy}{dx}$

A. $2\cos\left(2x+3\right)$

B. $\sin\left(2x+3\right)$

C. cos(2x+3)

D. tan(2x+3)

Key: A

$\frac{dy}{dx}=\frac{d}{dx}\sin(2x+3)$

Sol: $\cos(2x+3)\frac{d}{dx}(2x+3)$

$=2\cos(2x+3)$

83. Number of non-zero terms in the expansion of $(1+x)^{42}+(1-x)^{42}+(1+ix)^{42}+(1-ix)^{42}$

A. 11

B. 12

C. 21

D. 22

Key: A

Sol: $\left[\frac{42}{4}\right]+1=11$

84. If the arithmetic mean between a and b is $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ then n =

A. 0

B. 1

C. -1

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

Key: A

Sol: Given: $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is an arithmetic mean of a and b.

Therefore,

$\frac{a^{n+1}+b^{n+1}}{a^n+b^n}=\frac{a+b}{2}\ldots$(i)

L.H.S $=\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$

Putting n = 0, we get

$$\frac{a^{n+1}+b^{n+1}}{a^n+b^n}=\frac{a^{0+1}+b^{0+1}}{a^0+b^0}$$
$$=\frac{a+b}{1+1}\quad\left[\because a^0=1\right]$$
$$=\frac{a+b}{2}$$

So, for **n = 0**, the given expression is an arithmetic mean of a and b.

85. The sum of the series $1+\frac{1}{1+2}+\frac{1}{1+2+3}+\cdots$ up to 10 terms

A. $\frac{40}{11}$

B. $\frac{30}{11}$

C. $\frac{20}{11}$

D. $\frac{15}{11}$

Key: C

Sol:

$$T_r=\frac{1}{1+2+3+\cdots+r}=\frac{2}{r(r+1)}$$
$$S_{10}=2\sum_{r=1}^{10}\frac{1}{r(r+1)}$$
$$=2\sum_{r=1}^{10}\left[\frac{1}{r}-\frac{1}{r+1}\right]$$
$$=2\left[1-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\cdots+\frac{1}{10}-\frac{1}{11}\right]$$
$$=2\left[1-\frac{1}{11}\right]$$
$$=\frac{20}{11}$$

86. The equation of the circle with center (3,-2) and radius 3 is

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

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

C. $x^2+y^2+14x+6y-42=0$

D. $x^2+y^2+2x+16y+40=0$

Key: C

Sol: $$(x-3)^2+(y+2)^2=3^2$$
$$x^2+y^2-6x+4y+9+4=9$$
$$x^2+y^2-6x+4y+4=0$$

87. If $\int \frac{dx}{x^3(1+x^6)^{2/3}} = xf(x)(1+x^6)^{\frac{1}{3}}+C$ where C is a constant of integration, then the function f(x) is equal to:

A. $-\frac{1}{6x^3}$

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

C. $-\frac{1}{2x^3}$

D. $\frac{3}{2x^2}$

Key: C

Sol: Let $I=\int \frac{dx}{x^3(1+x^6)^{2/3}}$

$$=\int \frac{dx}{x^7\left(1+\frac{1}{x^6}\right)^{2/3}}$$

Put $1+x^{-6}=t \Rightarrow \frac{dx}{x^7}=\frac{-dt}{6}$

$$I=\frac{1}{6}\int \frac{-dt}{t^{2/3}}$$

$$=\frac{-1}{2}\left[1+\frac{1}{x^6}\right]^{1/3}+C$$

$$=\frac{-1}{2}\frac{(1+x^6)^{1/3}}{x^2}+C$$

Given $I = xf(x)(1+x^6)^{1/3} + C$

By comparision

$\Rightarrow f(x) = \dfrac{-1}{2x^3}$

88. $\int_0^{\pi/4} (\tan^4 x + \tan^2 x)\,dx =$

A. 1

B. 1/2

C. 1/3

D. 1/4

Key: C

Sol: $\int_0^{\pi/4} (\tan^4 x + \tan^2 x)\,dx = \int_0^{\pi/4} \tan^2 x(1+\tan^2 x)\,dx = \int_0^{\pi/4} \tan^2 x \sec^2 x\,dx = \left.\dfrac{\tan^3 x}{3}\right]_0^{\pi/4} = \dfrac{1}{3}$

89. The area bounded by the ellipse $3x^2 + 2y^2 = 6$ with the co-ordinate axes in sq. units is

A. $\sqrt{6}\pi$

B. $\sqrt{8}\pi$

C. $\sqrt{12}\pi$

D. $\sqrt{3}\pi$

Key: 1

Sol: Equation of given ellipse is $\dfrac{x^2}{2} + \dfrac{y^2}{3} = 1$

Area of the ellipse is $\pi ab = \pi(\sqrt{2})(\sqrt{3}) = \sqrt{6}\pi$

90. If the vertex of a parabola is (4,3) and its directrix is $3x + 2y - 7 = 0$ then the equation of latus rectum of the parabola is

A. $3x + 2y - 18 = 0$

B. $3x + 2y - 29 = 0$

C. $3x+2y-8=0$

D. $3x+2y-31=0$

Key: B

Sol: $(h,k)=(4,3)$

Directrix $3x+2y-7=0$

Parallel line $3x+2y+k=0\,(4,3)$

$$\frac{|18+k|}{\sqrt{13}}=\frac{|11|}{\sqrt{13}}\Rightarrow -11=18+k$$

$\Rightarrow k=-29$

91. If eccentricity of ellipse $\Rightarrow k=-29\frac{x^2}{a^2+1}+\frac{y^2}{a^2+2}=1$ is $\frac{1}{\sqrt{6}}$ then length of latus rectum of ellipse is

A. $\frac{5}{\sqrt{6}}$

B. $\frac{10}{\sqrt{6}}$

C. $\frac{8}{\sqrt{6}}$

D. $\frac{12}{\sqrt{6}}$

Key: B

$a^2+2>a^2+1$

Sol: $(a^2+1)=(a^2+2)(1-e^2)$

$\Rightarrow a^2=4\Rightarrow a=2$

Latus rectum $=\frac{2(a^2+1)}{\sqrt{a^2+2}}=\frac{10}{\sqrt{6}}$

92. If (2, 1, 3), (3, 1, 5) and (1, 2, 4) are the mid points of the sides BC, CA, AB of ΔABC respectively, then the perimeter of the triangle is

A. $2\sqrt{6}+\sqrt{3}$

B. $2\left(\sqrt{5}+\sqrt{6}+\sqrt{3}\right)$

C. $2\left(\sqrt{6}+3\right)$

D. $\sqrt{6}+\sqrt{3}$

Key: B

Sol: Given mid points of sides of triangle are

$Let\ D=(2,1,3), E=(3,1,5), F=(1,2,4)$

Now $DE=\sqrt{5}, EF=\sqrt{6}, FD=\sqrt{3}$

Perimetre of triangle $ABC=AB+BC+CA$

$=2(DE+EF+FD)$

$=2\left(\sqrt{5}+\sqrt{6}+\sqrt{3}\right)$

93. $Lt_{x\to -2}\frac{|x|}{x}$

A. 0

B. 1

C. -1

D. does not exist

Key: A

Sol: $Lit_{x\to -2}\frac{|x|}{x}=Lit_{x\to -2}\frac{-x}{x}=-1$

94. The negation of the propositon $q\vee \sim(p\wedge r)$ is

A. $\sim q\vee(p\wedge r)$

B. $\sim q\wedge(p\wedge r)$

C. $\sim p\vee \sim q\vee \sim r$

D. $q\wedge(\sim p\vee \sim r)$

Key: B

Sol: $\sim(q\vee\sim(p\wedge r))\equiv\sim q\wedge(p\wedge r)$

95. Let R be a relation defined by $R=\{(a,b)/a\geq b;a,b\in R\}$ then R is

A. Only Reflexive

B. Both Reflexive and transitive

C. Symmetric transitive but not reflexive

D. Neither transitive nor reflexive but symmetric

Key: B

Sol: $a\geq a\ a\in RT\ Reflexive\ a\in b\rightarrow b\in a\ a\geq b\rightarrow b\geq a\ Symmetric\ 2\geq 3\rightarrow 3\geq 2(F)$
$a\geq b\ b\geq a\rightarrow a\geq c\ (Transitive)$

96. If $(2+\sin x)\frac{dy}{dx}+(y+1)\cos x=0$ and $y(0)=1$, then $y\left(\frac{\pi}{2}\right)$ is equal to:

A. $\frac{1}{3}$

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

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

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

Key: A

Sol: Given equation $(2+\sin x)\frac{dy}{dx}+(y+1)\cos x=0$

$(2+\sin x)dy+\cos x(y+1)dx=0$

$\Rightarrow\ \frac{\cos x}{2+\sin x}dx+\frac{1}{y+1}dy=0$

integrating on both sides

$\Rightarrow\ \log(2+\sin x)+\log(y+1)=\log C$

$\Rightarrow\ (y+1)(2+\sin x)=C$

$Given\ y(0)=1$

$(1+1)(2+0)=C$

$\Rightarrow C \quad = 4$

$\Rightarrow \quad (y+1)\cdot(2+\sin x)=4$

Put $x=\frac{\pi}{2}$ then $y=\frac{1}{3}$

97. If $y=\frac{x}{\log|cx|}$ (where c is an arbitrary constant) is the general solution of the differential equation $\frac{dy}{dx}=\frac{y}{x}+\phi\left(\frac{x}{y}\right)$ then the function $\phi\left(\frac{x}{y}\right)$ is

A. $\frac{x^2}{y^2}$

B. $-\frac{x^2}{y^2}$

C. $\frac{y^2}{x^2}$

D. $-\frac{y^2}{x^2}$

Key: D

Sol: $\log c+\log|x|=\frac{x}{y}$

Differentiating w.r.t $x, \frac{1}{x}=\frac{y-x\frac{dy}{dx}}{y^2}$

$(\text{Or})\ \frac{y^2}{x}=y-x\frac{dy}{dx}$

$(\text{Or})\ \frac{dy}{dx}=\frac{y}{x}-\frac{y^2}{x^2}$

$(\text{Or})\ \phi\left(\frac{x}{y}\right)=-\frac{y^2}{x^2}.$

98. A vector of length $\sqrt{7}$ which is perpendicular to $2\bar{j}-\bar{k}$ and $-\bar{i}+2\bar{j}-3\bar{k}$ makes obtuse angle angle with y-axis is

A. $\frac{1}{\sqrt{5}}\left(4\bar{i}-\bar{j}+\sqrt{18k}\right)$

B. $\frac{1}{\sqrt{3}}\left(4\bar{i}-\bar{j}-2\bar{k}\right)$

C. $\frac{1}{\sqrt{3}}\left(-4\bar{i}+\bar{j}+2\bar{k}\right)$

D. $\frac{1}{\sqrt{3}}\left(-4\bar{i}-\bar{j}+2\bar{k}\right)$

Key: B

Sol: Required Vector $\sqrt{7}\frac{\bar{a}\times\bar{b}}{\left|\bar{a}\times\bar{b}\right|}$ and make j with negative coefficient

99. Let $\vec{a}=\hat{i}+\alpha\hat{j}+3\hat{k}$ *and* $\vec{b}=3\hat{i}-\alpha\hat{j}+\hat{k}$. If the area of the parallelogram whose adjacent sides are represented by the vector $\vec{a}$ *and* $\vec{b}$ is $8\sqrt{3}$ square units, then $\vec{a}.\vec{b}$ is equal to

A. 1
B. 2
C. 4
D. 8

Key: B

Sol: $\vec{a}=\hat{i}+\alpha\hat{j}+3\hat{k},\vec{b}=3\hat{i}-\alpha\hat{j}+\hat{k}$

Area of parallelogram $=\left|\hat{a}\times\vec{b}\right|=8\sqrt{3}$

$$\left|\hat{a}\times\vec{b}\right|=\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 1 & \alpha & 3\\ 3 & -\alpha & 1\end{vmatrix}=\hat{i}(4\alpha)-\hat{j}(-8)+\hat{k}(-4\alpha)$$

$\therefore\left|\hat{a}\times\vec{b}\right|=\sqrt{64+32\alpha^2}=8\sqrt{3}\Rightarrow 2+\alpha^2=6\Rightarrow\alpha^2=4$

$\therefore\vec{a}.\vec{b}=3-\alpha^2+3=2$

100. Bag B_1 contains 4 white and 2 black balls. Bag B_2 contains 3 white and 4 black balls.A bag is chosen at random and a ball is drawn from it at random, then the probability that the ball drawn is white, is

A. $\frac{1}{42}$

B. $\frac{42}{32}$

C. $\frac{33}{42}$

D. $\frac{23}{42}$

Key: B

Sol: Let E denotes the event drawing a white ball is

$$\Rightarrow P(E)=P(B_1)P(E/B_1)+P(B_2)P(E/B_2)$$

$$=\frac{1}{2}\times\frac{4}{6}+\frac{1}{2}\times\frac{3}{7}=\frac{1}{2}\left(\frac{2}{3}+\frac{3}{7}\right)=\frac{1}{2}\left(\frac{14+9}{21}\right)$$

$$=\frac{23}{42}$$

101. The mean and variance of a binomial distribution are α and $\frac{\alpha}{3}$ respectively. If $P(x=1)=\frac{4}{243}$ then $P(x=4 or 5)=$

A. $\frac{5}{9}$

B. $\frac{16}{27}$

C. $\frac{64}{81}$

D. $\frac{145}{243}$

Key: B

Sol:

$np = \alpha npq = \frac{\alpha}{3}$

$\frac{npq}{np} = \frac{\alpha/3}{\alpha} \Rightarrow q = \frac{1}{3}$

$p = \frac{2}{3}$

$p(x=1) = {}^nC_1 p^1 q^{n-1} = \frac{4}{243}$

$= n.\left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^{n-1} = \frac{4}{243}$

$\Rightarrow n\frac{2}{3^n} = \frac{4}{243}$

$\Rightarrow \frac{n}{3^n} = \frac{2}{3^5}$

$\Rightarrow n.3^5 = 2.3^n$

$\Rightarrow n = 6$

$p(x=4) or\ p(x=5)$

$= p(x=4) + p(x=5)$

$= {}^6C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^2 + {}^6C_5\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)^1$

$= 15.\frac{16}{81}.\frac{1}{9} + 6.\frac{32}{243}.\frac{1}{3}$

$= \frac{8.+64}{243} = \frac{144}{243} = \frac{16}{27}$

102. The value of $\tan\left(\frac{1}{2}Cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right)$ is

A. $\frac{3+\sqrt{5}}{2}$

B. $3+\sqrt{5}$

C. $\frac{1}{2}\left(3-\sqrt{5}\right)$

D. $2-\sqrt{3}$

Key: C

Sol: Put $\cos^{-1}\frac{\sqrt{5}}{3}=\alpha \Rightarrow \tan\alpha/2=\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$

103. Let $f(x)=\begin{cases}\frac{x-4}{|x-4|}+a, x<4 \\ a+b \quad x=4 \\ \frac{x-4}{|x-4|}+b, x>4\end{cases}$ then $f(x)$ is continuous at $x=4$ when

A. $a=0,b=0$

B. $a=1,b=1$

C. $a=-1,b=1$

D. $a=1,b=-1$

Key: D

Sol: Conceptual

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

A. $\frac{\sqrt{3}}{12}$

B. $\frac{\sqrt{3}}{10}$

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

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

Key: B

$$Let\ \ f(x)=\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$$

$$put\ x=\tan\theta$$

$$f^1(x)=\frac{1}{2\left(1+x^2\right)}$$

Sol: $$g(x)=\tan^{-1}\left(\frac{2x\sqrt{1-x^2}}{1-2x^2}\right)$$

$$put\ \ x=\sin\theta$$

$$g^1(x)=\frac{2}{\sqrt{1-x^2}}$$

$$\frac{f^1(x)}{g^1(x)}\ at\ x=\frac{1}{2}=\frac{\sqrt{3}}{10}$$

105. The number of distinct real roots of $x^4-4x+1=0$ is:

A. 4

B.2

C.1

D.0

Key: B

Sol:

Let $f(x)=x^4-4x+1$

$f'(x)=4x^3-4$

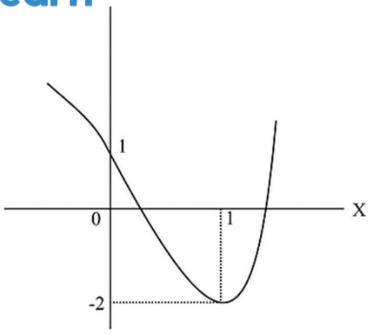
$f'(x)=0\Rightarrow x=1$

$x=1$ is point of minima.

$f(0)=1, f(1)=-2, f(2)=9$

$f(0)f(1)<0,\ f(1)f(2)<0$

f has one root in (0,1) and one root in (1,2)



Hence f(x)=0 has 2 distinct real solutions.

106. The minimum value of the function $f\left(x\right)=2x^{3}-21x^{2}+36x-20$ is

A. -128

B.-126

C.-120

D.-127

Key: A

Sol:

$$f\left(x\right)=2x^{3}-21x^{2}+36x-20\Rightarrow f'\left(x\right)=6x^{2}-42x+36$$
$$f'\left(x\right)=6\left(x^{2}-7x+36\right)\Rightarrow f'\left(x\right)=6\left(x-1\right)\left(x-6\right)$$
$$\textit{For min or max}\, f'\left(x\right)=0\,\textit{then}$$
$$6\left(x-1\right)\left(x-6\right)=0\Rightarrow x=1,6$$
$$f''\left(x\right)=6\left(2x-7\right)$$
$$f''\left(1\right)=6\left(-5\right)=-30<0\rightarrow \text{ maximum}$$
$$f''\left(6\right)=6\left(5\right)=30>0\rightarrow \text{ minimum}$$
$$f\left(x\right)=2x^{3}-21\left(x^{2}\right)+36x-20\Rightarrow f\left(6\right)=432-756+216-20=-128$$

107. $\int\frac{\sin^{3}x+\cos^{3}x}{\sin^{2}x\cdot\cos^{2}x}dx=$

A. $\sin x+\cos x+c$

B. $\tan x+\cot x+c$

C. $\sec x-cosecx+c$

D. $sinnx-\cos x+c$

Key: C

Sol: $\int(\tan x\cdot\sec x+\cot x\cdot cosex)dx$

108. Area bounded by the curve $x=2-y-y^2$ and the normal to the curve where it meets positive y – axis is A. then the value of $\sqrt{\frac{A}{5}}$ is

A. $\frac{10}{9}$

B. $\frac{9}{10}$

C. $\frac{3}{11}$

D. $\frac{11}{3}$

Key: A

Sol: Tangent at (0,1) is 3x−y+1=0

Area = 500/81

109. The shortest distance between the lines $\frac{x+7}{-6}=\frac{y-6}{7}=Z$ and $\frac{7-x}{2}=y-2=z-6$ is

A. $2\sqrt{29}$

B.1

C. $\frac{\sqrt{42}}{2}$

D. $\frac{\sqrt{34}}{2}$

Key: A

Sol: $L_1:\frac{x+7}{-6}=\frac{y-6}{7}=\frac{z-0}{1}\quad\Rightarrow\overline{a_1}=(-7,6,0),\overline{b_1}=-6\overline{i}+7\overline{j}+\overline{k}$

$L_2:\frac{x-7}{-2}=\frac{y-2}{1}=\frac{z-6}{1}\quad\Rightarrow\overline{a_2}=(7,2,6),\overline{b_1}=-2\overline{i}+\overline{j}+\overline{k}$

Shortest distance between L_1 and L_2 is

$$=\left|\frac{\left[\vec{a_2}-\vec{a_1}\quad \vec{b_1}\quad \vec{b_2}\right]}{\vec{b_1}\times\vec{b_2}}\right|=2\sqrt{29}$$

110. The angle between two lines $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z+3}{2}$ and $\frac{x}{1}=\frac{y}{1}=\frac{z}{0}$

A. $0°$

B. $30°$

C. $45°$

D. $90°$

Key: C

Sol: The given lines are $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z+3}{2}$ and $\frac{x}{1}=\frac{y}{1}=\frac{z}{0}$

If θ is angle between two lines $\frac{x-x_1}{a_1}=\frac{y-y_1}{b_1}=\frac{z-z_1}{c_1}$ and $\frac{x-x_2}{a_2}=\frac{y-y_2}{b_2}=\frac{z-z_2}{c_2}$ then

$$\cos\theta=\frac{a_1a_2+b_1b_2+c_1c_2}{\sqrt{a_1^2+b_1^2+c_1^2}\sqrt{a_2^2+b_2^2+c_2^2}}$$

Hence,

$$\cos\theta = \frac{2+1}{\sqrt{4+1+4}\sqrt{1+1}}$$

$$= \frac{3}{3\left(\sqrt{2}\right)}$$

$$= \frac{1}{\sqrt{2}}$$

Therefore, $\theta=\boxed{45°}$

APTITUDE

Amongst five friends, A, B, C, D and E, each bought a mobile phone for a different price. A paid more than both C and E. Only B paid more than D. E did not pay the minimum amount. E paid ₹8,000 for the phone.

111. Which of the following is true with regard to the given information?

A. Only two people paid a price less than the price paid by B

B. E paid more than C and B

C. None is true

D. No one paid more amount than that paid by C

Key : C

Solution : $A > C \& E$

Only $B > D$

$B > D > A > E > C$
$\downarrow$
8,000

112. If D paid ₹17,000 more than the price paid by E, which of the following could possibly the amount paid by A?

A. ₹35,000/–

B. ₹16,000/–

C. ₹7,500/–

D. ₹26,000

Key : B

Solution : E paid =₹8,000

D paid =17,000+8,000=25,000

Because D>A>E

113. Who paid the third highest amount for the mobile phone?

A. A

B. B

C. C

D. D

Key : A paid the third highest amount for the mobile phone.

114. In the sequence below, locate the missing number. 6,13,27,48,?

A. 76

B. 94

C. 136

D. 121

Solution : Let's calculate the differences between consecutive terms:

13 - 6 = 7

27 - 13 = 14

48 - 27 = 21

The differences between consecutive terms are increasing by 7 each time.

To find the next difference, we can add 7 to the previous difference of 21:

21 + 7 = 28

Now, to find the missing number in the series, we add this difference to the last number:

48 + 28 = 76

So, the missing number in the series is **76**.

115. What letters should fill in the blank spaces of the series 'pqr_ rs_rs s_q?

A. spqpprr

B. pqrrppq

C. sqppqpr

D. sqprrqr

Key : C

Solution : Starting with pqr_ it appears that p q and r are in sequential order.

In the next part, we have rs_rs which suggests that r and s are repeating.

Finally, we have s_q where s is followed by q, indicating a reversal of order.

Now, combining these patterns, we get pqr (sequential), rs (repeating), rs (repeating), sq (reversal).

So, if we continue the pattern it should be pqrs (sequential), rs (repeating), rs (repeating), sq (reversal).

Putting it all together, we get pqrsrsrsq, which matches sqppqpr, as given in the answer.

So, **sqppqpr** is the correct alternative to fill in the blank spaces of the series pqr_ rs_rs s_q.

116. Shyam started walking from point 'P' towards south. After walking 40 m he turned left, then walked 30 m and reached a point 'Q'. What will be the direction of 'Q' with respect to point 'P'?

A. North-East

B. South –West

C. South-East

D. North-West

Key : C

Solution : Shyam started walking from point 'P' towards the south. After walking 4040 m he turned left, then walked 3030 m and reached a point 'Q'. The direction of 'Q' concerning point 'P' is South-East.

117. On January 12, 1980, it was Saturday. The day of the week on January 12, 1979 was –

A. Saturday

B. Friday

C. Sunday

D. Thursday

Key : B

Solution : The year 1979 being an ordinary year, it has 1 odd day.

So, the day on 12th January 1980 is one day beyond on the day on 12th January, 1979.

But, January 12, 1980 being Saturday.

∴ January 12, 1979 was Friday.

118. In the following question below is followed by three arguments numbered A., B.and (C). You have to decide which of the argument is a 'strong' argument and which is a 'weak' argument. 30.

Statement : Should there be complete ban on setting up of thermal power plants in India ?

Arguments:

A. Yes, this is the only way to arrest further addition to environmental pollution.

B.No, there is a huge shortage of electricity in most parts of the country and hence generation of electricity needs to be augmented.

C.No, many developed countries continue to set up thermal power plants in their countries.

A. None is strong

B. Only A. is strong

C. Only B.is strong

D. Only C.is strong

Key : C

Solution : Only Argument B.is strong because thermal power plants in India are one way to increase environmental pollution so cannot be completely banned. Argument C.is based on example which is a bad argument.

119. In every question that follows, identify the absent term represented by the question mark (?) by considering the relationship between the words provided on either side of the analogy sign.

L × M: 12 × 13 : : U × W : ?

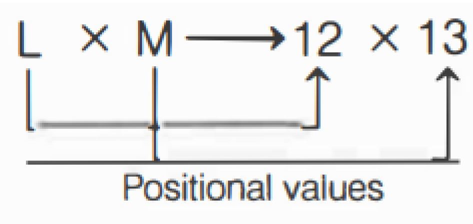
A. 21×31

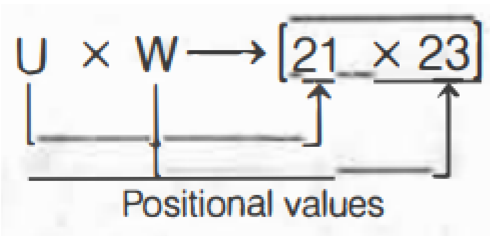
B. 21×22

C. 21×23

D. 21×25

Key : C

Solution : As 

Similarly 

The given word is following the positional values of each letter.

As, positional value of 'L' is 12 and 'M' is 13.

Similarly,

Positional value of 'U' is 21 and 'W' is 23.

Therefore, the option 'C' is correct and other options are incorrect as they are not following the positional values of each letter of U×M.

120. In the question given below, there are words that exhibit a specific relationship to one another. Your task is to identify the word from the provided options that shares the exact same relationship.

POT➔ TOPE; FIN➔ NIFE; LIT➔ ?

A. TILO

B. TILE

C. LITE

D. TILL

Key : B

Solution : Here, the pairs share a very simple relationship among them which is as follows:

In the pair POT the letters are rearranged from left to right, to right to left that is POT=TOP with an additonal letter E added, making it TOPE. Similarly, in the next pair, FIN is made NIF and E added, making it NIFE. Therefore, the same will go for the pair LIT making it TIL and E added, giving TILE. So, the correct answer is option B.

Analyse the details provided and answer the following questions:

In a specific code language,

'For profit order now' is represented as 'ho ja ye ga'

'Right now for him' is denoted as 'ga ve ja se'

'Place order for profit' is written as 'ga bl ho ye'

'Only in the right order' is coded as 've du ye zo

ENGLISH

121. In the provided code language, what is the code for 'bI'?

A. profit

B. now

C. place

D. order

Key : C

Solution : Based on the provided information, we can determine the code language as follows:

'For' is represented by 'ho'. 'Profit' is represented by 'ga'.

'Order' is represented by 'ja'. 'Now' is represented by 'ye'.

Right' is represented by 've' and 'Him' is represented by 'se'.

'Place' is represented by 'bl'. 'Only' is represented by 'du'.
'In' is represented by 'zo'

Therefore, the correct answer is PLACE.

122. In the given programming language code, which one of the following options could represent 'only for now'?

A. Zo ga ja

B. Zo ga ye

C. ja bl zo

D. du bl ja

Key : A

Solution : 'Only in the right order' is coded as 've du ye zo'.

If we see above, 'Only for now' is corresponded to 'zo/du ga ja'.

So, 'zo ga ja' is the code for 'only for now' in the provided code language.

123. In the code language provided, which of the following options could be represented by the code 'fo ve du'?

A. only in profit

B. order only him

C. place in right

D. in right spirits

Key : D

Solution : The code for 'Right now for him' is 'ga ve ja se', with 've' corresponding to 'right'.

'Only in the right order' is coded as 'du ye zo', confirming that 'right order only' is represented by 'fo ve zo'. Therefore, 'fo ve du' is the code for 'right order only' in the given code language. The code for 'In right spirits' is also 'fo ve du'.

124. In the given code language, what encoding is used for the term 'profit'?

A. ye

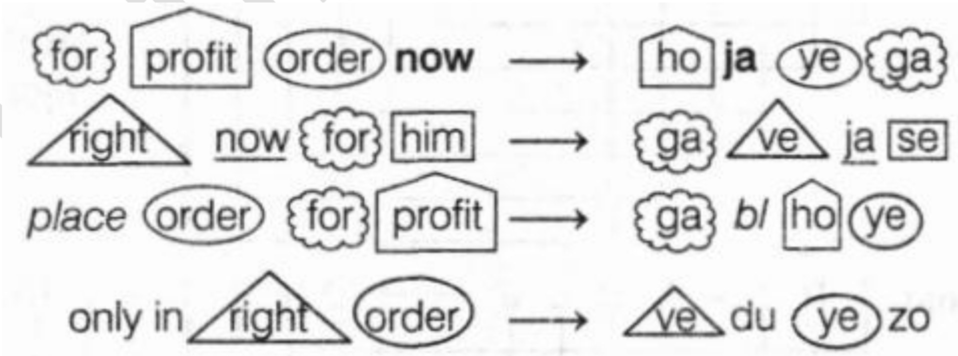
B. ho

C. ga

D. ja

Key : B

Solution :



'For profit order now' is expressed as 'ho ja ye ga', where 'profit' corresponds to 'ho'.

'Place order for profit' is written as 'ga bl ho ye', confirming that 'profit' is represented by 'ho'.

So, 'ho' is the code for 'profit' in the given code language.

The code for profit is 'ho'.

125. In the given code language, what is the encoding for the term 'him'?

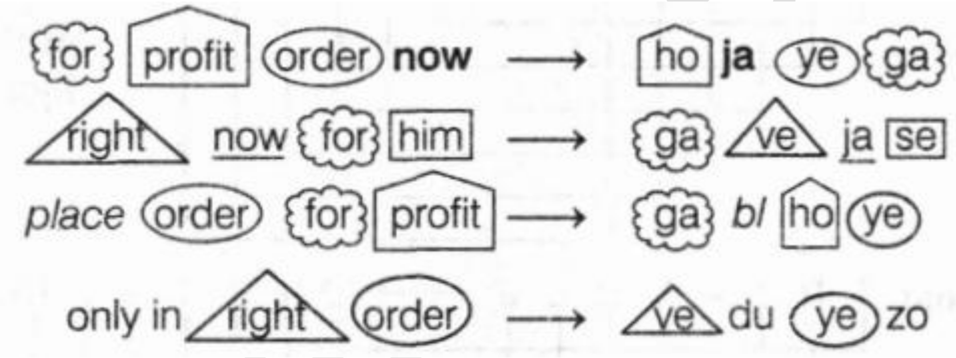
A. Cannot be determined

B. ga

C. ve

D. se

Key : D

Solution : 

If we observe the common elements amongst the phrases where 'him' appears:

'Right now for him' corresponds to 'ga ve ja se'.

As we can see, 'him' is represented by 'se'. Thus, 'se' is the code for 'him' in the provided code language.