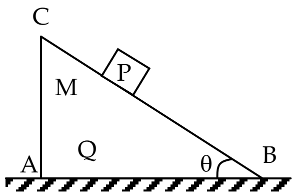
OLTS – 1920 – JEEM 2020

FULL TEST – 2

PART – A : PHYSICS
SECTION – A
(Single Correct Choice Type)

1. A block Q of mass M is placed on a horizontal frictionless surface AB and a body P of mass m is released on its frictionless slope. As P slides by a length L on this slope of inclination θ, the block Q would slide by a distance



(A) $\frac{ML\cos\theta}{M}$ (B) $\left(\frac{m}{M+m}\right)L$

(C) $\frac{(M+m)L}{m\cos\theta}$ (D) $\frac{mL\cos\theta}{M+m}$

Ans. D

Sol. Centre of mass of the system will not change in x-direction

$MX + m(X + L\cos\theta) = 0$

$X = -\left(\frac{m}{M+m}\right)L\cos\theta$

2. The dimensions of a rectangular block measured with a vernier callipers having least count of 0.1 mm is 5 mm × 10 mm × 5 mm. The maximum percentage error in measurement of volume of the block is

(A) 5% (B) 10% (C) 15 % (D) 20%

Ans. A

Sol. $V = lbh$

$\frac{\Delta V}{V} = \frac{\Delta l}{l} + \frac{\Delta b}{b} + \frac{\Delta h}{h}$

$= \frac{0.1}{5} + \frac{0.1}{10} + \frac{0.1}{5}$

$= \frac{0.5}{10}$

$\% \frac{\Delta V}{V} = \frac{0.5}{10} \times 10 = 5\%$

3. Three vectors $\vec{P}, \vec{Q}$ and $\vec{R}$ are such that $|\vec{Q}| = A\sqrt{2}$ and the angles between $\vec{P}$ and $\vec{Q}$, $\vec{Q}$ and $\vec{R}$, $\vec{R}$ and $\vec{P}$ are 90^0, 150^0 and 120^0 respectively. Find the value of $|\vec{P}|$.

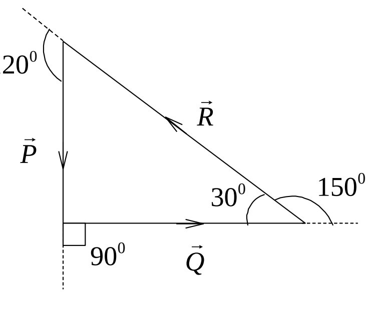
(A) $\frac{A}{\sqrt{2}}$ (B) $\frac{A\sqrt{2}}{\sqrt{3}}$ (C) $\frac{2A}{\sqrt{3}}$ (D) $\frac{A}{2}$

Ans. B

Sol.

$\tan 30^0 = \frac{|\vec{P}|}{|\vec{Q}|}$

$|\vec{P}| = \frac{A\sqrt{2}}{\sqrt{3}}$



4. The velocity and acceleration of a particle at time t = 0 are $\vec{u} = a\sqrt{2}\hat{i} + a\sqrt{2}\hat{j}\,(m/s)$ and $\vec{a}_0 = a\hat{i} - a\hat{j}\,(m/s^2)$ respectively. Find the angle made by the velocity of the particle at t = 2sec with initial velocity.

(A) $\tan^{-1}(2)$ (B) $\tan^{-1}(\sqrt{2})$ (C) $\tan^{-1}(1)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

Ans. B

Sol. $\vec{u}$ and $\vec{a}t$ are perpendicular vectors

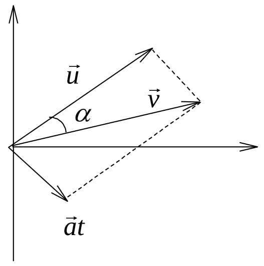
Also $\vec{v} = \vec{u} + \vec{a}t$

At $t = 2\sec$, $|\vec{u}| = 2a, |\vec{a}t| = a\sqrt{2}\times 2 = 2\sqrt{2}a$

$v = \left[|\vec{u}|^2 + |\vec{a}t|^2\right]^{1/2} = a\sqrt{12}$

$\tan\alpha = \frac{|\vec{a}t|}{|\vec{u}|}$

$\alpha = \tan^{-1}(\sqrt{2})$



5. When a man walks at the rate of 3 km/hr, rain appears to fall vertically. The speed of rain is $3\sqrt{2}$ km/hr. At what speed man should walk so that the rain appears to fall at an angle of 45^0 with vertical.

(A) 3 km/hr (B) 4 km/hr (C) $3\sqrt{2}$ km/hr (D) 6 km/hr

Ans. D

Sol. Let $\vec{V}_R = a\hat{i} + b\hat{j}$

Case I $\vec{V}_M = 3\hat{i}$

$\vec{V}_{RM} = \vec{V}_R - \vec{V}_M = (a-3)\hat{i} + b\hat{j}$

Now $a - 3 = 0$ as $\vec{V}_{RM}$ is vertical

Also $\left|\vec{V}_R\right|^2 = a^2 + b^2$

$\left(3\sqrt{2}\right)^2 = 3^2 + b^2$

b = 3

Case II $\vec{V}_M = k\hat{i}$

$\vec{V}_{RM} = (a-k)\hat{i} + 3\hat{j} = (3-k)\hat{i} + 3\hat{j}$

For angle to be 45^0, $\vec{V}_{RM} = -3\hat{i} + 3\hat{j}$

$k = 6$

6. Force F acting on a body moving in a straight line varies with the velocity v of the body as $F = \frac{k}{v}$ where k is a constant. The work done by the force in time t is proportional to

(A) t (B) $t^{3/2}$ (C) $t^{-1/2}$ (D) $t^{-3/2}$

Ans. A

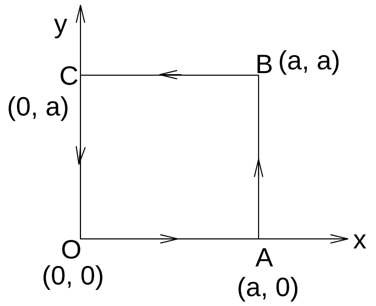
Sol. $P = Fv = \frac{k}{v}\times v = k$

$w = \int_0^t P\,dt = Kt$

7. The work done by the force $\vec{F} = x^2\hat{i} + y^2\hat{j}$ around the path shown in the figure is

(A) $\frac{2}{3}a^3$ (B) zero

(C) a^3 (D) $\frac{4}{3}a^3$



Ans. B

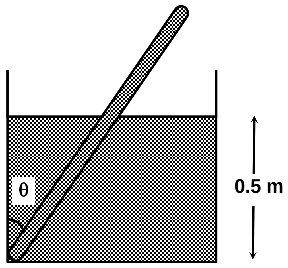
Sol. $W=\int \vec{F}.d\vec{r}$

$W=\int\left(F_xdx+F_ydy\right)$

$W=\int_0^A\left(F_xdx+F_ydy\right)+\int_A^B\left(F_xdx+F_yd_y\right)+\int_B^C\left(F_xdx+F_ydy\right)+\int_C^0\left(F_xdx+F_ydy\right)$

$W=0$

8. A wooden plank of length 1 m and uniform cross section is hinged at one end to the bottom of a tank as shown in the figure. The tank is filled with water upto a height of 0.5 m. The specific gravity of the plank is 0.5. The angle θ made by the plank in equilibrium position is

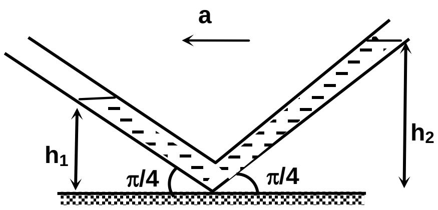


(A) 30° (B) 45°
(C) 60° (D) 90°

Ans. B

Sol. At equilibrium torque due to buoyant force & torque due to weight gets balance about lower point of rod.

9. A simple accelerometer (an instrument for measuring acceleration) can be made in the form of a tube filled with a liquid and bent as shown in figure. During motion the level of the liquid in left arm is at a height h_1 and in the right arm at a height h_2. Determine the acceleration 'a' of a carriage in which accelerometer is installed, assuming that the diameter of tube is much smaller than h_1 and h_2.



(A) $\frac{g(h_2-h_1)}{(h_2+h_1)}$ (B) $\frac{g(h_2+h_1)}{(h_2-h_1)}$ (C) $\frac{g(h_2-h_1)}{2h_1}$ (D) none of these

Ans. A

Sol. $\tan\theta=\frac{a}{g}$

10. One train is approaching an observer at rest and another train is receding from him with same velocity 4 m/s. Both the trains blow whistles of same frequency of 243 Hz. The beat frequency (In Hz) as heard by the observer is: (speed of sound in air = 320 m/s)

(A) 10 (B) 6
(C) 4 (D) 1

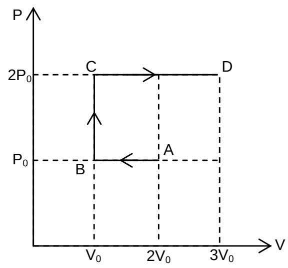
Ans. B

Sol. $f_b=f_2-f_1=243\left(\frac{320}{320-4}\right)-243\left(\frac{320}{320+4}\right)$

$=243\left[\frac{320}{316}-\frac{320}{324}\right]=6$

$f_b=6$

11. P –V diagram of an ideal gas is as shown, work done by the gas in the process ABCD is



(A) $4\,P_0V_0$ (B) $2\,P_0V_0$
(C) $3\,P_0V_0$ (D) P_0V_0

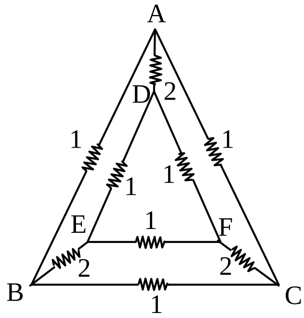
Ans. C

Sol. $W_{AB}=-P_0V_0$

$W_{CD}=+4P_0V_0$

$W_{ABCD}=+3P_0V_0$

12. A network of nine conductors connects six points A, B, C, D, E and F as shown below. The digits denote resistances in Ω. Find the equivalent resistance between B and C



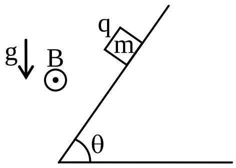
(A) $\frac{2}{15}\ \Omega$ (B) $\frac{7}{12}\ \Omega$ (C) $\frac{5}{12}\ \Omega$ (D) None of these

Ans. (D)

Sol. By symmetry

$V_A = V_D$

13. A block of mass m & charge q is released on a long smooth inclined plane. Magnetic field B is constant, uniform, horizontal and parallel to surface as shown. Find the time from start when block loses contact with the surface –



(A) $\frac{m\cos\theta}{qB}$ (B) $\frac{m\,\mathrm{cosec}\,\theta}{qB}$ (C) $\frac{m\cot\theta}{qB}$ (D) none of these

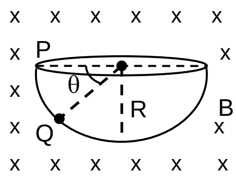
Ans. (C)

Sol. $q.V.B = mg\cos\theta$

$q(0 + g\sin\theta.t).B = mg\cos\theta$

$\therefore t = \frac{m\cot\theta}{qB}$

14. A charged sphere of mass m and charge – q starts sliding along the surface of a smooth hemispherical bowl, at position P. The region has a transverse uniform magnetic field B. Normal force by the surface of bowl on the sphere at position Q is:



(A) $mg\sin\theta + qB\sqrt{2gR\sin\theta}$ (B) $3mg\sin\theta + qB\sqrt{2gR\sin\theta}$

(C) $mg\sin\theta - qB\sqrt{2gR\sin\theta}$ (D) $3mg\sin\theta - qB\sqrt{2gR\sin\theta}$

Ans. B

Sol. From energy conservation

From P + 0 Q

$V = \sqrt{2gR\sin\theta}$

Force, equation into radial direction

$N + qvB - mg\sin\theta = \frac{mv^2}{R}$

$N = \left[3mg\sin\theta - qB\sqrt{2gR}\right]$

15. Two waves coming from two coherent sources, having different intensities interfere, their ratio of maximum intensity to the minimum intensity is 25. The intensities of the sources are in the ratio:

(A) 25 : 1 (B) 25 : 16 (C) 9 : 4 (D) 5 : 1

Ans. C

Sol. Given : $\frac{I_{max.}}{I_{min.}} = 25$

$\frac{I_{max.}}{I_{min.}} = \frac{(a+b)^2}{(a-b)^2}$ (where a,b are amplitude of two waves)

or $\frac{a+b}{a-b} = \frac{5}{1}$

or $a + b = 5a - 5b$

or $\frac{a}{b} = \frac{3}{2}$

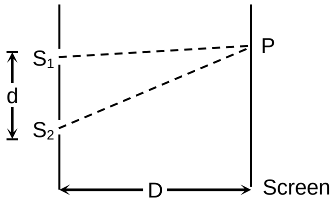
$\therefore \quad \frac{I_1}{I_2} = \frac{a^2}{b^2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$.

16. In Young's double slit experiment the two slits are d distance apart. Interference pattern is observed on a screen at a distance D from the slits. A dark fringe is observed on the screen directly opposite to one of the slits. The wavelength of light is :

(A) $\frac{D^2}{2d}$ (B) $\frac{d^2}{2D}$ (C) $\frac{D^2}{d}$ (D) Consider the nuclear reaction

Ans. D

Sol. From figure,



$S_2P = (D^2 + d^2)^{1/2} = D\left(1 + \frac{d^2}{D^2}\right)^{1/2}$

$= D\left(1 + \frac{1}{2}\frac{d^2}{D^2}\right) = D + \frac{d^2}{2D}$

Path difference, $\Delta x = S_2P - S_1P$

$= D + \frac{d^2}{2D} - D = \frac{d^2}{2D}$

For dark fringe,

$\frac{d^2}{2D} = \frac{\lambda}{2}$

or $\lambda = \frac{d^2}{D}$

17. $X^{200} \to A^{110} + B^{80}$. If the binding energy per nucleon for X, A and B are 7.4 MeV, 8.2 MeV and 8.1 MeV respectively, then the energy released in the reaction is :

(A) 70 MeV (B) 200 MeV (C) 190 MeV (D) 10 MeV

Ans. A

Sol. For X : Energy $= 200 \times 7.4 = 1480$ MeV

For A : Energy $= 110 \times 8.2 = 902$ MeV

For B : Energy $= 80 \times 8.1 = 648$ MeV

$\therefore$ Energy released $= (902 + 648) - 1480$

$= 1550 - 1480 = 70$ MeV.

18. Two radioactive nuclei P and Q, in a given sample decay into a stable nucleus R. At time $t = 0$, number of P species are $4N_0$ and that of Q are N_0. Half-life of P (for conversion to R) is 1 minute where as that of Q is 2 minutes. Initially there are no nuclei of R present in the sample. When number of nuclei of P and Q are equal, the number of nuclei of R present in the sample would be :

(A) $2N_0$ (B) $3N_0$ (C) $\frac{9N_0}{2}$ (D) $\frac{5N_0}{2}$

Ans. C

Sol.

	P	Q
No. of nuclei, at t=0	$4N_0$	N_0
Half-life	1 min	2 min
No. of nuclei after time t	N_P	N_Q

Let after t min. the number of nuclei of P and Q are equal.

$\therefore \quad N_P = 4N_0\left(\frac{1}{2}\right)^{t/1}$ and $N_Q = N_0\left(\frac{1}{2}\right)^{t/2}$

As $\quad N_P = N_Q$

$\therefore \quad 4N_0\left(\frac{1}{2}\right)^{t/1} = N_0\left(\frac{1}{2}\right)^{t/2} \frac{4}{2^{t/1}} = \frac{1}{2^{t/2}}$

$4 = \frac{2^t}{2^{t/2}} 4 = 2^{t/2}$

$2^2 = 2^{t/2}$

$\frac{t}{2} = 2$ or $t = 4$ min

After 4 minutes, both P and Q have equal number of nuclei.

$\therefore$ Number of nuclei of R

$$= \left(4N_0 - \frac{N_0}{4}\right) + \left(N_0 - \frac{N_0}{4}\right)$$

$$= \frac{15N_0}{4} + \frac{3N_0}{4} = \frac{9N_0}{2}.$$

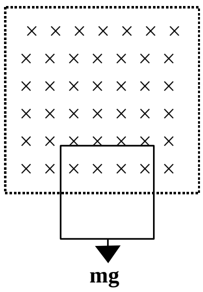
19. A resistance R and capacitance C are connected in series across a voltage $V = 100\sqrt{2}\sin(314t)$. The current is found to be $I = 5\sin\left(314t + \frac{\pi}{4}\right)$. The resistance R in the circuit is

(A) 5Ω (B) 10Ω
(C) 15Ω (D) 20Ω

Ans. D

Sol. Use $V = IZ$ and $\cos\frac{\pi}{4} = \frac{R}{Z}$

20. A horizontal magnetic field B is produced across a narrow gap between square iron pole-pieces as shown. A closed wire loop of side *l*, mass m and resistance R is allowed to fall with the top of the loop in the field. The terminal velocity attained by the loop is given by



(A) gt (B) $g\left(1 - \frac{Btl}{m}\right)t$

(C) $\frac{mgR}{B^2l^2}$ (D) 0

Ans. C

Sol. $\vec{F}_{ext} = 0 \quad Mg = Bil$

$$Mg = Bl \times \frac{BlV}{R}$$

$$V = \frac{MgR}{B^2l^2}$$

SECTION - B
Numerical Type (Single Digit)

21. A charged particle is projected in a magnetic field $\vec{B} = (3\hat{i} + 4\hat{j}) \times 10^{-2}$T. The acceleration of the particle is found to be $\vec{a} = (-\frac{8}{3}\hat{i} + y\hat{j})$ m/s². Find the value of y.

Ans. 2

Sol. $F_m \perp B \rightarrow a \perp B$

$\vec{a} \cdot \vec{B} = 0$

$(-8/3\hat{i} + y\hat{j}).(3\hat{i} + 4\hat{j}) = 0$

y = 2

22. In a room where temperature is 30ºC a body cools from 61ºC to 59ºC is 4 minutes. The time taken (in minutes) by the body to cool from 51ºC to 49ºC will be:

Ans. 6

Sol. Rate of cooling α difference in temperature

$$-\frac{dT}{dt}\ \alpha\ \Delta\theta$$

$$\frac{dT}{dt} = -K\Delta\theta$$

$dT = -K\Delta\theta.dt$

In First Case

dT = 61–59=2

$\Delta\theta$ = 60 – 30 = 30

dt = 4 minutes

$\therefore$

$$K = -\frac{dT}{\Delta\theta dt} = -\frac{2}{30 \times 4} = -\frac{1}{60}$$

For second case

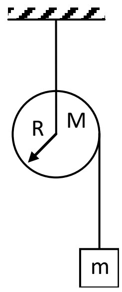
dT = 2

$\Delta\theta = 50 - 30 = 20$

$$\therefore dt = \frac{dT}{K\Delta\theta} = \frac{2}{\frac{1}{60} \times 20} = 6 \text{ min.}$$

SECTION - C
Numerical Type (XXXXXX.XX)

23. A mass M is supported by a massless string wound around a uniform cylinder of mass M and radius R. On releasing the mass from rest, it will fall with acceleration (g = 10 m/s²)



Ans. 00006.67

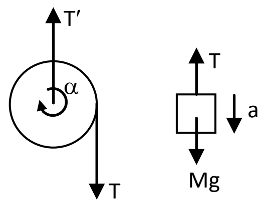
Sol. $Mg - T = Ma$ ... (i)

$$TR = \frac{MR^2}{2}\cdot\alpha \Rightarrow T = \frac{M}{2}(\alpha R)$$ ... (ii)

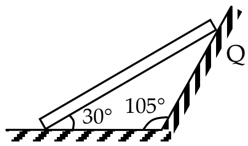
Also a = αR ... (iii)

Solving (i), (ii) & (iii)

$$a = \frac{2g}{3}$$



24. A rod is sliding down keeping in touch with a smooth inclined wall and smooth horizontal surface as shown in figure. At the instant shown, speed of end P is $\sqrt{2}$ m/s instantaneous speed of end Q (in m/s) is



Ans. 00001.73

Sol.

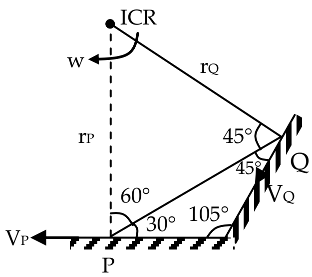
$$\frac{r_P}{\sin 45} = \frac{r_Q}{\sin 60}$$

$$\frac{r_P}{r_Q} = \frac{\sin 45}{\sin 60} = \frac{1/\sqrt{2}}{\sqrt{3}/2} = \sqrt{\frac{2}{3}}$$

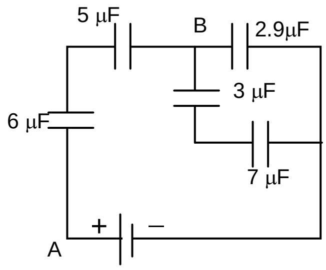
$$\frac{v_Q}{v_P} = \frac{r_Q}{r_P}$$

$$v_Q = \left(\frac{r_Q}{r_P}\right)v_P$$

$$= \sqrt{\frac{3}{2}}\cdot\sqrt{2} = \sqrt{3} \text{ m/s}$$



25. In the circuit shown if in steady state the potential difference between points A and B is 11V, find potential difference across 7 μF capacitor.



Ans. 00001.80

Sol. KLL for mesh BCDEB,

$$-\left(\frac{q_1 - q_2}{2.9}\right)\mu F + \frac{q_2}{7\mu F} + \frac{q_2}{3\mu F} = 0$$

$\Rightarrow$ q_2 = 12.6 μC ...(ii)

$\therefore$ Potential difference across 7 μF capacitor $= \frac{q_2}{C} = \frac{12.6\mu C}{7\mu F}$ = 1.8 V

PART – B : CHEMISTRY
SECTION – A
(Single Correct Choice Type)

26. The oxidation number of Cl in $CaOCl_2$ (bleaching powder) is
(A) zero, since it contains Cl_2
(B) –1, since it contains Cl^-
(C) +1, since it contains ClO^-
(D) +1 and –1, since it contains ClO^- and Cl^-

Ans. D

Sol. In $CaOCl_2$ (bleaching powder), one chlorine is as chloride and has oxidation number –1, the other chlorine is as OCl^{-1} and has oxidation number +1.

27. In which of the following pairs, the two species are not isostructural?
(A) CO_3^{2-} and NO_3^-
(B) PCl_4^+ and $SiCl_4$
(C) PF_5 and BrF_5
(D) AlF_6^{3-} and SF_6

Ans. C

Sol. (A) CO_3^{2-} and NO_3^- – Triangular planar
(B) PCl_4^+ and $SiCl_4$ – Tetrahedral
(C) PF_5 and BrF_5 – Trigonal bipyramidal and Square pyramidal
(D) AlF_6^{3-} and SF_6 – Octahedral

28. The correct set of four quantum numbers for the valence electrons of rubidium atom (Z= 37) is:
(A) $5, 1, 1, +\frac{1}{2}$
(B) $5, 0, 1, +\frac{1}{2}$
(C) $5, 0, 0, +\frac{1}{2}$
(D) $5, 1, 0, +\frac{1}{2}$

Ans. C

Sol. ${}_{37}Rb = [Kr]\,5s^1$

n = 5, l = 0, m = 0, $s = +\frac{1}{2}$

29. Which one of the following properties is not shown by NO?
(A) It combines with oxygen to form nitrogen dioxide
(B) It's bond order is 2.5
(C) It is diamagnetic in gaseous state
(D) It is a neutral oxide

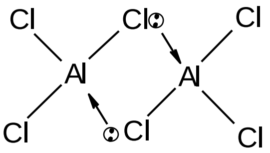
Ans. C

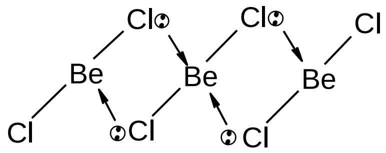
Sol. NO is paramagnetic in gaseous state due to the presence of unpaired electron in its structure.

30. Which one of the following is the correct statement?
(A) Boric acid is a protonic acid
(B) Beryllium exhibits coordination number of six
(C) Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase
(D) $B_2H_6.2NH_3$ is known as 'inorganic benzene'

Ans. C

Sol.





31. In which of the following arrangements the order is NOT according to the property indicated against it?
(A) $Al^{3+} < Mg^{2+} < Na^+ < F^-$ increasing ionic size
(B) $B < C < N < O$ increasing IE_1
(C) $I < Br < F < Cl$ increasing electron gain enthalpy
(D) $Li < Na < K < Rb$ increasing size

Ans. B

Sol. IE_1 of N is greater than IE_1 of O due to half-filled stable configuration in N.

32. Which method of purification is represented by the following equation

$$T(s) + 2I_2(g) \xrightarrow{523K} TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$$

(A) zone refining
(B) cupellation
(C) poling
(D) Van Arkel

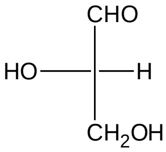
Ans. D

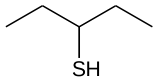
Sol. Van Arkel method

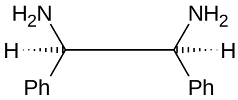
$$T(s) + 2I_2(g) \xrightarrow{523K} TiI_4(g)$$

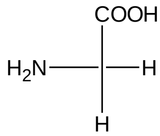
$$TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$$

33. Which of the following molecules is expected to rotate the plane of plane polarized light?

(A) 

(B) 

(C) 

(D) 

Ans. A

Sol. The plane of polarized light is rotated by optically active compound, i.e. it should be chiral.
So, (A) has, chiral C-atom. So, it is optically active.
In (B), (C) and (D) plane of symmetry is present.
Hence, (A) is correct.

34. In a fuel cell methanol is used as fuel and oxygen gas is used as an oxidizer. The reaction is $CH_3OH(\ell) + \frac{3}{2}O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell)$ At 298K standard Gibb's energies of formation for $CH_3OH(\ell)$, $H_2O(\ell)$ and $CO_2(g)$ are -166.2, -237.2 and -394.4 kJ mol^{-1} respectively. If standard enthalpy of combustion of methanol is -726kJ mol^{-1}, efficiency of the fuel cell will be

(A) 80 % (B) 87% (C) 90% (D) 97%

Ans. D

Sol. $CH_3OH(\ell) + \frac{3}{2}O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell) \quad \Delta H = -726 kJ\ mol^{-1}$

Also $\Delta G_f^o CH_3OH(\ell)$ = -166.2 kJ mol^{-1}

$\Delta G_f^o H_2O(\ell)$ = -237.2 kJ mol^{-1}

$\Delta G_f^o CO_2(\ell)$ = -394.4 kJ mol^{-1}

$\because$ $\Delta G = \Sigma\Delta G_f^o$ products $-\Sigma\Delta G_f^o$ reactants.

= -394.4 -2 (237.2) + 166.2

= -702.6 kJ mol^{-1}

now Efficiency of fuel cell = $\frac{\Delta G}{\Delta H} \times 100$

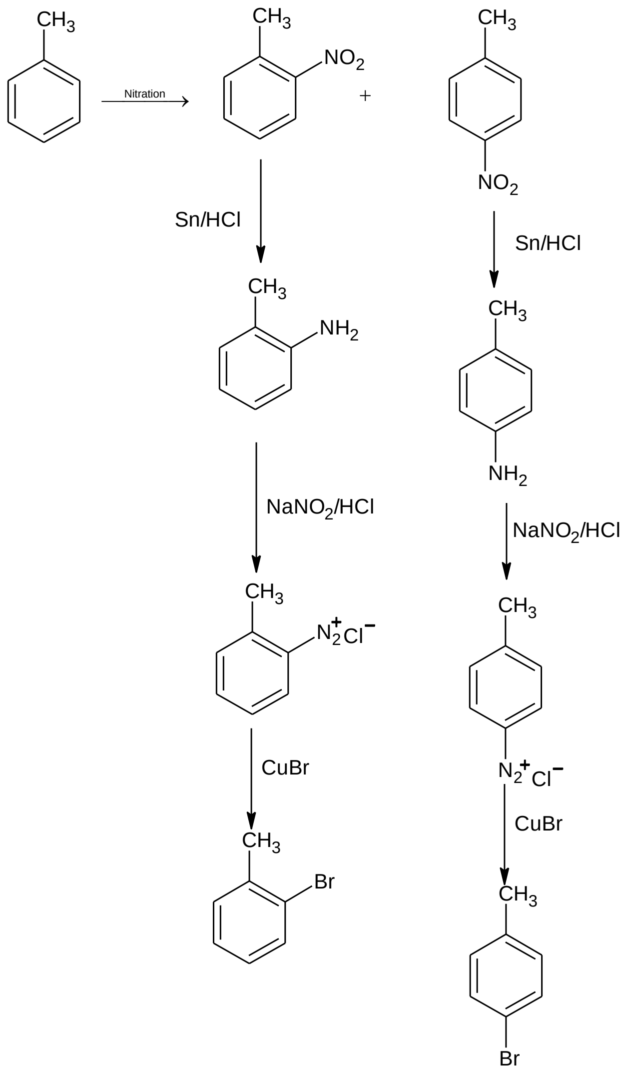
= $\frac{702.6}{726} \times 100$

= 97%

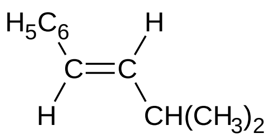
35. Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains

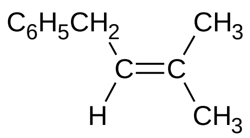
(A) mixture of o– and p–bromotoluenes
(B) mixture of o– and p–dibromobenzenes
(C) mixture of o– and p–bromoanilines
(D) mixture of o– and m–bromotoluenes

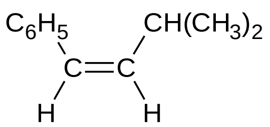
Ans. A

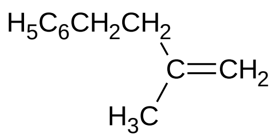


36. The main product of the following reaction is $C_6H_5CH_2CH(OH)CH(CH_3)_2 \xrightarrow{\text{conc. } H_2SO_4}$?

(A) 

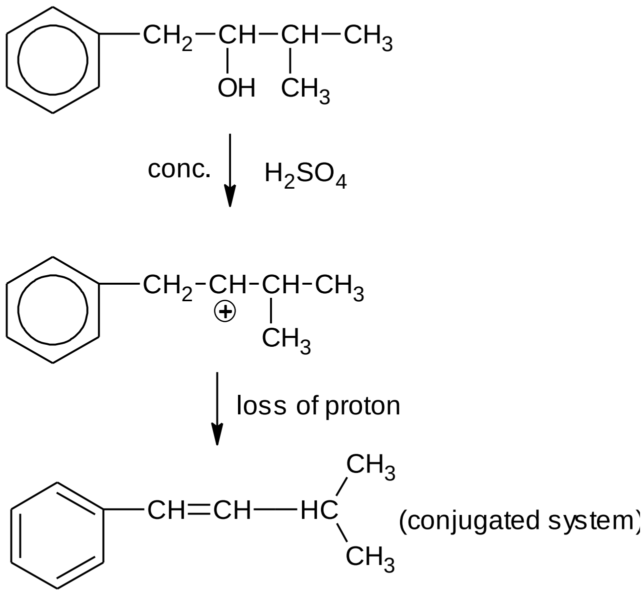
(B) 

(C) 

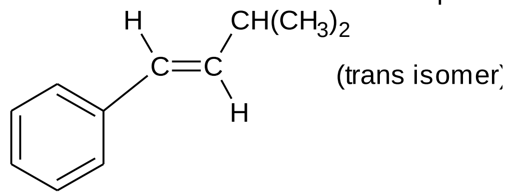
(D) 

Ans. A

Sol :



Trans isomers is more stable & main product here



37. Ozonolysis of an organic compound 'A' produces acetone and propionaldehyde in equimolar mixture. Identify 'A' from the following compounds:

(A) 2 – Methyl – 2 – pentene
(B) 2 – Methyl – 1 – pentene
(C) 1 – Pentene
(D) 2 – Pentene

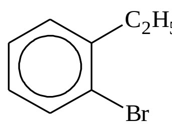
Ans. A

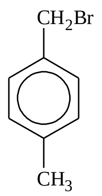
Sol.

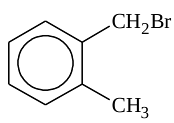
$$H_3C-\underset{\underset{CH_3}{|}}{C}=CH-CH_2CH_3 \xrightarrow[\text{(ii) } H_2O/Zn]{\text{(i) } O_3} H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{O}{||}}{C}} + CH_3CH_2CHO$$

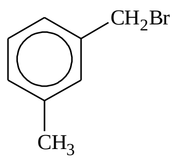
Hence, (A) is the correct answer

38. Compound (A), C_8H_9Br, gives a pale yellow precipitate when warmed with alcoholic $AgNO_3$. Oxidation of (A) gives a acid (B), $C_8H_6O_4$. (B) easily forms anhydride on heating. Identify the compound (A).

(A) 

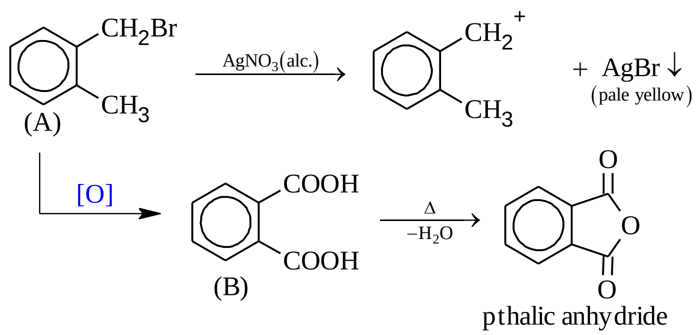
(B) 

(C) 

(D) 

Ans. C

Sol.



39. In Cannizzaro reaction given below

$$2\ \text{Ph CHO} \xrightarrow{:\overset{(-)}{\text{OH}}} \text{Ph } CH_2OH + PhC\ddot{O}_2^{(-)}$$ the slowest step is:

(A) the attack of $:\overset{(-)}{OH}$ at the carboxyl group (B) the transfer of hydride to the carbonyl group
(C) the abstraction of proton from the carboxylic group (D) the deprotonation of Ph CH_2OH

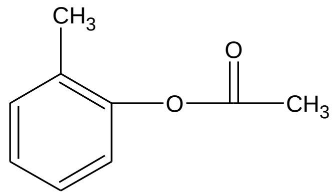
Ans. B

Sol. Hydride transfer is the slowest step.

40. Aspirin is known as
(A) Acetyl salicylic acid (B) Phenyl salicylate (C) Acetyl salicylate (D) Methyl salicylic acid

Ans. A

Sol.

Aspirin 

Acetyl salicylic acid

41. In the chemical reaction, $CH_3CH_2NH_2 + CHCl_3 + 3KOH \longrightarrow (A) + (B) + 3H_2O$, the compound (A) and (B) are respectively
(A) C_2H_5CN and 3KCl (B) $CH_3CH_2CONH_2$ & 3KCl (C) C_2H_5NC and K_2CO_3 (D) C_2H_5NC and 3KCl

Ans. D

Sol. It is example of carbylamine reaction. so, the product will be C_2H_5NC and KCl.
Hence, (D) is the correct answer.

42. Biuret test is not given by
(A) carbohydrates (B) polypeptides (C) urea (D) proteins

Ans. A

Sol : It is a test characteristic of amide linkage. Urea also has amide linkage like proteins.

43. Lanthanoid contraction is caused due to
(A) the appreciable shielding on outer electrons by 4f electrons from the nuclear charge
(B) the appreciable shielding on outer electrons by 5d electrons from the nuclear charge
(C) the same effective nuclear charge from Ce to Lu
(D) the imperfect shielding on outer electrons by 4f electrons from the nuclear charge

Ans. D

Sol. Conceptual

44. If Z is a compressibility factor, van der Waals equation at low pressure can be written as:
(A) $Z = 1 - \frac{Pb}{RT}$ (B) $Z = 1 + \frac{Pb}{RT}$ (C) $Z = 1 + \frac{RT}{Pb}$ (D) $Z = 1 - \frac{a}{VRT}$

Ans. D

Sol. $\left(P + \frac{n^2a}{V^2}\right)(V - nb) = nRT$

For 1 mole, $\left(P + \frac{a}{V^2}\right)(V - b) = RT$

$$PV = RT + Pb - \frac{a}{V} + \frac{ab}{V^2}$$

at low pressure, terms $Pb \ \& \ \frac{ab}{V^2}$ will be negligible as compared to RT.

So, $PV = RT - \frac{a}{V}$

$$Z = 1 - \frac{a}{RTV}$$

45. Which of the following pairs represents linkage isomers ?

(A) $[Cu(NH_3)_4][Pt\ Cl_4]$ and $[Pt(NH_3)_4][CuCl_4]$

(B) $[Pd(P\ Ph_3)_2(NCS)_2]$ and $[Pd\ (P\ Ph_3)_2\ (SCN)_2]$

(C) $[CO\ (NH_3)_5\ NO_3]SO_4$ and $[CO(NH_3)_5\ SO_4]NO_3$

(D) $[PtCl_2\ (NH_3)_4]Br_2$ and $[PtBr_2\ (NH_3)_4]Cl_2$

Ans. B

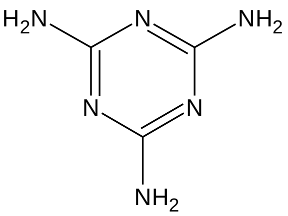
Sol. NCS^- is ambidentate ligand and it can be linked through N (or) S

SECTION - B
Numerical Type (Single Digit)

46. The number of nitrogen atom in one molecule of melamine is–

Ans. 6

Sol.



47. At 25°C, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At pH = x, Mg^{2+} ions start precipitating in the form of $Mg(OH)_2$ from a solution of 0.001 M Mg^{2+} ions. Find the value of x/2.

Ans. 5

Sol. $Mg(OH)_2 \rightleftharpoons Mg^{2+} + 2OH^-$

$K_{sp} = [Mg^{2+}][OH^-]^2$

$[OH^-] = \sqrt{\frac{K_{sp}}{[Mg^{2+}]}} = \sqrt{\frac{1\times 10^{-11}}{0.001}} = 10^{-4}$

pOH = 4

$\therefore$ pH = 14 – pOH = 14 – 4 = 10

SECTION - C
Numerical Type (XXXXXX.XX)

48. K_f for water is $1.86K\ kg\,mol^{-1}$. If your automobile radiator holds 1.0 kg of water, how many grams of ethylene glycol $(C_2H_6O_2)$ must you add to get the freezing point of the solution lowered to -2.8^0C?

Ans. 00093.33

Sol. $\Delta T_f = K_t.m$

49. The half life period of a first order chemical reaction is 6.93 minutes. The time required in minutes for the completion of 99% of the chemical reaction will be __________. (log 2=0.301)

Ans. 00046.06

Sol. $\because \lambda = \frac{0.693}{t_{1/2}} = \frac{0.693}{6.93}\min^{-1}$

Also $t = \frac{2.303}{\lambda}\log\frac{[A_o]}{[A]}$

$[A_o]$ = initial concentration (amount)

$[A]$ = final concentration (amount)

$\therefore\ t = \frac{2.303\times 6.93}{0.693}\log\frac{100}{1}$

= 46.06 minutes

50. The pKa of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid is ionized is

Ans. 00009.50

Sol. For buffer solution

$$pH = pK_a + \log \frac{[Salt]}{[Acid]}$$

$$= 4.5 + \log \frac{[Salt]}{[Acid]}$$

as HA is 50% ionized so [Salt] = [Acid]

pH = 4.5

pH + pOH = 14

$\Rightarrow$ pOH = 14 – 4.5 = 9.5

Hence (C) is correct.

PART – C : MATHEMATICS

SECTION – A

(Single Correct Choice Type)

51. The statement $P(n)$ "$1\times 1! + 2\times 2! + 3\times 3! + ... + n\times n! = (n+1)! - 1$" is

(A) True for all $n > 1$ (B) Not true for any n

(C) True for all $n \in N$ (D) None of these

Ans. C

Sol. Check for $n = 1, 2, 3, ...$ it true for all $n \in N$.

52. $\begin{vmatrix} x+1 & x+2 & x+4 \\ x+3 & x+5 & x+8 \\ x+7 & x+10 & x+14 \end{vmatrix} =$

(A) 2 (B) – 2 (C) $x^2 - 2$ (D) None of these

Ans. B

Sol. $\Delta = \begin{vmatrix} -1 & -2 & x+4 \\ -2 & -3 & x+8 \\ -3 & -4 & x+14 \end{vmatrix}$, by $\begin{matrix} C_1 \to C_1 - C_2 \\ C_2 \to C_2 - C_3 \end{matrix}$

$= \begin{vmatrix} -1 & -1 & x \\ -2 & -1 & x \\ -3 & -1 & x+2 \end{vmatrix}$, by $\begin{matrix} C_2 \to C_2 - C_1 \\ C_3 \to C_3 + 4C_1 \end{matrix}$

$= -(x - 2 + x) + 1.(-2x - 4 + 3x) + x(2-3)$

$= 2 + x - 4 - x = -2.$

53. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}, a, b \in N$. Then,

(A) There cannot exist any B such that AB = BA

(B) There exists more than one but finite number of B's such that AB = BA

(C) There exists exactly one B such that AB = BA

(D) There exists infinitely many B's such that AB = BA

Ans. D

Sol. Let $AB = BA \Rightarrow \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix} = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

$\Rightarrow \begin{bmatrix} a & 2b \\ 3a & 4b \end{bmatrix} = \begin{bmatrix} a & 2a \\ 3b & 4b \end{bmatrix}$

This is only possible, when $a = b$

So, B should be of the form $\begin{bmatrix} a & 0 \\ 0 & a \end{bmatrix}$

As, $a \in N$ so there are infinitely many B's.

54. If θ lies in the second quadrant, then the value of $\sqrt{\left(\frac{1-\sin\theta}{1+\sin\theta}\right)} + \sqrt{\left(\frac{1+\sin\theta}{1-\sin\theta}\right)}$

(A) $2\sec\theta$ (B) $-2\sec\theta$ (C) $2\cos ec\theta$ (D) None of these

Ans. B

Sol. $\frac{\sqrt{(1-\sin\theta)^2} + \sqrt{(1+\sin\theta)^2}}{\sqrt{\cos^2\theta}} = \frac{|1-\sin\theta| + |1+\sin\theta|}{|\cos\theta|}$

Since is 2nd quadrant $\cos\theta$ is negative and $1 \pm \sin\theta$ is positive.

$\therefore \sqrt{\frac{1-\sin\theta}{(1+\sin\theta)}} + \sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = -\frac{2}{\cos\theta}$

55. $\sin 6\theta + \sin 4\theta + \sin 2\theta = 0$, then $\theta =$

(A) $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{3}$ (B) $\frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{6}$ (C) $\frac{n\pi}{4}$ or $2n\pi \pm \frac{\pi}{6}$ (D) None of these

Ans. A

Sol $. \Rightarrow 2\sin 4\theta \cos 2\theta + \sin 4\theta = 0$

$\Rightarrow \sin 4\theta(2\cos 2\theta + 1) = 0$

$\Rightarrow \cos 2\theta = -\frac{1}{2}$

$\Rightarrow 2\theta = 2n\pi \pm \frac{2\pi}{3} \Rightarrow \theta = n\pi \pm \frac{\pi}{3}$ and $\sin 4\theta = 0$

$\Rightarrow 4\theta = n\pi \Rightarrow \theta = \frac{n\pi}{4} \Rightarrow \theta = \frac{n\pi}{4}$ or $n\pi \pm \frac{\pi}{3}$.

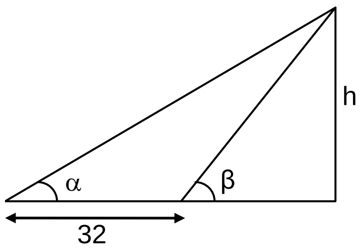
56. At a point on the ground the angle of elevation of a tower is such that its contangent is 3/5. On walking 32 metres towards the tower the cotangent of the angle of elevation is 2/5. The height of the tower is

(A) 160 m (B) 120 m (C) 64 m (D) None of these

Ans. A

Sol. $\cot\theta = \frac{3}{5}, \cot\beta = \frac{2}{5}, 32 = h\cot\alpha - h\cot\beta$

$h = \left(\frac{32}{\cot\alpha - \cot\beta}\right) = \frac{32}{1/5} = 160m$



57. $\sin^{-1}\left[x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}\right] =$

(A) $\sin^{-1}x + \sin^{-1}\sqrt{x}$ (B) $\sin^{-1}x - \sin^{-1}\sqrt{x}$

(C) $\sin^{-1}\sqrt{x} - \sin^{-1}x$ (D) None of these

Ans. B

Sol. Let $x = \sin\theta$ and $\sqrt{x} = \sin\phi$

Hence, $\sin^{-1}\left(\sin\theta\sqrt{1-\sin^2\phi} - \sin\phi\sqrt{1-\sin^2\theta}\right)$

$= \sin^{-1}(\sin\theta\cos\phi - \sin\phi\cos\phi) = \sin^{-1}\sin(\theta - \phi)$

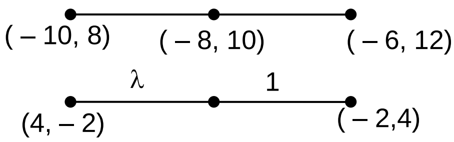
$= \theta - \phi = \sin^{-1}(x) - \sin^{-1}(\sqrt{x})$

58. The mid point of the line joining the points $(-10,8)$ and $(-6,12)$ divides the line joining the points $(4,-2)$ and $(-2,4)$ in the ratio

(A) 1 : 2 internally (B) 1 : 2 externally (C) 2 : 1 internally (D) 2 : 1 externally

Ans. D

Sol. $\left(\frac{-2\lambda+4}{\lambda+1}, \frac{4\lambda-2}{\lambda+1}\right)$



$\Rightarrow \frac{-2\lambda+4}{\lambda+1} = -8 \Rightarrow -2\lambda + 4 = -8\lambda - 8 \Rightarrow 6\lambda = -12$

$\lambda = \frac{-2}{1}$ externally $\Rightarrow 2:1$ externally.

$(4\lambda - 2 = 10\lambda + 10 \Rightarrow \lambda = -2)$

59. Equation of diagonals of the square formed by the lines $x = 0, y = 0, x = 1$ and $y = 1$ are

(A) $y = x, y + x = 1$ (B) $y = x, x + y = 2$

(C) $2y = x, y + x = \frac{1}{3}$ (D) $y = 2x, y + 2x = 1$

Ans. A

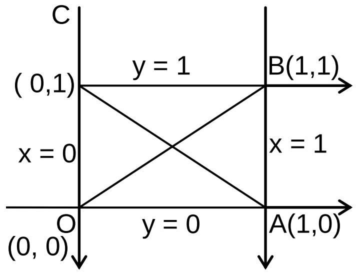
Sol. Equation of OB is $y-0=\frac{1-0}{1-0}(x-0)$

$\Rightarrow y=x$

And equation of AC is $y-0=\frac{1-0}{0-1}(x-1)$

$\Rightarrow y=-x+1$

$\Rightarrow x+y-1=0$



60. The equation of circle which passes through the point (1, 1) and intersect the given circles $x^2+y^2+2x+4y+6=0$ and $x^2+y^2+4x+6y+2=0$ orthogonally, is

(A) $x^2+y^2+16x+12y+2=0$ (B) $x^2+y^2-16x-12-2=0$

(C) $x^2+y^2-16x+12y+2=0$ (D) None of these

Ans. C

Sol. Let equation of circle be

$x^2+y^2+2gx+2fy+c=0$

As is intersects orthogonally the given circles, we have $2g+4f=6+c$ and $4g+6f=2+c$

As it passes through $(1,1)$, we have $2g+2f=-2-c$

From these, we get g, f and c as $-8,6,2$ respectively and hence equation of circle as

$x^2+y^2-16x+12y+2=0$

61. Let a,b,c be distinct non – negative numbers. If the vectors $a\hat{i}+a\hat{j}+c\hat{k}, \hat{i}+\hat{k}$ and $c\hat{i}+c\hat{j}+b\hat{k}$, lie in a plane then

(A) $c^2=ab$ (B) $a^2=bc$ (C) $b^2=ac$ (D) None of the above

Ans. A

Sol. Since, three vectors $a\hat{i}+a\hat{j}+c\hat{k}, \hat{i}+\hat{k}$ and $c\hat{i}+c\hat{j}+b\hat{k}$ lie in a plane

$$\therefore \begin{vmatrix} a & a & c \\ 1 & 0 & 1 \\ c & c & b \end{vmatrix}=0 \Rightarrow -1\begin{vmatrix} a & c \\ c & b \end{vmatrix}-1\begin{vmatrix} a & a \\ c & c \end{vmatrix}=0 \Rightarrow ab=c^2$$

62. The distance of the point $(1,-5,9)$ from the plane $x-y+z=5$ measured along the line $x=y=z$ is

(A) $10\sqrt{3}$ (B) $\frac{10}{\sqrt{3}}$ (C) $\frac{20}{3}$ (D) $3\sqrt{10}$

Ans. A

Sol. $P(-1,-5,9)$

Equation of line $PQ: \frac{x-1}{1}=\frac{y+5}{1}=\frac{z-9}{1}=\lambda$

$\therefore Q$ can be taken as $(\lambda+1, \lambda-5, \lambda+9)$

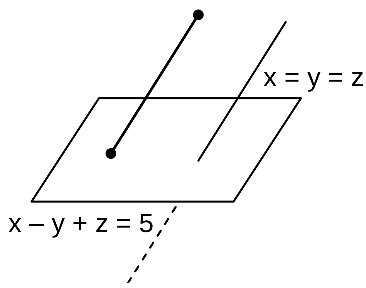
As Q lies on plane $x-y+z=5$

$\therefore (\lambda+1)-(\lambda-5)+(\lambda+9)=5$

$\therefore \lambda=-10 \Rightarrow Q(-9,-15,-1)$

$\therefore$ Required distance

$PQ=\sqrt{(1+9)^2+(-5+15)^2+(9+1)^2}=\sqrt{100+100+100}=10\sqrt{3}$



63. The domain of the function $\sqrt{\log_e(x^2-6x+6)}$ is

(A) $(-\infty,\infty)$ (B) $(-\infty,3-\sqrt{3})\cup(3+\sqrt{3},\infty)$

(C) $(-\infty,1]\cup[5,\infty)$ (D) $[0,\infty)$

Ans. C

Sol. The function $f(x)=\sqrt{\log_e(x^2-6x+6)}$ is defined when $\log_e(x^2-6x+6)\geq 0$

$\Rightarrow x^2 - 6x + 6 \geq 1$

$\Rightarrow (x-5)(x-1) \geq 0$

This inequality holds if $x \leq 1$ or $x \geq 5$. Hence, the domain of the function will be $(-\infty, 1] \cup [5, \infty)$

64. If $f(x) = x^3 - 10x^2 + 200x - 10,$ then

(A) $f(x)$ is decreasing in $(-\infty, 10]$ and increasing in $[10, \infty)$

(B) $f(x)$ is increasing in $(-\infty, 10]$ and decreasing in $[10, \infty)$

(C) $f(x)$ is increasing throughout number line

(D) $f(x)$ is decreasing throughout number line

Ans. C

Sol. $f(x) = x^3 - 10x^2 + 200x - 10$

$f'(x) = 3x^2 - 20x + 200$

For increasing $f'(x) > 0 \Rightarrow 3x^2 - 20x + 200 > 0$

$$3\left[x^2 - \frac{20}{3}x + \frac{200}{3} + \frac{100}{9} - \frac{100}{9}\right] > 0$$

$$\Rightarrow 3\left[\left(x - \frac{10}{3}\right)^2 + \frac{500}{9}\right] > 0 \Rightarrow 3\left(x - \frac{10}{3}\right)^2 + \frac{500}{3} > 0$$

Always increasing throughout real line.

65. $\int \frac{\sin 2x}{\sin^4 x + \cos^4 x} dx =$

(A) $\cot^{-1}(\tan^2 x) + c$ (B) $\tan^{-1}(\tan^2 x) + c$ (C) $\cot^{-1}(\cot^2 x) + c$ (D) $\tan^{-1}(\cot^2 x) + c$

Ans. B

Sol. $\int \frac{\sin 2x}{\sin^4 x + \cos^4 x} dx$

$$= \int \frac{2\sin x \cos x}{\sin^4 x + \cos^4 x} dx = \int \frac{2\tan x \sec^2 x}{1 + \tan^4 x} dx$$

Put $\tan^2 x = t \Rightarrow 2\tan x \sec^2 x dx = dt,$ then it reduced to $\int \frac{dt}{1+t^2} = \tan^{-1} t + c = \tan^{-1}(\tan^2 x) + c$

66. $\int_0^{\pi/2} \frac{\cos x - \sin x}{1 + \sin x \cos x} dx =$

(A) 2 (B) – 2 (C) 0 (D) None of these

Ans. C

Sol. $\int_0^{\pi/2} \frac{\cos x - \sin x}{1 + \sin x \cos x} dx = I$ …(i)

Now, $I = \int \frac{\cos\left(\frac{\pi}{2} - x\right) - \sin\left(\frac{\pi}{2} - x\right)}{1 + \sin\left(\frac{\pi}{2} - x\right)\cos\left(\frac{\pi}{2} - x\right)} dx$

$= \int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$ …(ii)

on adding, $2I = 0 \Rightarrow I = 0$

67. The area bounded by the curves $y^2 = 8x$ and $y = x$ is

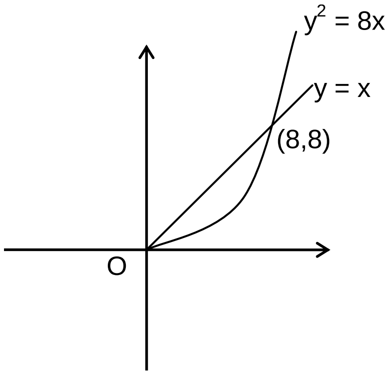
(A) $\frac{128}{3}$ *sq.units* (B) $\frac{32}{3}$ *sq.units* (C) $\frac{64}{3}$ *sq.units* (D) 32 *sq.units*

Ans. B

Sol. $y^2 = 8x$ and $y = x \Rightarrow x^2 = 8x \Rightarrow x = 0,8$

$\therefore$ Required area = $\int_0^8 \left(2\sqrt{2}\sqrt{x} - x\right)dx$

$= \left[\frac{4\sqrt{2}}{3}x^{3/2} - \frac{x^2}{2}\right]_0^8 = \frac{128}{3} - \frac{64}{2} = \frac{32}{3} sq.units$



68. The differential equation $y\frac{dy}{dx} + x = C$ represents

(A) Family of hyperbolas (B) Family of parabolas
(C) Family or ellipse (D) Family of circles

Ans. D

Sol. $y\frac{dy}{dx} + x = C$

$\Rightarrow y\frac{dy}{dx} = C - x$

$\Rightarrow ydy = (C - x)dx$

on integrating both sides, we get

$\frac{y^2}{2} = Cx - \frac{x^2}{2} + K$

$\Rightarrow \frac{x^2}{2} + \frac{y^2}{2} = Cx + K$

$\Rightarrow \frac{x^2}{2} + \frac{y^2}{2} - Cx = K$

69. The standard deviation of some temperature data in °C is 5. If the data were covered into °F, then the variance would be [use $9C = 5(F - 32)$]

(A) 81 (B) 57 (C) 36 (D) 25

Ans. A

Sol. $\sigma_c = 5 \Rightarrow \frac{5}{9}(F - 32) = C$

$F = \frac{9C}{5} + 32$

$\sigma F = \frac{9}{5}\sigma_C = \frac{9}{5} \times 5 = 9$

Here, $\sigma_F^2 = (9)^2 = 81$

70. If $p \Rightarrow (q \vee r)$ is false, then the truth values of p, q, r are respectively

(A) T, F, F (B) F, F, F (C) F, T, T (D) T, T, F

Ans. A

Sol. $p \Rightarrow q$ is false only when p is true and q is false

$\therefore p \Rightarrow q \vee r$ is false when p is true and $q \vee r$ is false, and $q \vee r$ is false when both q and r are false.

Hence, truth values of p, q and r are respectively T, F, F.

SECTION - B
Numerical Type (Single Digit)

71. The number of roots of the equation $\log(-2x) = 2\log(x+1)$ are

Ans. 1

Sol. $\log(-2x) = 2\log(x+1)$

Given equation is possible when $2x > 0 \Rightarrow x < 0$ and $x + 1 < 0 \Rightarrow x > -1$ i.e. so $1 < x < -0$

Now, $-2x=(x+1)^2 \Rightarrow x^2+4x+1=0$

$x=\frac{-4\pm\sqrt{12}}{2} \Rightarrow x=-2\pm\sqrt{3}$

Only $x=-2+\sqrt{3}$ lies in $-1<x<0$

72. For each point (x,y) on all ellipse, the sum of the distances from (x,y) to the points (2, 0) and $(-2,0)$ is 8. Then the positive value of x so that $(x,3)$ lies on the ellipse is

Ans. 2

Sol. $\sqrt{(x-2)^2+y^2}+\sqrt{(x+2)^2+y^2}=8$

put $y=3$ and get $x=\pm 2$

SECTION - C
Numerical Type (XXXXXX.XX)

73. $\frac{51}{4}\lim_{x\to 0}\frac{\sqrt{1+\sin x}-\sqrt{1-\sin x}}{x}$ is

Ans. 00012.75

Sol. Multiply function by $\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}+\sqrt{1-\sin x}}$ and solve.

74. If $f(x)=\cos x\cos 2x\cos 4x\cos 8x\cos 16x,$ then $f'\left(\frac{\pi}{4}\right)\times\frac{1001}{2\sqrt{2}}$ is

Ans. 00500.50

Sol. $f(x)=\frac{2\sin x.\cos x.\cos 2x.\cos 4x.\cos 8x.\cos 16x}{2\sin x}$

$=\frac{\sin 32x}{2^5\sin x}$

$\therefore\ f'(x)=\frac{1}{32}.\frac{32\cos 32x\cdot\sin x-\cos x\cdot\sin 32x}{\sin^2 x}$

$f'\left(\frac{\pi}{4}\right)=\frac{32\cdot\frac{1}{\sqrt{2}}-\frac{1}{\sqrt{2}}\cdot 0}{32\left(\frac{1}{\sqrt{2}}\right)^2}=\sqrt{2}$

75. The probability that atleast one of the events A and B occurs is 0.5. If A and B occur simultaneously with probability 0.2, then $\left(P\left(A^C\right)+P\left(B^C\right)\right)\times 10.2$ is

Ans. 00013.26

Sol. $P(A\cup B)^C=P\left(A^C\right)+P\left(B^C\right)-P(A\cap B)^C$

$P\left(A^C\right)+P\left(B^C\right)=0.5+0.8$

$=1.3$