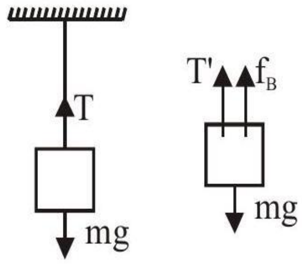
1. (b)



$$\frac{F}{A} = y \cdot \frac{\Delta \ell}{\ell}$$

$$\Delta \ell \propto F$$

$$T = mg$$

$$T = mg - f_B = mg - \frac{m}{\rho_b} \cdot \rho_\ell \cdot g$$

$$= \left(1 - \frac{\rho_\ell}{\rho_b}\right) mg$$

$$= \left(1 - \frac{2}{8}\right) mg$$

$$T' = \frac{3}{4} mg$$

From (i)

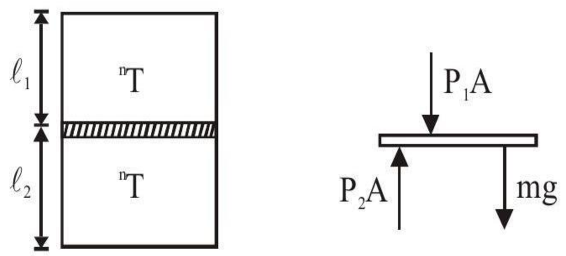
$$\frac{\Delta \ell'}{\Delta \ell} = \frac{T'}{T} = \frac{3}{4}$$

$$\Delta \ell' = \frac{3}{4} \cdot \Delta \ell = 3 \text{ mm}$$

2. (a) From $\frac{1}{f} = (\mu_{rel} - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

Focal length of lens will change hence image disappears from the screen.

3. (b)



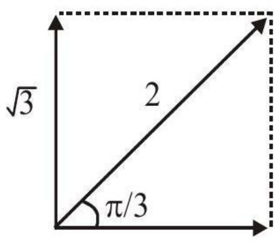
$$P_2 A = P_1 A + mg$$

$$\frac{nRT \cdot A}{A\ell_2} = \frac{nRT \cdot A}{A\ell_1} + mg$$

$$nRT\left(\frac{1}{\ell_2}-\frac{1}{\ell_1}\right)=mg$$

$$m=\frac{nRT}{g}\left(\frac{\ell_1-\ell_2}{\ell_1\cdot\ell_2}\right)$$

4. (d)



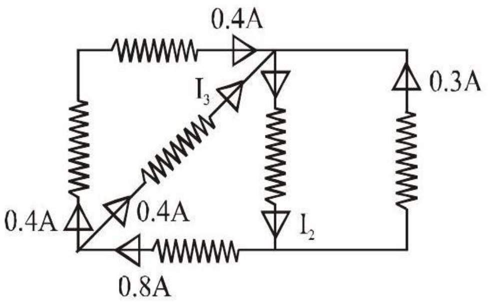
$$y=5[\sin(3\pi t)+\sqrt{3}\cos(3\pi t)]$$

$$=10\sin\left(3\pi t+\frac{\pi}{3}\right)$$

Amplitude $=10$ cm

$$T=\frac{2\pi}{w}=\frac{2\pi}{3\pi}=\frac{2}{3}\sec$$

5. (a)



From KCL, $I_3=0.8-0.4=0.4$ A

$$I_2=0.4+0.4+0.3$$
$$=1.1\text{ A}$$
$$I_6=0.4\text{ A}$$

6. (b) Work Energy Theorem from A to B

$$mgh=\frac{1}{g}mv_B^2-\frac{1}{g}mv_A^2$$

$$2gh=v_B^2-v_A^2$$

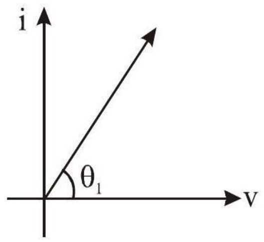
$$2\times10\times10=v_B^2-5^2$$

$$v_B=15\text{ m/s}$$

Angular momentum about 0

$$L_0 = mvr$$
$$= 20 \times 10^{-3} \times 20$$
$$L_0 = 6\ kg \cdot m^2/s$$

7. (Bonus)

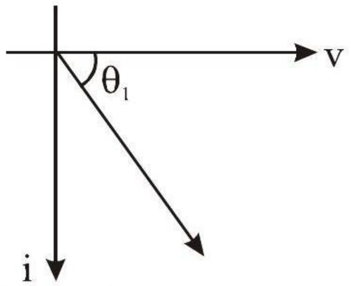


$x_e = \frac{1}{\omega_c} = \frac{4}{10^{-6}\times\sqrt{3}\times 100} = \frac{2\times 10^4}{\sqrt{3}} \tan\theta/2 \frac{x_e}{R_e} = \frac{10^3}{\sqrt{3}}$

θ_1 is close to 90

For L-R circuit

$$x_L = w_L = 100 \times \frac{\sqrt{3}}{10} = \sqrt{3}$$



$R_1 = 10$

$R_1 = 10$

$$\tan\theta_2 = \frac{X_e}{R}$$

$$\tan\theta_2 = \sqrt{3}$$

$$\theta_2 = 60$$

So phase difference comes out $90 + 60 = 150$.

Therefore Ans. is Bonus

If R_2 is 20 KΩ

then phase difference comes out to be $60 + 30$

$= 90°$

8. (c) $x \propto \frac{1}{T_C}$

curie law for paramagnetic substane

$$\frac{x_1}{x_2} = \frac{T_{C_2}}{T_{C_1}}$$

$$\frac{2.8 \times 10^{-4}}{x_2} = \frac{300}{350}$$

$$x_2 = \frac{2.8 \times 350 \times 10^{-4}}{300}$$

$$= 3.266 \times 10^{-4}$$

9. (d) Induied emf $= Bv\ell$

$$= 0.3 \times 10^{-4} \times 5 \times 10$$
$$= 1.5 \times 10^{-3} \text{ V}$$

10. (b) At saturation, $V_{CE} = 0$

$$V_{CE} = V_{CC} - I_C R_C$$

$$\Rightarrow I_C = \frac{V_{CC}}{R_C} = 5 \times 10^{-3} \text{ A}$$

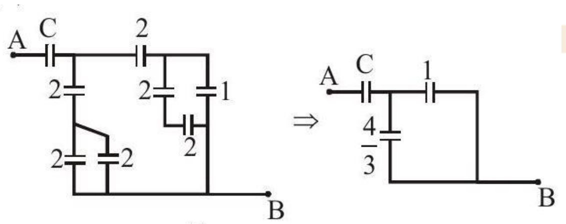
Given

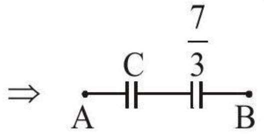
$$\beta_{dc} = \frac{I_C}{I_B}$$
$$I_B = \frac{5 \times 10^{-3}}{200}$$
$$I_B = 25\mu A$$

At input side

$$V_{BB} = I_B R_B + V_{BE}$$
$$= (25 \text{ mA})(100\text{k}\Omega) + 1 \text{ V}$$
$$V_{BB} = 3.5 \text{ V}$$

11. (b)





From equs.

$$\frac{\frac{7C}{3}}{\frac{7}{3}+C}=\frac{1}{2}$$

$\Rightarrow 14C = 7 + 3C$

$\Rightarrow C = \frac{7}{11}$

12. (c) Orbital velocity $V = \sqrt{\frac{GMe}{r}}$

$T_A = \frac{1}{2} m_A V_A^2$

$T_B = \frac{1}{2} m_B V_B^2$

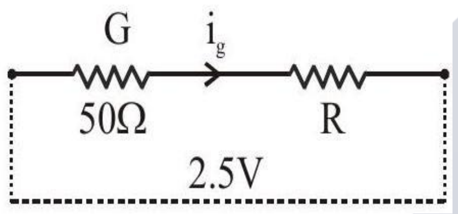
$$\Rightarrow \frac{T_A}{T_B} = \frac{m \times \frac{Gm}{R}}{2m \times \frac{Gm}{2R}}$$

$\Rightarrow \frac{T_A}{T_B} = 1$

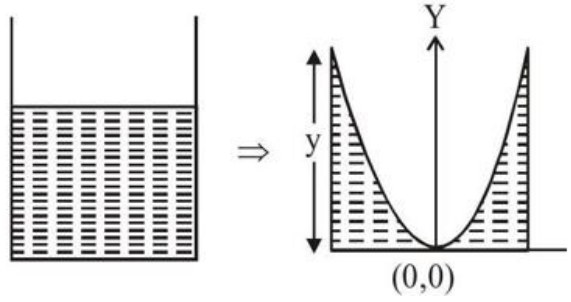
13. (b) $I = \frac{2}{5}mR^2 + mx^2$

14. (BONUS)

15. (c) $I_g = 4 \times 10^{-4} \times 25 = 10^{-2}$ A

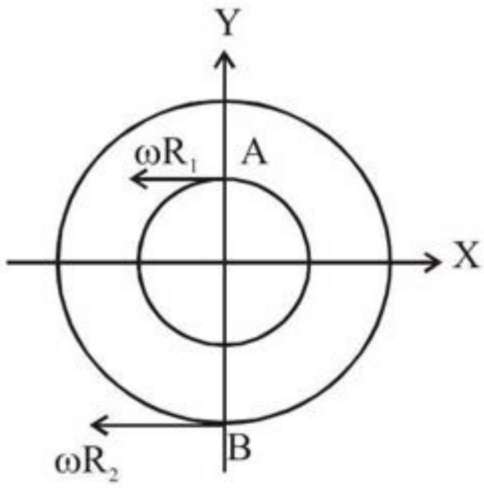


16. (c)



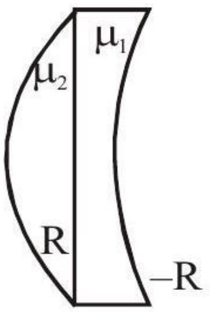
$$y = \frac{\omega^2 x^2}{2g} = \frac{(2 \times 2\pi)^2 \times (0.05)^2}{20} \simeq 2 \text{ cm}$$

17. (d) $\theta = \omega t = \omega \frac{\pi}{2\omega} = \frac{\pi}{2}$



$\vec{V}_A - \vec{V}_S = \omega R_1(-\hat{i}) - \omega R_2(-i)$

18. (c)



$\frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1-\mu_1}{R} + \frac{\mu_2 - 1}{R}$

19. (c) $\left[\frac{\ell}{r}\right] = T$

$[CV] = AT$

So, $\left[\frac{\ell}{rCV}\right] = \frac{T}{AT} = A^{-1}$

20. (d) ${}^{232}_{90}Th \longrightarrow {}^{208}_{78}Y + {}^{4}_{2}He \; {}^{208}_{78}Y \longrightarrow {}^{208}_{82}X + 4\beta$ praticle

21. (b) $I = \varepsilon_0 CE^2_{rms}$

$\& E_{rms} = cB_{rms}$

$I = \varepsilon_0 C^3 \, B^2_{rms}$

$B_{rms} = \sqrt{\frac{I}{\epsilon_0 C^3}}$

$B_{rms} \approx 10^{-4}$

22. (a)

23. (a) $t \propto \frac{\text{Volume}}{\text{velocity}}$

volume $\propto \frac{T}{P}$

$\therefore t \propto \frac{\sqrt{T}}{P}$

$\frac{t_1}{6 \times 10^{-8}} = \frac{\sqrt{500}}{2P} \times \frac{P}{\sqrt{300}}$

$t_1 = 3.8 \times 10^{-8}$

$\approx 4 \times 10^{-8}$

24. (c)

25. (b) $2 + mg\sin 30 = \mu mg\cos 30^\circ$

$10 = mg\sin 30 + \mu mg\cos 30^\circ$

$= 2\mu mg\cos 30 - 2$

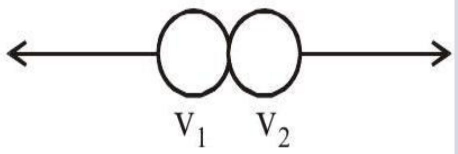
$6 = \mu mg\cos 30$

$4 = mg\sin 30$

$\frac{3}{2} = \mu \times \sqrt{3}$

$\mu = \frac{\sqrt{3}}{2}$

26. (a)



$mv_0 = mv_2 - mv_1$

$\frac{1}{2}mV_1^2 = 0.36 \times \frac{1}{2}mV_0^2$

$v_1 = 0.6v_0$

$\frac{1}{2}MV_2^2 = 0.64 \times \frac{1}{2}mV_0^2$

$V_2 = \sqrt{\frac{m}{M}} \times 0.8\ V_0$

$mV_0 = \sqrt{mM} \times 0.8\ V_0 - m \times 0.6\ V_0$

$\Rightarrow 1.6\ m = 0.8\sqrt{mM}$

$4\ m^2 = mM$

27. (b)

28. (b)

29. (d) $E = \frac{\sigma}{\epsilon_0} = \frac{Q}{A\epsilon_0}$

$Q = AE\epsilon_0$

$Q = (a)(100)(8.85 \times 10^{-12})$

$Q = 8.85 \times 10^{-10} C$

30. (c) $\lambda = \frac{1240}{5.6-0.7}$ nm

31. (a) $8\ gNaOH, \text{mol of NaOH} = \frac{8}{40} = 0.2\ \text{mol}\ 18\ gH_2O, \text{mol of } H_2O = \frac{18}{18} = 1\ \text{mol}$

$\therefore\ X_{NaOH} = \frac{0.2}{1.2} = 0.167$

$\text{Molality} = \frac{0.2 \times 1000}{18} = 11.11\ m$

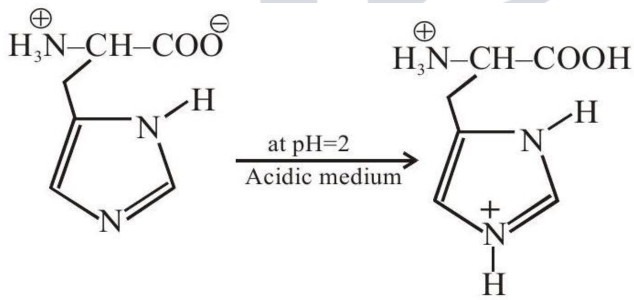
32. (a)

33. (b) $\mu = 5.9BM \therefore n(\quad \text{no of unpaired. e } e^-) = 5$

Cation $Mn^{II} - 3\ d^5$ confn only possible for relatively weak ligand.

$\therefore$ NCS

34. (a) Histidine is



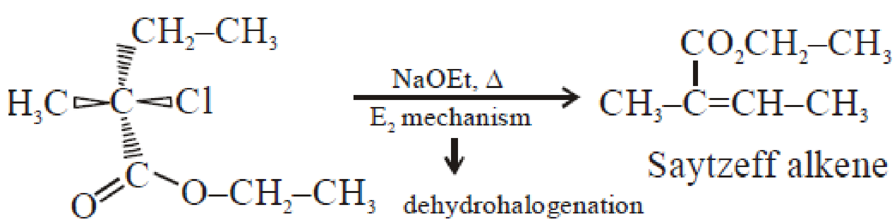
Zwitter ionic form

$pIn = 7.59$

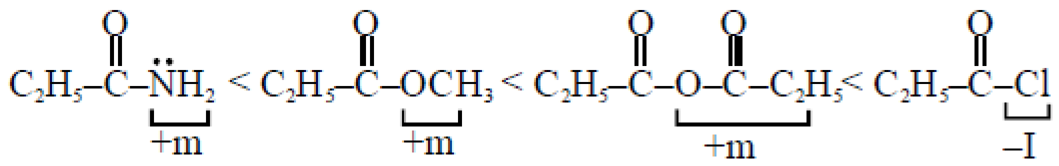
35. (c) Freons (CFC's) are not common components of photo chemical smog.

36. (d) Ozone protects most of the medium freequnecies ultravoilet light from 200 - 315 nm wave length.

37. (c)

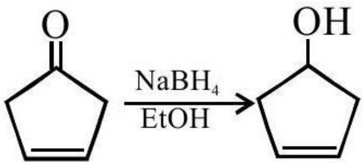


38. (a) Rate of nucleophilic $\propto$ Electrophilicity of attack on carbonyl carbonyl group



39. (d)

$NaBH_4$ can- not reduce $C=C$ but can reduce $\underset{\text{O}}{\overset{-\text{C}-}{\parallel}}$ into OH.



40. (b) $2(C_6H_5COOH) \underset{wg}{\overset{C_6H_6}{\rightarrow}} \underset{\text{diner}}{\longrightarrow} (C_6H_5COOH)_2\ \Delta_f T = ikm$

$2 = 0.6 \times 5 \times \dfrac{w \times 1000}{122 \times 30}$

$(i = 1 - 0.8 + 0.4 = 0.6)$

$w = 2.44\ g$

41. (c) $C_{(graphite)} + O_2(g) \rightarrow CO_2(g) \Delta_r H^o = xkJ/mol$

$C_{(graphite)} + \frac{1}{2} O_2(g) \rightarrow CO(g) \Delta_r H^o = ykJ/mol$

$CO(g) + \frac{1}{2} O_2(g) \rightarrow CO_2(g) \Delta_r H^o = zkJ/mol$

$(a) = (b) + (c)$

$x = y + z$

42. (d) $\frac{2}{5}$ air escaped from vessel, $\therefore \frac{3}{5}$ air remain is vessel. P, V constant

$n_1 T_1 = n_2 T_2$

$n_1(300) = \left(\frac{3}{5} n_1\right) T_2 \Rightarrow T_2 = 500\ K$

43. (b)

$$\begin{aligned} \Lambda_m^0(HA) &= \Lambda_m^0(HCl) + \Lambda_m^0(NaA) - \Lambda_m^0(NaCl) \\ &= 425.9 + 100.5 - 126.4 \end{aligned}$$

$= 400\ S\ cm^2\ mol^{-1}$

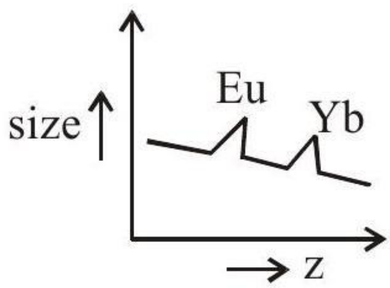
$\Lambda_m = \dfrac{1000\ K}{M} = \dfrac{1000 \times 5 \times 10^{-5}}{10^{-3}} = 50\ S\ cm^2\ mol^{-1}$

$\alpha = \frac{\Lambda_m}{\Lambda_m^0} = \frac{50}{400} = 0.125$

44. (b)
45. (b)

$Ag_2CO_3(s)_{(0.1+2S)M}\overset{2}{}{}_{S}2Ag^+(aq.) + CO_3^{-2}(aq)$
$Ksp = [Ag^+]^2[CO_3^{-2}]$
$8 \times 10^{-12} = (0.1 + 2S)^2(S)$
$S = 8 \times 10^{-10}M$

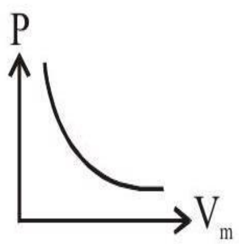
46. (a) Colloidal solution fo rubber are negatively charged.
47. (a) ZnO&MgO both are in oxide form therefore no change on calcination.
48. (c)

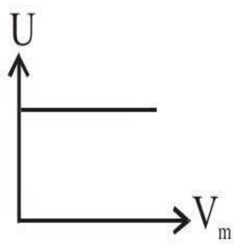


Eu > Ce > Ho > N.

49. (d) Catenation is not shown by lead.
50. (c) Isothermal expansion $PV_m = K$(Graph-C)

$P = \frac{K}{V_m}$ (Graph-A)

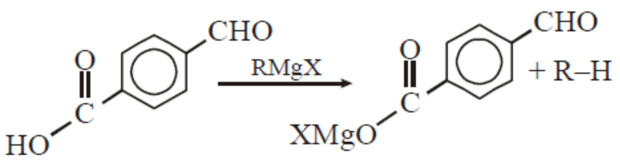


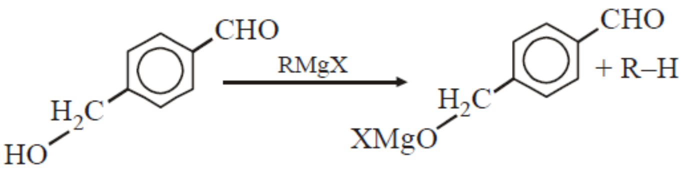


51. (b) $1\ L - 1MH_2O_2$ solution will produce $11.35\ LO_2$ gas at STP.
52. (b) $\ln\frac{K_2}{K_1} = \frac{E_a}{R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

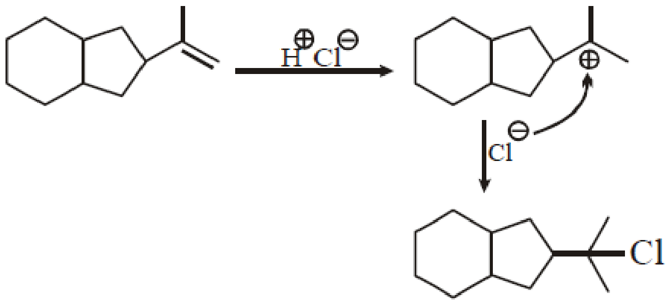
$2.303\log\frac{K_2}{10^{-5}} = 4606\left[\frac{1}{400} - \frac{1}{500}\right]$
$\Rightarrow K_2 = 10^{-4}\ s^{-1}$

53. (d) carbon atom have $2p$ orbitals able to form strongest $p\pi - p\pi$ bonds
54. (b)
55. (b) Acid-base reaction of G.R are fast.





56. (a)



57. (b) $3Cl_2 + 6OH^- \rightarrow 5Cl^- + ClO_3^- + 3H_2O$

58. (a)

$$\underset{\text{Br}}{\overset{}{CH_3 - CH_2 - CH}} \underset{\text{Br}}{- CH_2}$$

$$\downarrow \text{Alc. KOH}$$

$$CH_3 - CH_2 - \underset{\text{Br}}{C} = CH_2$$

$$\downarrow NaNH_2 \text{ in liq. } NH_3$$

$$CH_3 - CH_2 - C \equiv CH$$

59. (b) According to de-broglie's hypothesis

$$2\pi r_n = n\lambda \Rightarrow 2\pi \cdot a_0 = \frac{n^2}{z} = n \times 1.5\pi a_0$$

$$\frac{n}{z} = 0.75$$

60. (d) Nylon-6,6 is polymer of

Hexamethylene diamine & Adipic acid

$H_2N-(CH_2)_6-NH_2$ $HOOC-(CH_2)_4-COOH$

61. (c) $A=\{x\in z: 2^{(x+2)(x^2-5x+6)}=1\}$

$2^{(x+2)(x^2-5x+6)}=2^0 \Rightarrow x=-2,2,3$

$A=\{-2,2,3\}$

$B=\{x\in Z: -3<2x-1<9\}$

$B=\{0,1,2,3,4\}$

A × B has is 15 elements so number of subsets of A × B is 2^{15}.

62. (b) A.M. ≥ G.M.

$$\frac{\sin^4\alpha+4\cos^4\beta+1+1}{4}\geq(\sin^4\alpha\cdot 4\cos^4\beta.1.1)^{\frac{1}{4}}$$

$\sin^4\alpha+4\cos^2\beta+2\geq 4\sqrt{2}\sin\alpha\cos\beta$

given that $\sin^4\alpha+4\cos^4\beta+2=4\sqrt{2}\sin\alpha\cos\beta$

⇒ A.M. = G.M. ⇒ $\sin^4\alpha=1=4\cos^4\beta$

$\sin\alpha=1, \cos\beta=\pm\frac{1}{\sqrt{2}}$

$\Rightarrow \sin\beta=\frac{1}{\sqrt{2}}$ as $\beta\in[0,\pi]$

$\cos(\alpha+\beta)-\cos(\alpha-\beta)=-2\sin\alpha\sin\beta$

$=-\sqrt{2}$

63. (c) DR's of line are 2, 1, -2

normal vector of plane is $\hat{\imath}-2\hat{\jmath}-k\hat{k}$

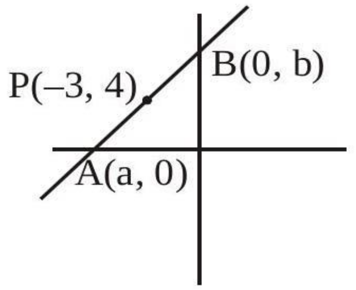
$$\sin\alpha=\frac{(2\hat{\imath}+\hat{\jmath}-2\hat{k})\cdot(\hat{\imath}-2\hat{\jmath}-k\hat{k})}{3\sqrt{1+4+k^2}}$$

$$\sin\alpha=\frac{2k}{3\sqrt{k^2+5}}$$

$$\cos\alpha=\frac{2\sqrt{2}}{3}$$

$$(1)^2+(2)^2=1\Rightarrow k^2=\frac{5}{3}$$

64. (d)



Let the line be $\frac{x}{a}+\frac{y}{b}=1$

$(-3,4)=\left(\frac{a}{2},\frac{b}{2}\right)$

$a=-6, b=8$

equation of line is $4x-3y+24=0$

65. (b) $\int \frac{3x^{13}+2x^{11}}{(2x^4+3x^2+1)^4}dx$

$$\int \frac{\left(\frac{3}{x^3}+\frac{2}{x^5}\right)dx}{\left(2+\frac{3}{x^2}+\frac{1}{x^4}\right)^4}$$

Let $\left(2+\frac{3}{x^2}+\frac{1}{x^4}\right)=t$

$$-\frac{1}{2}\int \frac{dt}{t^4}=\frac{1}{6t^3}+C \Rightarrow \frac{x^{12}}{6(2x^4+3x^2+1)^3}+C$$

66. (c) Let m-men, 2-women

$^mC_2\times 2={}^mC_1\,{}^2C_1\cdot 2+84$

$m^2-5m-84=0 \Rightarrow (m-12)(m+7)=0$

$m=12$

67. (c) $f'(x)=3x^2-6(a-2)x+3a$

$f'(x)\geq 0 \forall x\in(0,1]$

$f'(x)\leq 0 \forall x\in[1,5)$

$\Rightarrow f'(x)=0$ at $x=1 \Rightarrow a=5$

$f(x)-14=(x-1)^2(x-7)$

$$\frac{f(x)-14}{(x-1)^2}=x-7$$

68. (a) $\frac{f'(x)}{f(x)}=1 \forall x\in R$

Intergrate & use $f(a)=2$

$f(x) = 2e^{x-1} \Rightarrow f'(x) = 2e^{x-1}$

$h(x) = f(f(x)) \Rightarrow h'(x) = f'(f(x))f'(x)$

$h'(a) = f'(f(a))f'(a)$

$\quad = f'(b)f'(a)$

$\quad = 2e \cdot 2 = 4e$

69. (d) $y = x^2 - 5x + 5$

$\frac{dy}{dx} = 2x - 5 = 2 \Rightarrow x = \frac{7}{2}$

at $x = \frac{7}{2}, y = \frac{-1}{4}$

Equation of tangent at $\left(\frac{7}{2}, \frac{-1}{4}\right)$ is $2x - y - \frac{29}{4} = 0$

Now check options

$x = \frac{1}{8}, y = -7$

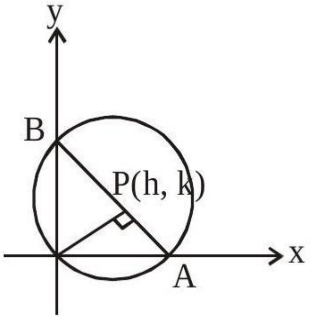
70. (b) All four points are coplaner so

$$\begin{vmatrix} 1-\lambda^2 & 2 & 0 \\ 2 & -\lambda^2+1 & 0 \\ 2 & 2 & -\lambda^2-1 \end{vmatrix} = 0$$

$(\lambda^2 + 1)^2(3 - \lambda^2) = 0$

$\lambda = \pm\sqrt{3}$

71. (c)



Slope of $AB = \frac{-h}{k}$

Equation of AB is $hx + ky = h^2 + k^2$

$A\left(\frac{h^2+k^2}{h}, 0\right), B\left(0, \frac{h^2+k^2}{k}\right)$

$AB = 2R$

$\Rightarrow (h^2 + k^2)^3 = 4R^2\, h^2k^2$

$\Rightarrow (x^2 + y^2)^3 = 4R^2x^2y^2$

72. (a) $x^2 = 8y$

$\Rightarrow \frac{dy}{dx} = \frac{x}{4} = \tan\theta$

$\therefore x_1 = 4\tan\theta$

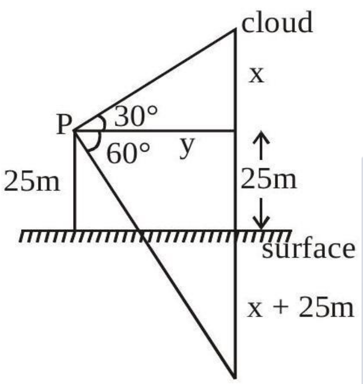
$y_1 = 2\tan^2\theta$

Equation of tangent :-

$y - 2\tan^2\theta = \tan\theta(x - 4\tan\theta)$

$\Rightarrow x = y\cot\theta + 2\tan\theta$

73. (b)



$\tan 30^\circ = \frac{x}{y} \Rightarrow y = \sqrt{3}x$

$\tan 60^\circ = \frac{25 + x + 25}{y}$

$\Rightarrow \sqrt{3}y = 50 + x$

$\Rightarrow 3x = 50 + x$

$\Rightarrow x = 25 \text{ m}$

$\therefore$ Height of cloud from surface $= 25 + 25 = 50$ m

74. (d) $\int_1^e \left(\frac{x}{e}\right)^{2x} \log_e x \cdot dx - \int_1^e \left(\frac{e}{x}\right) \log_e x . dx$

Let $\left(\frac{x}{e}\right)^{2x} = t, \left(\frac{e}{x}\right)^{x} = v$

$= \frac{1}{2}\int_{\left(\frac{1}{e}\right)^2}^{1} dt + \int_e^1 dv$

$= \frac{1}{2}\left(1 - \frac{1}{e^2}\right) + (1 - e) = \frac{3}{2} - \frac{1}{2e^2} - e$

75. (b)

$\lim_{x\to\infty}\sum_{r=1}^{2n}\frac{n}{n^2+r^2}$

$\lim_{x\to\infty}\sum_{r=1}^{2n}\frac{1}{n\left(1+\frac{r^2}{n^2}\right)}=\int_0^2\frac{dx}{1+x^2}=\tan^{-1}2$

76. (b)

$\begin{vmatrix}\lambda-1 & 2 & 2\\ 1 & 2-\lambda & 1\\ 1 & 1 & 1\end{vmatrix}=0\Rightarrow(\lambda-1)^3=0\Rightarrow\lambda=1$

77. (a)

$2.\ {}^nC_5={}^nC_4+{}^nC_6$

$2.\frac{\underline{n}}{\lfloor n\underline{n-5}}=\frac{\underline{n}}{\lfloor 4\underline{n-4}}+\frac{\underline{n}}{\underline{6}\underline{n-6}}$

$\frac{2}{5}\cdot\frac{1}{n-5}=\frac{1}{(n-4)(n-5)}+\frac{1}{30}$

n = 14 satisfying equation.

78. (b) $(\vec{a}\cdot\vec{c})\vec{b}-(\vec{a}\cdot\vec{b})\cdot\vec{c}=\frac{1}{2}\vec{b}$

$\because\ \vec{b}\&\vec{c}$ are linearly independent

$\therefore\ \vec{a}\cdot\vec{C}=\frac{1}{2}\ \&\vec{a}\cdot\vec{b}=0$

(All given vectors are unit vectors)

$\therefore\ \vec{a}\wedge\vec{c}=60^\circ\ \&\ \vec{a}\wedge\vec{b}=90^\circ$

$\therefore\ |\alpha-\beta|=30^\circ$

79. (b) $|A|=\begin{vmatrix}1 & \sin\theta & 1\\ -\sin\theta & 1 & \sin\theta\\ -1 & -\sin\theta & 1\end{vmatrix}$

$=2(1+\sin^2\theta)$

$\theta\in\left(\frac{3\pi}{4},\frac{5\pi}{4}\right)\Rightarrow\frac{1}{\sqrt{2}}<\sin\theta<\frac{1}{\sqrt{2}}$

$\Rightarrow 0\le\sin^2\theta<\frac{1}{2}$

$\therefore\ |A|\in[2,3)$

80. (c)

$$\lim_{x\to1^-}\frac{\sqrt{\pi}-\sqrt{2\sin^{-1}x}}{\sqrt{1-x}}\times\frac{\sqrt{\pi}+\sqrt{2\sin^{-1}x}}{\sqrt{\pi}+\sqrt{2\sin^{-1}x}}$$

$$\lim_{x\to1^-}\frac{2\left(\frac{\pi}{2}-\sin^{-1}x\right)}{\sqrt{1-x}\cdot\left(\sqrt{\pi}+\sqrt{2\sin^{-1}x}\right)}$$

$$\lim_{x\to1^-}\frac{2\cos^{-1}x}{\sqrt{1-x}}\cdot\frac{1}{2\sqrt{\pi}}$$

Put $x=\cos\theta$

$$\lim_{\theta\to0^+}\frac{2\theta}{\sqrt{2}\sin\left(\frac{\theta}{2}\right)}\cdot\frac{1}{2\sqrt{\pi}}=\sqrt{\frac{2}{\pi}}$$

81. (a)

p	q	~p	~p→q	~(~p→q)	(~p ^ ~q)
T	T	F	T	F	F
F	T	T	T	F	F
T	F	F	T	F	F
F	F	T	F	T	T

82. (d) General term $T_{r+1}={}^{60}C_r\,7^{\frac{60-r}{5}}3^{\frac{r}{10}}$

$\therefore$ for rational term, $r=0,10,20,30,40,50,60$

$\Rightarrow$ no of rational terms $=7$

$\therefore$ number of irrational terms $=54$

83. (c)

mean $\bar{x}=4,\sigma^2=5.2,n=5,.x_1=3x_2=4=x_3$

$\sum x_i=20$

$x_4+x_5=9\ldots\ldots(i)$

$\frac{\sum x_i^2}{x}-(\bar{x})^2=\sigma^2\Rightarrow\sum x_i^2=106$

$x_4^2+x_5^2=65\ldots\ldots(\text{ii})$

Using (i) and (ii) $(x_4-x_5)^2=49$

$|x_4-x_5|=7$

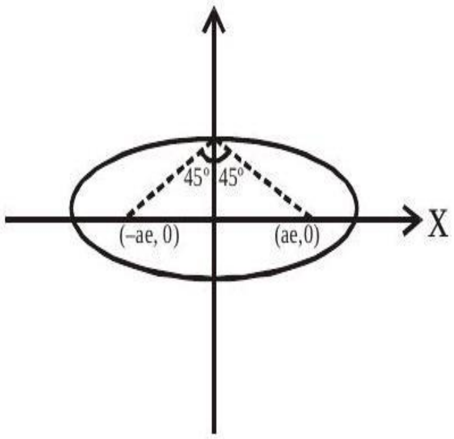
84. (b)

$$S = \left(\frac{3}{4}\right)^3 + \left(\frac{6}{4}\right)^3 + \left(\frac{9}{4}\right)^3 + \left(\frac{12}{4}\right)^3 + \cdots \ldots\ldots\ldots .15 \text{ term}$$
$$= \frac{27}{64}\sum_{r=1}^{15} r^3$$
$$= \frac{27}{64}\cdot\left[\frac{15(15+1)}{2}\right]^2$$
$$= 225\ K \text{ (Given in question)}$$

K=27

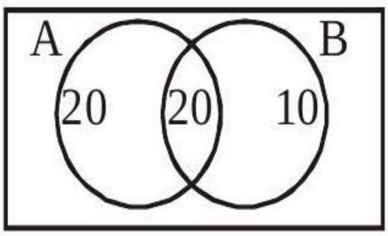
85. (c)

$m_{SB} \cdot m_{SB} = -1$



$b^2 = a^2e^2 \ldots .(i)$
$\frac{1}{2}\ S'B.SB = 8$
$S'B.SB = 16$
$a^2e^2 + b^2 = 16 \ldots..(ii)$
$b^2 = a^2(1-e^2) \ldots..(iii)$
using (i),(ii), (iii) $a = 4$
$b = 2\sqrt{2}$
$\therefore \ell\ (L.R) = \frac{2\,b^2}{a} = 4$

86. (b)



A → opted NCC

B → opted NSS

$\therefore$ P (nither A nor B) $= \frac{10}{60} = z\frac{1}{6}$

87. (b) Exprsssion is always positve it

$$2m+1>0 \Rightarrow m>-\frac{1}{2}$$

&

$$D<0 \Rightarrow m^2-6m-3<0$$
$$3-\sqrt{12}<m<3+\sqrt{12}$$

$\therefore$ Common interval is

$3-\sqrt{12}<\mathrm{m}<3+\sqrt{12}$

$\therefore$ Intgral value of m{0,1,2,3,4,5,6}

88. (c)

Expected Gain/ Loss $=$
$=\mathrm{W}\times 100+\mathrm{LW}(-50+100)+\mathrm{L}^2\,\mathrm{W}(-50-50+100)+\mathrm{L}^3(-150)$

$$=\frac{1}{3}\times 100+\frac{2}{3}\cdot\frac{1}{3}(50)+\left(\frac{2}{3}\right)^2\left(\frac{1}{3}\right)(0)+\left(\frac{2}{3}\right)^3(-150)=0$$

here w denotes probability that outcome 5 or 6 ($\mathrm{w}=\frac{2}{6}=\frac{1}{3}$)

here L denotes probability that outcome

1,2,3,4 $\left(\mathrm{L}=\frac{4}{6}=\frac{2}{3}\right)$

89. (b)

$$\frac{dy}{dx}=\frac{x^2-2y}{x}$$

$$\frac{\mathrm{dy}}{\mathrm{dx}}+2\frac{\mathrm{y}}{\mathrm{x}}=\mathrm{x}$$

$$\mathrm{I.F}=\mathrm{e}^{\int\frac{2}{\mathrm{x}}\mathrm{dx}}=\mathrm{x}^2$$

$$\therefore \mathrm{y}\cdot\mathrm{x}^2=\int \mathrm{x}\cdot\mathrm{x}^2\mathrm{dx}+\mathrm{C}$$

$$=\frac{x^4}{y}+C$$

hence bpasses through $(1,-2) \Rightarrow C=-\frac{9}{4}$

$$\therefore \mathrm{yx}^2=\frac{\mathrm{x}^4}{4}-\frac{9}{4}$$

90. (a) $|z_1|=9, |z_2-(3+4i)|=4$

$C_1(0,0)$ radius $r_1 = 9$

$C_2(3,4)$, radius $r_2 = 4$

$C_1C_2 = |r_1 - r_2| = 5$

$\therefore$ Circle touches internally

$\therefore |z_1 - z_2|_{min} = 0$