SOLUTIONS

PROGRESS TEST-8

GZRA

JEE MAIN PATTERN

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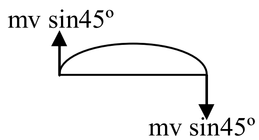
Corporate Office: Paruslok, Boring Road Crossing, Patna-01
Kankarbagh Office: A-10, 1st Floor, Patrakar Nagar, Patna-20
Bazar Samiti Office : Rainbow Tower, Sai Complex, Rampur Rd., Bazar Samiti Patna-06
Call : 9569668800 | 7544015993/4/6/7

PHYSICS

1. **(C)**

$\Delta p = 2mv\sin45^\circ = 2\ mv\frac{1}{\sqrt{2}} = \sqrt{2}\ mv$

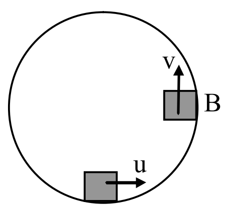


2. **(A)**

$u^2 = 5gR$

$\therefore\ v^2 = u^2 - 2gR$

$= 5gR - 2gR = 3gR$



Tangential acceleration at B is

$a_t = g$ (downwards)

Centripetal acceleration at B is

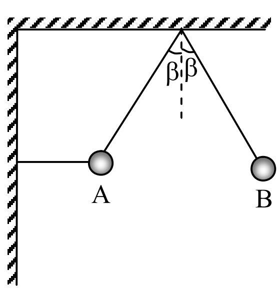
$a_C = \frac{v^2}{R} = 3g$

$\therefore$ Total acceleration will be

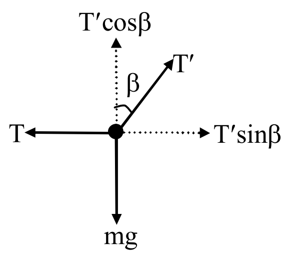
$a = \sqrt{a_C^2 + a_t^2} = g\ \sqrt{10}$

3. **(D)**

4. **(B)**



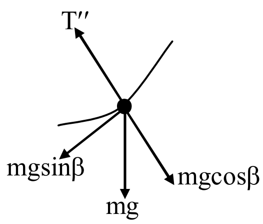
At : A



$T'\cos\beta = mg$

$$T' = \frac{mg}{\cos\beta}$$

At : B



$$T'' - mg\cos\beta = \frac{mv^2}{\ell}$$

at B ; $v = 0$

$T'' = mg\cos\beta$

$$\frac{T''}{T'} = \frac{mg\cos\beta}{mg/\cos\beta}$$

$$\frac{\text{Tension at B}}{\text{Tension at A}} = \frac{T''}{T'} = \cos^2\beta$$

5. Let *x* be the distance between the particles after *t* seconds.

Then $x = vt - \frac{1}{2}at^2$ … (i)

For *x* to be maximum , $\frac{dx}{dt} = 0$ or $t = \frac{v}{a}$

From (i), we get

$$x = \frac{v^2}{2a}$$

$\therefore$ **(b)**

6. Maximum acceleration of slab can be

$$a = 0.6 \times 10 \times 9.8 = \frac{6 \times 9.8}{40} = \frac{58.8}{40} = 1.47 \text{ ms}^{-2}$$

Hence block over slab will slip and $a = \frac{0.4 \times 10 \times 9.8}{40} = 0.98 \text{ ms}^{-2}$

$\therefore$ **(A)**

7. **(D)**

Let N be the normal reaction between m and M,

Equilibrium of M

N sin 45º = kx … (i)

Equilibrium of m in vertical direction gives

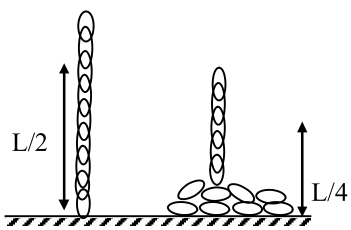
N cos 45º = mg … (ii)

From Eqs. (i) and (ii), we get

$x = \frac{mg}{k}$

8. **(C)**

The work done by man is negative of magnitude of decrease in potential energy of chain.



$\Delta U = mg\frac{\ell}{2} - \frac{m}{2}g\frac{\ell}{4} = 3\,mg\frac{\ell}{8}$

$\therefore W = -\frac{3mg\ell}{8}$

9. **(B)**

$W = \int_{(0,0)}^{(1,1)} \vec{F}.\vec{d}x$

Here $\vec{d}s = dx\hat{i} + dy\hat{j} + dz\hat{k}$

$\therefore \quad W = \int_{(0,0)}^{(1,1)} (x^2 dy + y dx)$

$$= \int_{(0,0)}^{(1,1)} (y^2dy + x.dx) \text{ (as x = y)}$$

$$\therefore \quad W = \left[\frac{y^3}{3} + \frac{x^2}{2}\right]_{(0,0)}^{(1,1)} = \frac{5}{6} \text{ J}$$

10. (C)

$$\text{K.E.} = Fx; \quad P = \left(\frac{F^2}{m}\right)t; \quad K = \left(\frac{F^2}{2m}\right)t^2$$

11. (C)

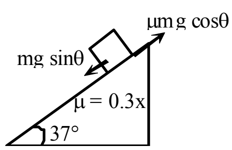
P = Fv

or $P = \left(mv\frac{dv}{dx}\right)v$

or $\int_0^v v^2 dv = \int_0^x \frac{P}{m} dx$

$\frac{v^3}{3} = \frac{Px}{m}$ or $v = \left(\frac{3Px}{m}\right)^{1/3}$

12. (D)



After some time friction becomes more than mgsinθ, then body will retard. Thus speed is maximum when, total force or acc. is zero.

$mg\sin\theta - \mu mg\cos\theta = 0$

$\Rightarrow \mu = \tan\theta \Rightarrow 0.3x = 3/4$

$\Rightarrow x = 2.5$ m

13. (D)

$$H = \frac{u_1^2 \sin^2\theta_1}{2g} = \frac{u_2^2 \sin^2\theta_2}{2g}$$

14. (A)

15. (A)

16. (D)

For a mole of an ideal gas, the equation of state is PV = RT

or $T = \frac{PV}{R}$

which is proportional to the product PV

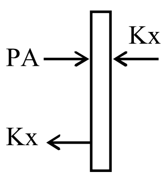
At x , PV = $(4 \times 10^5)(1 \times 10^{-4}) = 40$ Nm

At y, PV = $(1 \times 10^5)(5 \times 10^{-4}) = 50$ Nm

At z, PV = $(1 \times 10^5)(1 \times 10^{-4}) = 10$ Nm

Thus, T is maximum at y since PV is the highest and T is minimum at z since PV is the smallest

17. (B)



$P = \frac{2Kx}{A}$

$= \frac{2 \times 100}{1} \times \frac{1}{2}$

= 100 N/m^2

18. (B)

$U = U_0V \Rightarrow nC_VT = U_0V \Rightarrow T \propto V$ isobaric process

$$\boxed{C = C_V + \frac{P}{n}\frac{dV}{dT}}$$

$\frac{dV}{dT}$ = constant

$\frac{P}{n} = \frac{RT}{V} = \frac{RT}{\text{constant}\, T}$

$C = C_V + \frac{R}{\text{constant}}$

$C = C_V + R = \frac{5}{2}R + R = \frac{7}{2}R$

19. **(C)**

$\Delta Q = nC_P\,\Delta T = \frac{7}{2} nR\Delta T$ $\left(C_P = \frac{7}{2}R\right)$

$\Delta U = nC_V\,\Delta T = \frac{5}{2} nR\Delta T$ $\left(C_V = \frac{5}{2}R\right)$

and $\Delta W = \Delta Q - \Delta U = nR\Delta T$

$\therefore\ \Delta Q : \Delta U : \Delta W = 7 : 5 : 2$

20. **(D)**

Heat released by water

$\Delta Q = 80 \times 1 \times 30 = 2400$ cal ……(i)

Mass of Ice melt

$2400 = m \times 80$ $[\Delta Q = mL]$

$\therefore\ m = \frac{2400}{80} = 30$ gm

21. **(B)**

22. **(A)** $x \times 540 = y \times 80 + y \times 1 \times 100$

$\Rightarrow\ 540\,x = 180\,y$ or $\frac{x}{y} = \frac{1}{3}$

23. **(C)**

$(3L)\alpha_{eff}\Delta\theta = L\alpha\,\Delta\theta + 2L(2\alpha)(\Delta\theta)$

$\therefore\ \alpha_{eff} = \frac{5}{3}\alpha$

24. **(B)**

$\frac{mL}{t_1} = \frac{K_1 A (T_1 - T_2)}{L}$

$\frac{mL}{t_2} = \frac{K_2 A (T_1 - T_2)}{L}$

$\frac{K_1}{K_2} = \frac{t_2}{t_1}$

25. **(D)**

$\tau \propto \frac{Kr^2}{\ell}$

$\therefore\ \tau_1 = \tau_2$

$\frac{K_1 r_1^2}{\ell_1} = \frac{K_2 r_2^2}{\ell_2}$

26. **(D)**

N = $\frac{PV}{KT}$

$\frac{N_A}{N_B}$ = $\frac{PV}{KT}$ × $\frac{K2T}{2P(V/4)}$ = $\frac{4}{1}$

27. **(C)**

g_{eff} = g + a = $\frac{2u}{t}$

$\Rightarrow \ a = \frac{2u}{t} - g = \frac{2u - gt}{t}$

28. **(A)**

$\frac{3}{4}$th energy is lost i.e., $\frac{1}{4}$th kinetic energy is left. Hence, its velocity becomes $\frac{v_0}{2}$ under a retardation of μg in time t_0.

$\therefore \ \frac{v_0}{2} = v_0 - \mu g \, t_0$

or $\mu g \, t_0 = \frac{v_0}{2}$ or $\mu = \frac{v_0}{2g\,t_0}$

29. **(B)** $\frac{\frac{1}{2} m u_1^2 \cos^2\theta_1}{\frac{1}{2} m u_2^2 \cos^2\theta_2} = \frac{4}{1}$

$\Rightarrow \ \frac{u_1 \cos\theta_1}{u_2 \cos\theta_2} = 2$ …(1)

and $\frac{u_1^2 \sin^2\theta_1}{u_2^2 \sin^2\theta_2} = \frac{4}{1}$

or $\frac{u_1 \sin\theta_1}{u_2 \sin\theta_2} = \frac{2}{1}$ …(2)

from equation no. (1) and (2)

$\frac{u_1 \sin\theta_1 . u_1 \cos\theta_1}{u_2 \sin\theta_2 . u_2 \cos\theta_2} = \frac{4}{1}$

30. **(C)** $T_{mix} = \frac{m_1 s_1 T_1 + m_2 s_2 T_2}{m_1 s_1 + m_2 s_2}$

CHEMISTRY

31. (D) **32. (C)** **33. (A)** **34. (D)**

35. (B)

The velocity corresponding to the maxima is the most probable velocity which is given by the expression.

$$C_{mp} = \sqrt{\frac{2RT}{M}}$$

$$RT = \frac{C_{mp}^2 M}{2} = \frac{(200)^2 \times 100 \times 10^{-3}}{2} = 40000 \times 50 \times 10^{-3}\ J\,mol^{-1} = 40 \times 50\ J\,mol^{-1}$$

No. of moles = $\frac{300}{100} = 3$

$$E = \frac{3}{2} nRT = \frac{3}{2} \times 3 \times 40 \times 50 = 9 \times 10^3 J = 9kJ$$

36. (D)

37. (B)

V_{real} = $\frac{\text{Molar mass}}{\text{density}} = \frac{18}{0.36}$.

V_{ideal} = $\frac{nRT}{P} = \frac{1 \times 0.082 \times 500}{1}$.

So, Z = $\frac{V_{real}}{V_{ideal}} = \frac{50}{0.082 \times 500} = \frac{50}{41}$.

38. (B)

$$2S \xrightarrow[\text{excitation}]{\text{Energy 4p}} 2p \xrightarrow[\text{Excitation}]{\text{Energy up}} 3d \xrightarrow[\text{deexcitations}]{\text{Energy down}} 3p$$

$$3p \xrightarrow[\text{excitation}]{\text{Energy up}} 4S \xrightarrow[\text{deexcitation}]{\text{Energy down}} 3p$$

During deexcitation emission of light results

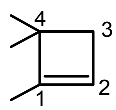
39. (A)

40. (C)

$$\lambda = \frac{h}{mv} \quad \lambda = \frac{h}{\sqrt{2mKE}}$$

$$\lambda_{req} = \frac{h}{\sqrt{zm9KE}} = \frac{1}{3}\frac{\lambda}{\sqrt{2mKG}} = \frac{\lambda}{3}$$

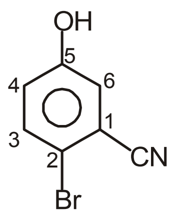
41. (C)



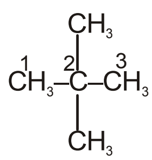
1,4,4-Trimethylcyclobutene

42. (D)

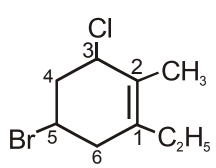
43. (B)



44. (A)

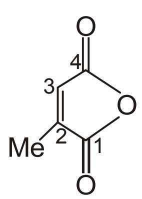


45. (C)

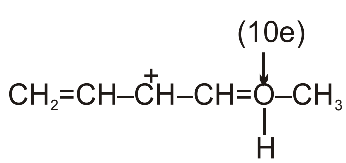


: 5-Bromo-3-chloro-1-ethyl-2-methylcyclohex-1-ene

46. (A)

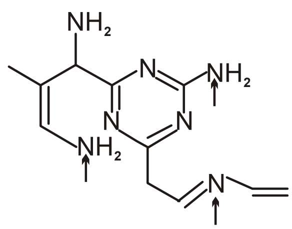


47. (B)



48. (C)

49. (C)

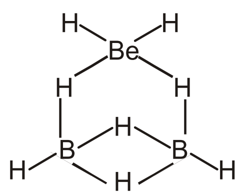


50. (C)

51. (C)

52. (B)

53. (C)

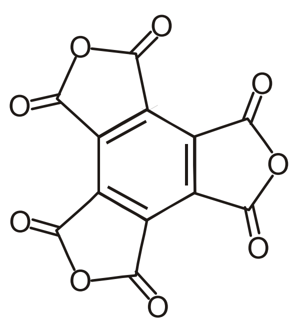


54. (A)

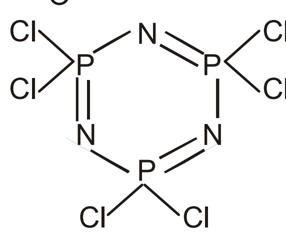
(IV) $LiClO_4 > NaClO_4 > KClO_4 > RbClO_4 > CsClO_4$

55. (A)

(iii) $C_{12}O_9$ – sp^2 ;



(iv) $N_3P_3Cl_6$ – sp^2 & sp^3 ;



56. (A)

(i) LiF > NaF > KF > RbF : Lattice energy

(iii) $Li^+ < Mg^{2+} < Al^{3+}$:Hydration energy

57. (A)

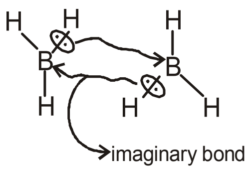
58. (C)

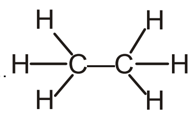
Due to size of Nitrogen is smaller than another.

59. (D)

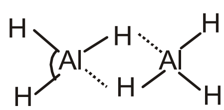
1 & 3 have x – x bond absent.

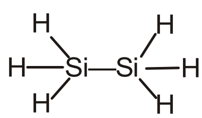
(1) $B_2 H_6$



(2) C_2H_6 .... 

(3) Al_2H_6



(4)  x-x bond are present

60. (C)

MATHEMATICS

61. (B)

Let the equation of chord be y = mx + c ; Joint equation of OA & OB is

$$4x^2 + y^2 - x\left(\frac{y - mx}{c}\right) + 4y\left(\frac{y - mx}{c}\right) = 0$$

$$\because OA \perp OB \Rightarrow \left(4 + \frac{m}{c}\right) + \left(1 + \frac{4}{c}\right) = 0$$

$$\Rightarrow 5c + m + 4 = 0$$

$$\therefore y = mx + c \Rightarrow y + 4x + c(5x - 1) = 0$$

$\Rightarrow$ passing through the intersection of

$y + 4x = 0$ and $5x - 1 = 0$

62. (D)

Only (3, –4) satisfies equation of the circle.

63. (C)

64. (C)

$$P \equiv \frac{x}{\cos\frac{\pi}{4}} = \frac{y}{\sin\frac{\pi}{4}} = 6\sqrt{2} \quad \Rightarrow x = 6,\ y = 6$$

Since P(6,6) lie on circle

$72 + 12(g + f) + c = 0$ ......(i)

Since y = x touches the circle, then

$2x^2 + 2x(g+f) + c = 0$ has equal roots D = 0

$4(g + f)^2 = 8c \Rightarrow (g + f)^2 = 2c$ ......(ii)

From, we get

$$(12(g+f))^2 = [-(c+72)]^2 \Rightarrow 144(2c) = (c+72)^2 \Rightarrow (c-72)^2 = 0 \Rightarrow c = 72$$

65. (C)

66. (A)

$$\alpha - \beta = \sum_{r=1}^{100}(a_{2r} - a_{2r-1}) = 100\,d$$

67. (D)

68. (C)

$(x - 1)(x - 0) + (y - 0)(y - 1) = 0$

69. (C)

Let the equation of one of the circles be

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

Since it passes through origin,

$\therefore$ c = 0.

So, the equation becomes

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

Since it cuts the circle $x^2 + y^2 + 6x - 4y + 2 = 0$

orthogonally,

$\therefore \quad 2g(3) + 2f(-2) = 0 + 2$

$\Rightarrow \quad -6(-g) + 4(-f) = 2$

Thus, the locus of the centre (–g, f) is

$-6(-g) + 4(-f) = 2$ or $3x - 2y + 1 = 0$

70. (B)

$\sin x + \cos x = \sqrt{2}$

71. (B)

The equation of the straight line passing through the points of intersection of given circle is

$(x^2 + y^2 + 5x + 1) - (x^2 + y^2 - 3x + 7y - 25) = 0$

i.e., $8x - 15y + 26 = 0$ ....(i)

Also, centre of the circle $x^2 + y^2 - 2x = 0$ is (1, 0).

$\therefore$ Distance of the point (1, 0) from the straight line ......(1)

$$= \frac{|8(1) - 15(0) + 26|}{\sqrt{64 + 225}} = \frac{34}{17} = 2$$

72. (B)

The equation of the line L be $y - 2 = m(x - 8)$, $m < 0$

coordinates of P and Q are P $\left(8 - \frac{2}{m}, 0\right)$ and Q $(0, 2 - 8m)$.

So, $OP + OQ = 8 - \frac{2}{m} + 2 - 8m = 10 + \frac{2}{(-m)} + 8(-m) \geq 10 + 2\sqrt{\frac{2}{(-m)} \times 8(-m)} \geq 18$

So, absolute minium value of OP + OQ = 18

73. (B)

The parabola $y = x^2 + 1$ and $x = y^2 + 1$ are symmetrical about $y = x$.

Therefore, the tangent at point A is parallel to y = x. Therefore, $\frac{dy}{dx} = 2x$ or $2x = 1$

or $x = \frac{1}{2}$ and $y = \frac{5}{4}$

$$\therefore A \equiv \left(\frac{1}{2}, \frac{5}{4}\right) \text{ and } B \equiv \left(\frac{5}{4}, \frac{1}{2}\right)$$

Hence, Radius $= \frac{1}{2}\sqrt{\left(\frac{1}{2} - \frac{5}{4}\right)^2 + \left(\frac{5}{4} - \frac{1}{2}\right)^2} = \frac{3}{8}\sqrt{2}$

$$\therefore \text{Area} = \frac{9\pi}{32}$$

74. (A)

The family of parabola is

$$y = \frac{a^3x^2}{3} + \frac{a^2x}{2} - 2a$$

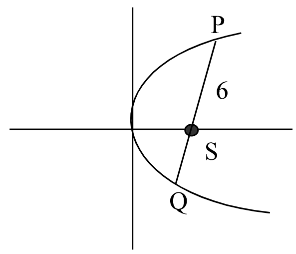
and the vertex is A(–B/2A, –D/4A) ≡ (h, k). Therefore,

$$h = -\frac{a^2/2}{2(a^3/3)} = -\frac{3}{4a}$$

and $k = \frac{(a^2/2)^2 - \{4a^3(-2a)/3\}}{4(a^3/3)} = \frac{-35a}{16}$

Eliminating a, required locus is xy = 105/64.

75. (C)



$y^2 = 8x$

$\Rightarrow$ a = 2

$\Rightarrow \frac{2.PS.SQ}{PS + SQ} = 4$

$\Rightarrow$ SQ = 3

76. (D)

required equation is $x^2 - (\alpha + \beta)x + \alpha\beta = 0$

$$\alpha + \beta = \frac{1}{10 - \sqrt{72}} + \frac{1}{10 + 6\sqrt{2}} = \frac{5}{7}$$

$$\alpha.\beta = \frac{1}{28}$$

77. (A)

Let $S = \sum_{n=1}^{\infty} \frac{a_n}{2^n}$, then

$$S = \frac{a_1}{2} + \frac{a_2}{2^2} + \frac{a_3}{2^3} + \sum_{n=3}^{\infty} \frac{a_{n+1}}{2^{n+1}} = 0 + \frac{1}{4} + \frac{2}{8} + \sum_{n=3}^{\infty} \frac{a_n + a_{n-1} + a_{n-2}}{2^{n+1}}$$

$$= \frac{1}{2} + \frac{1}{2}\sum_{n=3}^{\infty} \frac{a_n}{2^n} + \frac{1}{4}\sum_{n=3}^{\infty} \frac{a_{n-1}}{2^{n-1}} + \frac{1}{8}\sum_{n=3}^{\infty} \frac{a_{n-2}}{2^{n-2}} = \frac{1}{2} + \frac{1}{2}\left(S - \frac{0}{2} - \frac{1}{4}\right) + \frac{1}{4}\left(S - \frac{0}{2}\right) + \frac{1}{8}S$$

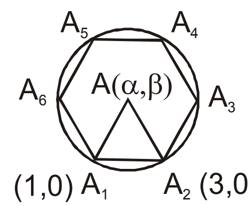
$$\Rightarrow \quad S = \frac{3}{8} + \frac{7}{8}S \Rightarrow \frac{1}{8}S = \frac{3}{8} \Rightarrow S = 3$$

78. (D)

b > 0

Also, $(\alpha-1)^2+\beta^2=(\alpha-3)^2+\beta^2 \Rightarrow \alpha=2$

$$\cos 60^\circ=\frac{AA_1^2+AA_2^2-A_1A_2^2}{2AA_1\times AA_2}\Rightarrow(1+\beta^2)=2\beta^2-2\Rightarrow\beta=\sqrt{3}$$



$\therefore$ Equation of circle having centre $(2,\sqrt{3})$ and radius 2 is

$x^2+y^2-4x-2\sqrt{3}\,y+3=0$

79. (C)

$$a_n=\frac{n(n+1)}{\left(\frac{n(n+1)}{2}\right)^2}=4\left(\frac{1}{n}-\frac{1}{n+1}\right)$$

$$S_n=4\left(1-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\ldots+\frac{1}{n}-\frac{1}{(n+1)}\right)$$

$$S_n=4\left(1-\frac{1}{n+1}\right)$$

$S_\infty=4$.

80. (B)

$\alpha+\beta=a$ and $\alpha\beta=-(a+b)$

$$\frac{\alpha^2+2\alpha+1}{\alpha^2+2\alpha+b}+\frac{\beta^2+2\beta+1}{\beta^2+2\beta+b}=\frac{(\alpha+1)^2}{(\alpha+1)^2+(b-1)}+\frac{(\beta+1)^2}{(\beta+1)^2+(b-1)}$$

81. (B)

$$\alpha+\beta=\frac{3}{2}$$

$$\alpha\beta=-3$$

$$\therefore(\alpha+\beta)^2-2\alpha\beta+4$$

$$=\frac{9}{4}+6+4=\frac{49}{4}$$

and $(\alpha^2+2)(\beta^2+2)=\alpha^2\beta^2+2(\alpha^2+\beta^2)+4$

$$=9+2\left(\frac{33}{4}\right)+4=\frac{59}{2}$$

Hence, the required equation is $x^2-\frac{49}{4}x+\frac{59}{2}=0$

82. (B)

Equation of normal in terms of m is $y = mx - 4m - 2m^3$. If it passes through (a, 0) then $am - 4m - 2m^3 = 0$

$\Rightarrow m(a - 4 - 2m^2) = 0 \quad \Rightarrow \quad m = 0, m^2 = \frac{a-4}{2}$.

For three distinct normal, $a - 4 > 0 \Rightarrow a > 4$

83. (A)

Let $16^{\sin^2 x} = y$, then $16^{\cos^2 x} = 16^{1-\sin^2 x} = \frac{16}{y}$

Hence $y + \frac{16}{y} = 10 \Rightarrow y^2 - 10y + 16 = 0 \Rightarrow y = 2$ or 8

Now $16^{\sin^2 x} = 2 \Rightarrow 2^{4\sin^2 x} = (2)^1 \Rightarrow 4\sin^2 x = 1$

$\therefore \quad \sin x = \pm\frac{1}{2} \Rightarrow x = \frac{\pi}{6}$

and $16^{\sin^2 x} = 8 \Rightarrow 2^{4\sin^2 x} = 2^3 \Rightarrow \sin x = \pm\frac{\sqrt{3}}{2} \Rightarrow x = \frac{\pi}{3}$

84. (B)

85. (C)

Let α, 2α are the roots of equation

so $\alpha + 2\alpha = 3\alpha = 3a \Rightarrow \alpha = a$

and $\alpha(2\alpha) = 2\alpha^2 = f(a)$

$\Rightarrow \quad f(a) = 2a^2$

Hence $f(x) = 2x^2$

86. (A)

Since $x_1 x_2 = 4$

$x_2 = \frac{4}{x_1}$

$$\therefore \quad \frac{x_1}{x_1 - 1} + \frac{\frac{4}{x_1}}{\frac{4}{x_1} - 1} = 2 \Rightarrow \frac{x_1}{x_1 - 1} + \frac{4}{4 - x_1} = 2$$

$4x_1 - x_1^2 + 4x_1 - 4 = 2(x_1 - 1)(4 - x_1)$

$\Rightarrow \quad x_1^2 - 2x_1 + 4 = 0 \quad \Rightarrow \quad x^2 - 2x + 4 = 0$

87. (C)

Let $f(x) = x^2 - \frac{3ax}{a-2} + \frac{1}{a-2} = 0$ $\therefore$ $a - 2 > 2$

$D = \frac{9a^2}{(a-2)^2} - 4\left(\frac{1}{a-2}\right) = \frac{1}{(a-2)^2}(9a^2 - 4a + 8) = \{8a^2 + (a-2)^2 + 4\} > 9$

$f(0) = \frac{1}{a-2} > 0$ and $-\frac{b}{2a} = \frac{3a}{2(a-2)} > 0$

Since $D > 0$, $f(0) > 0 - \frac{b}{2a} > 0$

Hence both roots of given equation are positive.

88. (B)

Let α_1 and α_2 are roots

$\alpha_1{}^2 + \alpha_1{}^2 = 16$ ...(1)

$\alpha_1\alpha_2 = p$

$\alpha_1 + \alpha_2 = 4$ ...(2)

Solving we get $\alpha_1\alpha_2 = 0$

$\Rightarrow p = 0$

89. (C)

90. (A)

Let the equatoin of the circle be

$x^2 + y^2 + 2gx + 2fy + c = 0$ ... (i)

Since the circle touches y-axis, we have $c = f^2$.

Clearly, the point of contact is (0, 2) and it lies on the circle.

So, (0, 2) must satisfy (i).

$\therefore$ $4 + 4f + c = 0$ or $4 + 4f + f^2 = 0$ $[\because c = f^2]$

This gives $(2 + f)^2 = 0$ or $f = -2$. And, therefore, $c = 4$.

Also, intercept on x-axis is given by $2\sqrt{g^2 - c}$.

Now, $2\sqrt{g^2 - c} = 3 \Rightarrow g^2 - c = \frac{9}{4}$ or $g^2 = \frac{9}{4} + c = \frac{9}{4} + 4$, i.e., $g = \pm\frac{5}{2}$.

Hence, the required equation of the circle is

$x^2 + y^2 \pm 5x - 4y + 4 = 0$