MOCK TEST JEE -2020
TEST-02 ANSWER KEY

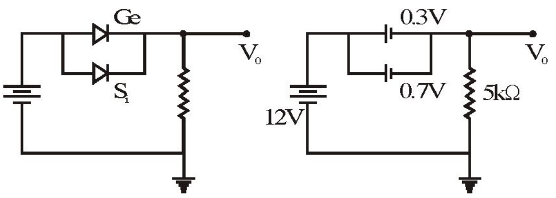
Test Date :03-01-2020

[PHYSICS]

1.

Ans. (2)

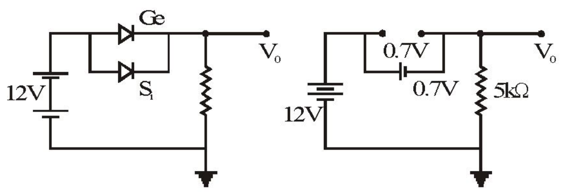
initially



As resistances of diodes are neglisible w.r.t. load resistance

$V_0 = 12 - 0.3 = 11.7$ Volt

Finally



$V_0 = 12 - 0.7 = 11.3$ Volt

2.

Ans. (1)

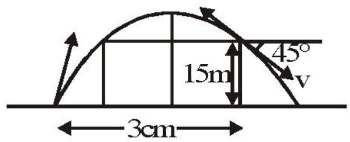
In FM, modulation index

$$= \frac{\text{frequency deviation}}{\text{modulation frequency}}$$

$$= \frac{50 \times 10^3}{7 \times 10^3} = 7.143$$

3.

Ans. (4)



$$y = x\tan\theta - \frac{gx^2(1+\tan^2\theta)}{2u^2}$$

$$x^2 = \frac{30 \times 30 \times 10}{45 \times 2}$$

$x^2 = 100$

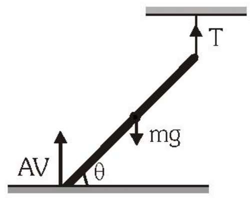
$V^2 = x^2 + 2 \times 10 \times 15$

$V^2 = 500$

$\Rightarrow \quad V = \sqrt{500}\,m/s$

4.

Ans. (1)



$Mg = N + T \qquad ...(1)$

Torque about com will be zero.

$$\therefore \quad N \times \frac{\ell}{2}\cos\theta = T \times \frac{\ell}{2}\cos\theta = 0$$

$N = T$

$$\therefore \quad T = \frac{mg}{2}$$

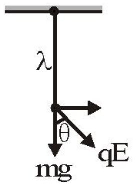
5.

Ans. (2)

Pendulum will perform oscillatory motion with extreme positions along gravitational force and electronstatic forces.

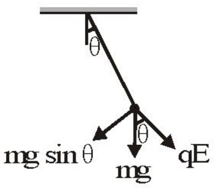
(1) When pendulum is vertical

torque about line = qE sin θ × ℓ



(2) When pendulum is along electric field

torque about image = mg sin θ × ℓ



$\therefore \quad E = \dfrac{mg}{q}$

6.

Ans. (1)

$T^2 = 2\pi\sqrt{\dfrac{\ell}{g_{eff}}}$

ℓ = length of threads

$T^1 = \dfrac{T}{\sqrt{2}}$

where $T = 2\pi\sqrt{\dfrac{\ell}{g}}$

$g_{eff} = 2g = (g + a)$

∴ net downwards force = 2mg = mg + iBL

$\therefore \quad i = \dfrac{mg}{BL}$

7.

Ans. (1)

$n = \dfrac{180}{18} = 10 \text{ moles}$

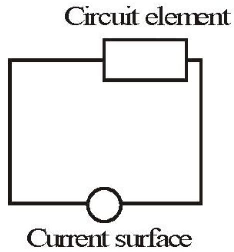
PV = nRT

P × 0.1 = 10 × 8.314 × 1000

$P = 8.314 \times 10^5$ Pa

8.

Ans. (4)



$\dfrac{dV}{dt} = \dfrac{8-2}{3} = 2$

Potential rises with time across capacitor Q = CV

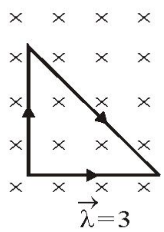
$\dfrac{dQ}{dt} = i = C\dfrac{dV}{dt}$

1 = C × 2

⇒ C = 0.5 F

9.

Ans. (2)



Force due to magnetic field

$= i(\vec{\ell} \times \vec{B}) = 2 \times [0.03\hat{i} \times 2(-\hat{k})] = (0.12\hat{j})N$

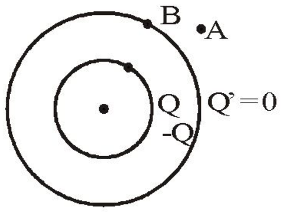
$\therefore$ Acceleration $= \dfrac{F}{m}$

$= \dfrac{0.12}{10 \times 10^{-3}} = (12 m/s^2)\hat{j}$

10.

Ans. (4)

There will be no change on outer surface of outer sphere.



$\therefore \quad V_A = V_B = 0$

$$V_0 = \frac{kQ}{r_a} - \frac{kQ}{r_b} = \frac{Q}{4\pi \in_0}\left[\frac{1}{r_a} - \frac{1}{r_b}\right]$$

But $V_C \neq 0$

11.

Ans. (1)

$A = A_0\ e^{-\frac{b}{2m}t}$

$A = A_0\ e^{-\frac{xt}{2\delta Ld}}$

12.

Ans. (3)

$$|V| = \left|-\frac{d\phi}{dt}\right| = \oint \vec{E}.\vec{d}l$$

$\Rightarrow \quad \pi b^2 \frac{B}{\Delta t} = E \times 2\pi a$

$\therefore$ Force on circular wheel

$$= E \times q = E \times 2\ \pi\ a \times \lambda = \frac{\pi b^2 B}{\Delta t} \times \lambda$$

Torque about centre = $a \times F = \frac{\pi b^2 B}{\Delta t} \times \lambda a = I_C \alpha$

$\therefore \quad I_C \times \frac{\omega}{\Delta t} = \frac{\pi b^2 B \lambda a}{\Delta t}$

$\therefore \quad \omega = \frac{\pi b^2 B \lambda a}{I_C} = \frac{\pi b^2 a B \lambda}{2I}$

13.

Ans. (2)

Since momentum is transfered to mirror so reflected light is of less momentum so it will have more wavelength.

14.

Ans. (4)

$$\lambda = \frac{h}{\sqrt{2mT_A}}$$

$\Rightarrow \quad T_A = \frac{h^2}{2m\lambda_A^2}$

$T_B = T_A - 1.5$

$$\frac{h}{4 \times 2m\lambda_A^2} = \frac{h}{\lambda_A^2 \times 2m} - 1.5$$

$$\frac{3}{4} \times \frac{h}{2m\lambda_A^2} = 1.5\text{eV}$$

$\Rightarrow \quad T_A = \frac{h}{2m\lambda_A^2} = 2.00\text{eV}$

$\therefore \quad T_B = T_A - 1.5 = 0.5$ eV

$\therefore \quad 2 = 4.25 - \phi_A$

$0.5 = 4.7 - \phi_B$

$\Rightarrow \quad \phi_B = 4.2$ eV

15.

Ans. (3)

By newton's formula $f^2 = x.x'$

$\therefore \quad |m| = \frac{f + x'}{f + x} = \frac{V}{x}$

$$= \frac{fx + f^2}{fx + x^2} = \frac{f(f + x)}{x(f + x)}$$

$$|m| = \frac{f}{x}$$

16.

Ans. (4)

Mass of spherical shell of width 'dr' of radius

= dm

$$= \rho_0\left(1-\frac{r^2}{R^2}\right).4\pi r^2.dr$$

$$\therefore \quad m = \int_0^R dm$$

$$= \frac{\rho_0}{R^2}\int_0^R (R^2-r^2)4\pi r^2 dr$$

$$= \frac{\rho_0 \times 4\pi}{R^2}\left[R^2\int_0^R r^2 dr - \int_0^R r^4 dr\right]$$

$$\therefore \quad m = \frac{\rho_0 \times 4\pi}{R^2}\left[\frac{R^5}{3}-\frac{R^5}{5}\right]$$

$$m = \frac{\rho_0 \times 8\pi R^3}{15}$$

$\therefore$ Gravitational force on unit mass of r > R

$$\therefore \quad F = \frac{GM\times 1}{r^2} = \frac{G\times 8\pi\rho_0 R^3}{15r^2}$$

17. **Ans. (2)**

$$V = \frac{\pi d^2}{4}\times h$$

vernier scale reading = (6 ± 0.01) cm

ruler scale reading = (10 ± 1) cm

$$\therefore \quad \left(\frac{\Delta V}{V}\right) = \left(2\frac{\Delta d}{d}+\frac{\Delta h}{h}\right)$$

$$\therefore \quad \frac{\Delta V}{V}\% = \left(\frac{2\times 0.1}{6}+\frac{1}{10}\right)\times 100\%$$

= 0.1 + 0.033

= 0.133 × 10%

= 13.3 %

18.

Ans. (1)

Length of micro scope tube = $v_0 + u_e = \ell$ on increasing length $u_e \uparrow$

$$m = \frac{v_0}{u_0}\times\frac{v}{u_e}$$

$\therefore\ u_e\uparrow \Rightarrow\ m\downarrow$

19.

Ans. (4)

$$\ell = n\frac{\lambda}{2} \quad\Rightarrow\quad \lambda = \frac{2\lambda}{n}$$

$$f = \frac{nV}{2\ell}$$

$$400 = \frac{n\times 350}{2\ell}$$

$$\ell = \frac{n\times 350}{800} = \frac{7}{16}n$$

n = 1, 2, 3, ...

20.

Ans. (1)

$$V = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{10}{0.1}} = 10 m/s$$

y = 2 sin (20 t – 2x)

$$\frac{\partial y}{\partial t} = v_p = 0.02\cos(t-2x)$$

Energy density

$$= \frac{I}{V}\times \text{Area} = \frac{\partial\times A^2\omega^2\cos^2(\omega t-kx)\times \text{Area}\times v}{v}$$

At near position,

Energy density = $\mu \times A^2\omega^2$

$= 0.1 \times 4 \times 10^{-4} \times 400$

$= 1.6 \times 10^{-2}$ J/m

21.

$$f = \frac{1}{2\ell}\sqrt{\frac{T}{\mu}}$$

$$f = \frac{f}{2} = \frac{1}{2\ell}\sqrt{\frac{T'}{\mu}}$$

$$\therefore \quad T' = \frac{T}{4} = \frac{12\times g}{4}$$

$\therefore$ mass = 3 kg

$\therefore$ removed mass = 9 kg

22. **3**
23. **2**
24. **4**
25. **3**

[CHEMISTRY]

26.

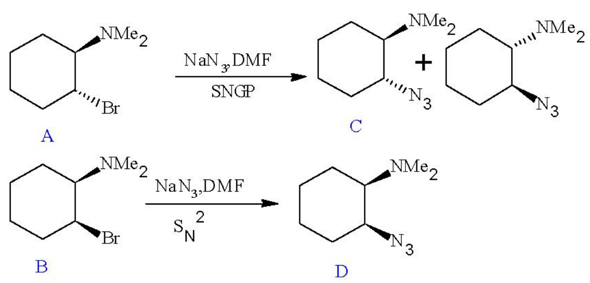
Ans. (2)

$$\lambda_{(NaBr)} = \lambda_{Na+} \times X_{Br^-} = 12 \times 10^{-3}$$

$$\lambda = \frac{K}{1000 \times M} \Rightarrow K = 12 \times 10^{-3} \times 10^{3} \times 0.1 = 1.2$$

27.

Ans. (2)



28.

Ans. (1)

$$CrO_4^{-2} + H_2O_2 \xrightarrow[\text{in presence of Organic solvent}]{\text{Acidic medium}} CrO_5$$

29.

Ans. (1)

$$n = \frac{PV}{ZRT} = \frac{81.06 \times 10^6 \times V_1}{1.95 \times R \times 223} \quad \text{(i)}$$

$$n = \frac{20.265 \times 10^6 \times V_2}{1.1 \times R \times 373} \quad \text{(ii)}$$

$$\frac{20.265 \times 10^6 \times V_2}{1.1 \times R \times 373} = \frac{21.06 \times 10^6 \times 10m^3}{1.95 \times R \times 223}$$

$V_2 = 3.77$

30.

Ans. (2)

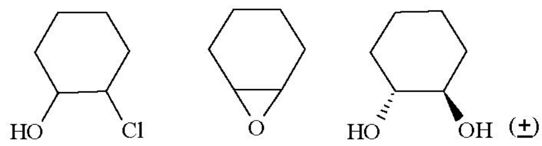
$Au + HNO_3 + 3HCl \rightarrow AuCl_4^{-2} + NO$

$Cu + \text{dil } HNO_3 \rightarrow Cu(NO_3)_2 + NO$

Au, Cu : transition metals. NO : paramagnetic colourless gas.

31.

Ans. (4)



(I) (II) (III)

32.

Ans. (3)

$BaC_2 + H_2O \rightarrow Ba(OH)_2 + C_2H_2$

$SrC_2 + H_2O \rightarrow Sr(OH)_2 + C_2H_2$

$Be_2C + H_2O \rightarrow Be(OH)_2 + CH_4$

33.

Ans. (3)

Gold number is 0.06 so 0.06mg will be required for 10 ml, so for 100 ml 0.6 mg will be required.

34.

Ans. (1)

$FeCl_3$ forms $Fe(OH)_3\downarrow$

35.

Ans. (2)

Facts

36.

Ans. (2)

$$C_6H_5CH_2-\underset{\underset{NH}{\|}}{C}-CH_3 \xrightarrow{Ni/H_2} C_6H_5-CH_2-\underset{\underset{NH_2}{|}}{CH}-CH_3$$

Addition-elimination

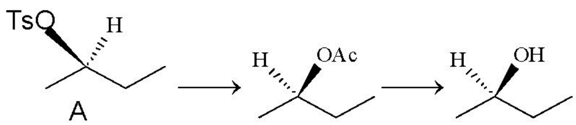
37.

Ans. (4)

H_2O_2 produces electrolysis followed by hydrolysis.

38.

Ans. (2)



39. (4)

40. (1)

41.

Ans. (1)

0.06 ppm, so in 10^6 ml water = 0.06 gm SO_2

$$[SO_2] = \frac{0.06}{64 \times 10^3} = \frac{6}{64} \times 10^{-5}$$

$[H^+] = \frac{12}{64} \times 10^{-5}$, So pH = 5 -(log 12 – log64)

= 5.7

42.

Ans. (3)

Mozingo reduction.

43.

Ans. (3)

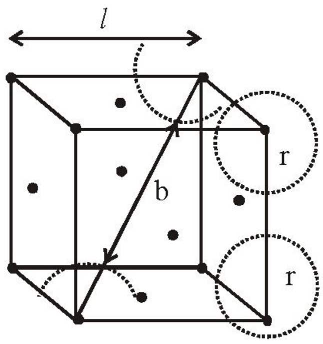
$d_{x^2-y^2}$: e^- density is present along x & y axis.

d_{z^2} : e^- density is in xy plane also.

44.

Ans. (1)

given $\frac{a}{b} = \frac{1}{2}$



then length (a) = 1 – 2r

then length (b) = $1\sqrt{3} - 2r$

$$\frac{1-2r}{1\sqrt{3}-2r} = \frac{1}{2}$$

$$2l - 4r = l\sqrt{3} - 2r$$

$$2l - l\sqrt{3} = 2r$$

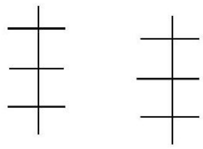
$$\frac{r}{l} = \left(\frac{2-\sqrt{3}}{2}\right) = 0.134$$

45.

Ans. (4)

$$B_2H_6 + 2NH_3 \rightarrow \underset{(A)}{[BH_2(NH_3)_2]BH_4} \xrightarrow{\Delta} \underset{(B)}{B_3N_3H_6}$$

46. **2**



47. Meq of $Mg^{+2} \equiv$ Meq of washing soda

$$\frac{W}{E} \times 1000 = Mg^{+2};\ EW = \frac{24}{2} = 12$$

$$\frac{12 \times 10^{-3}}{12} \times 1000 = 1.$$

48.

$$E = h\upsilon = h\frac{c}{\lambda} \text{ i.e. } E \propto \frac{1}{\lambda}$$

$$\frac{E_1}{E_2} = \frac{\lambda_2}{\lambda_1} = \frac{4000}{2000} = 2.$$

49.

$$\bar{v} = \frac{1}{\lambda} = R_H\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

$$= \frac{1}{\lambda} = R_H\left[\frac{1}{3^2} - \frac{1}{n_2^2}\right] = n_2 = 3 \text{ for Paschen series.}$$

50. BeF_3^- does not show sp^3–hybridization because this compound is not formed.

[MATHEMATICS]

51. **Ans. (2)**

$$x - \frac{x^3}{6} < \sin x < x \ \forall \ x > 0$$

$$\Rightarrow f\left(x - \frac{x^3}{6}\right) > f(\sin x) > f(x)$$

$$\Rightarrow \frac{f\left(x - \frac{x^3}{6}\right)}{f(x)} < \frac{f(\sin x)}{f(x)} < 1$$

$$\Rightarrow \lim_{x\to\infty} \frac{f\left(x - \frac{x^3}{6}\right)}{f(x)} < \lim_{x\to\infty} \frac{f(\sin x)}{f(x)} < 1$$

52. **Ans. (1)**

$f'(x) = (3\sin^2 x + 2\lambda \sin x)\cos x$

$= 3 \sin x \cos x \left(\sin x + \frac{2\lambda}{3}\right)$

sinx is increasing for $-\frac{\pi}{2} < x < \frac{\pi}{2}$

$\Rightarrow -1 < -\frac{2\lambda}{3} < 0 \Rightarrow 0 < \lambda < \frac{3}{2}$

53.

Ans. (4)

$x^3 - x + \frac{1}{x} - \frac{k}{x^2} = 0$

$\Rightarrow x^6 - x^4 + x^2 - kx = 0$ .... (i)

and $x^4 - x^2 + 1 - \frac{k}{x} = 0$ .... (ii)

Adding (i) & (ii)

$x^6 + 1 = k\left(x + \frac{1}{x}\right) \geq 2 \quad [\because x > 0]$

$\Rightarrow \int_0^1 x^6 dx \geq \int_0^1 (2k-1)dx \Rightarrow \int_0^1 x^6 dx \geq 2k - 1$

But $\int_0^1 x^6 dx \geq \frac{1}{10}$

$\therefore 2k - 1 \leq \frac{1}{10} \Rightarrow k \leq \frac{11}{20}$

54.

Ans. (1)

$x \in (1, e) \Rightarrow \log x \in (0, 1)$

$\log x > (\log x)^2$

$\Rightarrow \frac{\log x}{1-x} < \frac{(\log x)^2}{1-x}$

$\Rightarrow -\frac{1}{x} < \frac{1}{1-x} < \frac{\log x}{1-x} < \frac{\log^2 x}{1-x}$

So, $-1 < I_1 < I_2$

55.

Ans. (4)

$\cos^3 20° - \sin^3 10° - \sin^3 50°$

$\cos^3\theta = 4\cos^3\theta - 3\cos\theta$

$\sin^3\theta = 3\sin\theta - 4\sin^3\theta$

$\Rightarrow \frac{\cos 60° + 3\cos 20°}{4} - \left(\frac{3\sin 10° - \sin 30°}{4}\right)$

$-\left(\frac{3\sin 50° - \sin 150°}{4}\right)$

$= \frac{1}{4}[\cos 60° + 3(\cos 20 - \sin 10° - \sin 50)$

$+ \sin 30 + \sin 150]$

$= \frac{1}{4}\left[\frac{3}{2} + 3(\cos 20 - 2\sin 30° \cos 20)\right]$

$= \frac{3}{8} + 0 = \frac{a}{b}$

$b - a = 8 - 3 = 5$

56.

Ans. (2)

$\sum_{r=1}^{5} {}^{20}C_{2r-1} = k \Rightarrow {}^{20}C_1 + {}^{20}C_3 + {}^{20}C_5 + {}^{20}C_7 + {}^{20}C_9$

$\Rightarrow {}^{20}C_1 + {}^{20}C_3 + ... + {}^{20}C_9 = 2^{18}$

$k^6 = (2^{18})^6 \Rightarrow 2^{108} = 2^3[2^{105}]$

$= 8[2^{21\times 5}] = 8[32]^{21} = 8[33-1]^{21}$

$= 8[M(11) - 1] = 8M(11) - 8 = 8M(11) - 11 + 3$

$= (8M(11) - 11) + 3$

57.

Ans. (1)

Unit's place at $3^{4n} = 1$, $3^{4n+1} = 3$, $3^{4n+2} = 9$, $3^{4n+3} = 7$

Units place at $7^{4n} = 1$, $7^{4n+1} = 7$, $7^{4n+2} = 9$, $7^{4n+3} = 3$

We have 25 probability each for 4n, 4n + 1, 4n + 2, 4n + 3

Now, for digit equal to 8 at units place

$P = \frac{25 \times 25 + 25 \times 25}{100 \times 99} = \frac{1850}{9900} = \frac{37}{198}$

58.

Ans. (2)

$$S_n = \sum_{r=1}^{n} \frac{2r+1}{r^2(r+1)^2} = \sum_{r=1}^{n}\left(\frac{1}{r^2} - \frac{1}{(r+1)^2}\right)$$

$$S_{20} = \left(\frac{1}{1} - \frac{1}{2^2}\right) + \left(\frac{1}{2^2} - \frac{1}{3^2}\right) + ... \left(\frac{1}{20^2} - \frac{1}{21^2}\right)$$

$$S_{20} = 1 - \frac{1}{441} = \frac{440}{441}$$

So, $\sqrt{n+1} = \sqrt{441} = 21$

59.

Ans. (3)

$\angle PAD = 39° = \angle DBA$ (Alternate segments are asked)

BCD = 103°

$\angle BAD = 77°$

$\angle ADB = 180° - 77° - 39° = 64°$

60.

Ans. (4)

E _ _ E _ _ _

Total 4 posibilities and to arrange NWYRA we can arrange them in 5! ways

Total = 5! × 4 = 480

Answer = 480 – 1 = 479 (as rearrangements are asked)

61.

Ans. (3)

$D > 0$

For this maximum value of k = 6 = 2 × 3

So, number of divisors = (1 + 1)(1 + 1) = 4

So, number of proper divisors = 4 – 2 = 2

62.

Ans. (3)

We have, $\log\frac{dy}{dx} = 9x - 6y + 6$

$\Rightarrow \frac{dy}{dx} = e^{9x+6} \cdot e^{-6y}$

$\Rightarrow e^{6y}dy = e^{9x+6}dx$

Integrating, $\frac{e^{6y}}{6} = \frac{e^{9x+6}}{9} + c$

Putting x = 0, y = 1; we get

$\frac{e^6}{6} = \frac{e^6}{9} + c \Rightarrow c = \frac{e^6}{18}$

$\therefore$ Solution is $\frac{e^{6y}}{6} = \frac{e^{9x+6}}{9} + \frac{e^6}{18}$

$3e^{6y} = 2e^{9x+6} + e^6$

63.

Ans. (1)

If a line makes angle $\theta_1, \theta_2, \theta_3$ with the planes x=0, y = 0, z = 0 then

$\sin^2\theta_1 + \sin^2\theta_2 + \sin^2\theta_3 = 1$

Here, $\theta_1 = \theta_2 = a$

$\therefore\ 2\sin^2\alpha + \sin^2\theta_3 = 1$

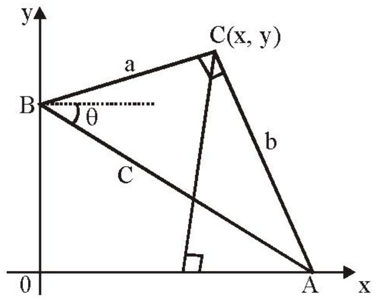
$1 - 2\sin^2\alpha = \sin^2\theta_3 \geq 0$

$\cos 2\alpha \geq 0$

$\Rightarrow 2\alpha \in \left[0, \frac{\pi}{2}\right] \Rightarrow \alpha \in \left[0, \frac{\pi}{4}\right]$

64.

Ans. (1)



$x = a\cos(B - \theta) = a\cos B\cos\theta + a\sin B\sin\theta$

$= \frac{a^2}{c}\cos\theta + \frac{ab}{c}\sin\theta = \frac{a}{c}(a\cos\theta + b\sin\theta)$

$y = b\sin(\theta + A) = b\sin\theta\cos A + b\cos\theta\sin A$

$= \frac{b^2}{c}\sin\theta + \frac{ab}{c}\cos\theta = \frac{b}{c}(b\sin\theta + a\cos\theta)$

$\therefore \frac{y}{x} = \frac{b}{a}$; straightl ine

65.

Ans. (2)

$\sqrt{3} = \left|(\vec{b} - \vec{a})\cdot\frac{(\vec{p}\times\vec{q})}{|\vec{p}\times\vec{q}|}\right|$

$\Rightarrow \sqrt{3} = |\vec{b} - \vec{a}|\cos 30° \Rightarrow |\vec{b} - \vec{a}| = AB = 2$

66.

Ans. (2)

Clearly, $\vec{r}\cdot\vec{a} = \beta[\vec{a}\ \ \vec{b}\ \ \vec{c}] = \frac{1}{8}\beta$

$\vec{r}\cdot\vec{a} = \beta[\vec{a}\ \ \vec{b}\ \ \vec{c}] = \frac{1}{8}\beta$

$\vec{r}\cdot\vec{b} = \gamma[\vec{a}\ \ \vec{b}\ \ \vec{c}] = \frac{1}{8}\gamma$

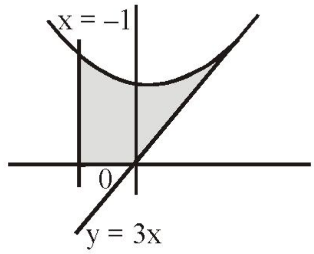
$\therefore \vec{r}\cdot(\vec{a} + \vec{b} + \vec{c}) = \frac{1}{8}(\alpha + \beta + \gamma)$

$\therefore \alpha + \beta + \gamma = 8\vec{r}\cdot(\vec{a} + \vec{b} + \vec{c})$

67.

Ans. (2)

Equation of tangent is y = 3x



$$A = \int_{-1}^{0}(x^2 + x + 1)dx + \int_{0}^{1}(x^2 + x + 1 - 3x)dx = \frac{7}{6}$$

68.

Ans. (1)

$N = k({}^nC_0 + {}^nC_1 + \ldots\ldots {}^nC_n) = k\cdot 2^n$

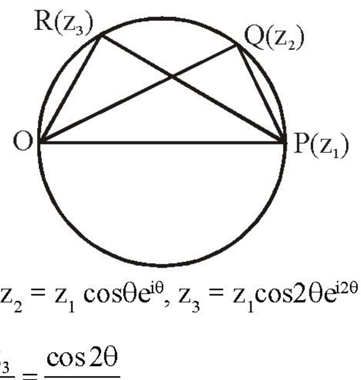
$\Sigma f_i x_i = k\cdot n(2)^{n-1}$

$\bar{x} = \frac{n\cdot 2^{n-1}}{2^n} = \frac{n}{2}$

69.

Ans. (1)

In terms of $\overline{OP}(z_1)$, z_2 & z_3 are easily obtainable by rotation about the point O.



Thus, $z_2 = z_1\cos\theta e^{i\theta}$, $z_3 = z_1\cos 2\theta e^{i2\theta}$

$\therefore \frac{z_1 z_3}{z_2^2} = \frac{\cos 2\theta}{\cos^2\theta}$

70.

Ans. (2)

$f(x) \cdot f'(-x) = f(-x) \cdot f'(x)$

$f'(x) \cdot f(-x) - f(x)f'(-x) = 0$

$\frac{d}{dx}(f(x)f(-x)) = 0$

$f(x) \cdot f(-x) = k$, given $(f(0))^2 = k$

Then $f(3) \cdot f(-3) = 9$

71.

Since $f^{-1}og^{-1}(x) = (gof)^{-1}(x)$

domain of $(gof)^{-1}(x)$ is range of gof(x) which is [–5, –2].

$\Rightarrow$ Number of integers are 4

72.

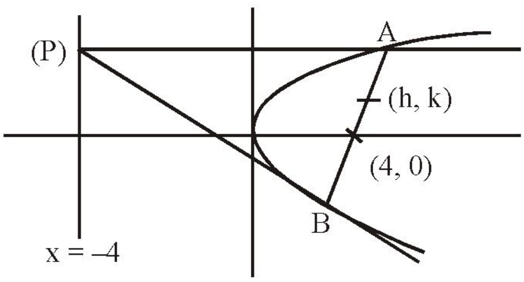
$AX = \lambda X \Rightarrow (A - \lambda I)X = O$

$$X \neq O \Rightarrow \begin{vmatrix} 4-\lambda & 6 & 6 \\ 1 & 3-\lambda & 2 \\ -1 & -5 & -2-\lambda \end{vmatrix} = 0$$

$\Rightarrow (\lambda - 1)(\lambda - 2)^2 = 0$

$\Rightarrow \lambda = 1, 2$

73.



Equation of AB

$T = S_1$

$yk - 8(x + h) = k^2 - 16h$

this chord passing through (4, 0)

$0 - 8(4 + h) = k^2 - 16h$

$y^2 = 8(x - 4)$

So, focus is (6, 0)

74.

Ans. (4)

$f(x) = 1 - \tan^{2n}x$

$f\left(\frac{\pi}{4}\right) = 0$

Now, $\left[\sec\left(0 + \frac{\pi}{4}\right)\right] = \left[\sqrt{2}\right] = 1$

75.

Ans. (3)

$$P_n = \cos\left(\frac{x}{2^1}\right)\cos\left(\frac{x}{2^2}\right)\cos\left(\frac{x}{2^3}\right).....\cos\left(\frac{x}{2^n}\right)$$

$$= \frac{\sin 2^n \cdot \left(\frac{x}{2^n}\right)}{2^n \sin\left(\frac{x}{2^n}\right)} = \frac{\sin x}{2^n \sin\left(\frac{x}{2^n}\right)}$$

$$g(x) = \lim_{x \to \infty} \frac{x \sin x}{(2^n)\sin\left(\frac{x}{2^n}\right)} = \sin x$$

In $[0, 4\pi]$ $\sin x = -1$ has two solutions