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ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) — path to success

CLASSROOM CONTACT PROGRAMME
(Academic Session : 2018 - 2019)

LEADER & ENTHUSIAST COURSE

TARGET : JEE (MAIN) 2019

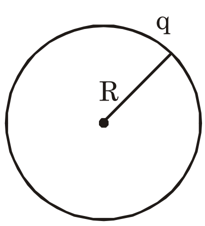
Test Type : **ALL INDIA OPEN TEST** Test Pattern : JEE-Main

TEST DATE : 23 - 12 - 2018

SOLUTION

1. Ans. (2)

Sol. $\int_0^U dU = \int V dq$



$= \int_0^Q \frac{kq}{R} dq = \frac{k}{R}\left[\frac{q^2}{2}\right]_0^Q$

$U = \frac{kQ^2}{2R}$

2. Ans. (3)

Sol. Considering gravity, buoyant force and viscouse force oscillation will be damped.

$\Omega_1^2 = \omega_2^2 - C$, ω_2 is natural frequency.

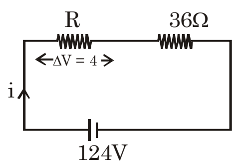
$\Rightarrow T_1 > T_2$ C is a constant.

3. Ans. (2)

Sol. $R_{cron} = \frac{v^2}{P} = \frac{120 \times 120}{400}$

$R_{iron} = 36\ \Omega$

Let resistance of wire is R.



$iR = 4$

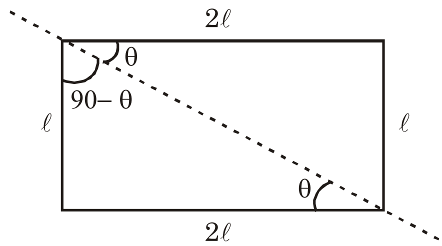
$\frac{124}{36 + R}.R = 4$

$31R = 36 + R$

$R = \frac{36}{30} = 1.2\Omega$

4. Ans. (2)

Sol.



$\tan\theta = \frac{1}{2}$ $\lambda = \frac{m}{6\ell} kg/m$

$I = \left\{\frac{(4\ell \sin\theta)^2}{12} \times \frac{4m}{6}\right\} + \left\{\frac{(2\ell \cos\theta)^2}{12}\frac{2m}{6}\right\}$

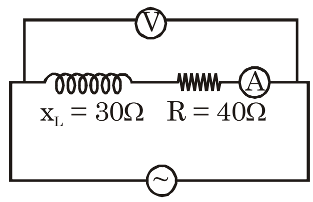
$= \frac{m}{18} 16\ell^2 \sin^2\theta + \frac{m}{36}.4\ell^2 \cos^2\theta$

$= \frac{2m\ell^2}{9}$

5. Ans. (2)

6. Ans. (4)

Sol.



$P = V_{rms} . I_{rms} \cos\phi$

$= I^2_{rms}. Z \cos\phi$

$= 1 \times 50 \times \frac{4}{5} = 40$ W

7. Ans. (1)

Sol. $\frac{1}{\lambda} = Rz^2\left[\frac{1}{3^2} - \frac{1}{4^2}\right]$

$\lambda = \frac{144}{7R} = 18.70 \times 10^{-7}$ m

8. Ans. (2)

Sol. Perimeter = 2 (ℓ + b)

$= 2(45.1 + 2.32) = 2 \times 47.4 = 94.8$ cm

9. Ans. (4)

Sol. $v = \sqrt{Rg\tan\theta}$

$\Rightarrow (15)^2 = R \times 10 \times \frac{3}{4}$

$R = \frac{15\times15\times4}{3\times10}$

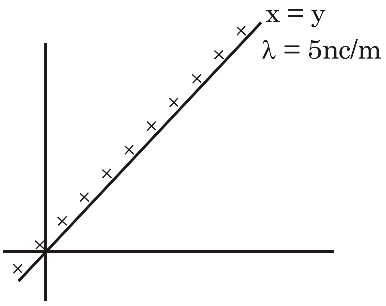
R = 30 m

10. Ans. (3)

Sol. $T = 2\pi\sqrt{\frac{L}{g}} \approx 2\text{sec}$

11. Ans. (1)

Sol.



$\vec{E} = \frac{2k\lambda}{r}.\hat{r}$

$\vec{E} = \frac{2\times5\times10^{-9}}{4\pi\in_0 .4}\hat{k}$

$\vec{E} = 22.5\hat{k}$

12. Ans. (1)

Sol. $\eta = 1 - \frac{T_L}{T_H}$

$\frac{1}{2} = 1 - \frac{T_L}{T_H}$

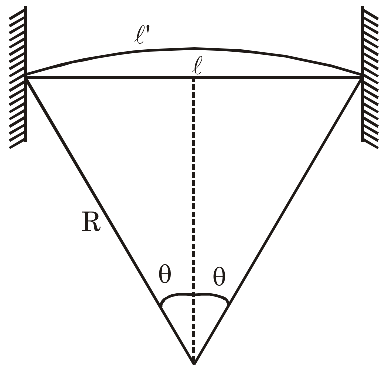
$\Rightarrow T_H = 2T_L$

$\Delta U = -nC_V\Delta T$ ($\because$ temprature decreases)

$= 3 \times \frac{3R}{2} \times T_L$

13. Ans. (3)

Sol.



$\ell' = R \times 2\theta$

$\frac{\ell}{2} = R\sin\theta$

$\frac{\ell}{2} = R\left[\theta - \frac{\theta^3}{6}\right]$

$\frac{\ell}{2} = R\theta\left[1 - \frac{\theta^2}{6}\right]$

$\frac{\ell}{2} = \frac{\ell'}{2}\left[1 - \frac{\theta^2}{6}\right]$

$\ell = \ell(1+\alpha\Delta T)\left[1 - \frac{\theta^2}{6}\right]$

$\frac{1}{1+\alpha\Delta T} = 1 - \frac{\theta^2}{6}$

$\Rightarrow 1 - \alpha\delta T = 1 - \frac{\theta^2}{6}$

$\Rightarrow \theta = \sqrt{6\alpha\Delta T}$

Now $\frac{\ell}{2} = R\theta\left[1 - \frac{\theta^2}{6}\right]$

$\frac{\ell}{2\sqrt{6\times\Delta T}} = R\left[1 - \frac{6\alpha\Delta T}{6}\right]$

$\Rightarrow R = \frac{\ell}{2\sqrt{6\alpha\Delta T}}$ as $1 >> \alpha\Delta T$

14. Ans. (4)

Sol. During combination of electron and hole in P-N junction +ve ion form in n-side & –ve ion form P-side.

15. Ans. (4)

Sol. $\beta = \frac{I_C}{I_b}$ $\frac{V_{out}}{V_{in}} = \frac{I_C.R_{out}}{I_bR_{in}} = 1V$

Input & output are out of phase in CE.

16. Ans. (1)

Sol. $\because \lambda_d = \frac{h}{P} = \frac{h}{mv_{rms}}$

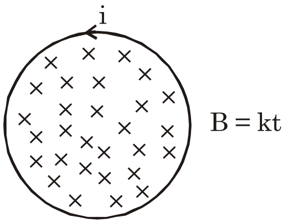
$\therefore \quad \lambda_d \propto \frac{1}{\sqrt{T}}$

$\because \quad T \propto \frac{1}{\lambda}$

$\lambda_d \propto \sqrt{\lambda}$

17. Ans. (2)

Sol.



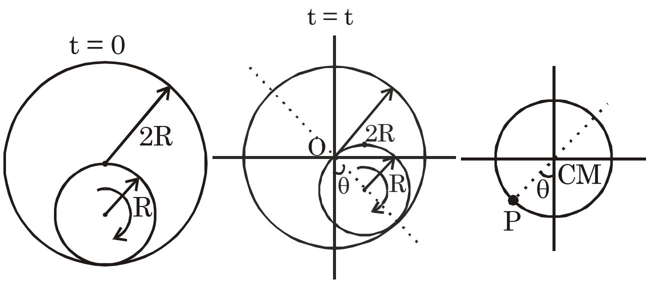
$\phi = kt\ \pi R^2$

$\frac{d\phi}{dt} = k\pi R^2 = \text{constant}$

current is constant
flux increasing hence
current P induced to decrease the flux hence anticlockwise.

18. Ans. (3)

Sol.



$\vec{r}_{cm} = -R\cos\theta\hat{j} + R\sin\theta\hat{i}$

$\vec{r}_{P,cm} = -R\cos\theta\hat{j} - R\sin\theta\hat{i}$

$\vec{r}_{P,cm} = \vec{r}_P - \vec{r}_{cm}\ ,\ \vec{r}_P = \vec{r}_{P,cm} + \vec{r}_{cm}$

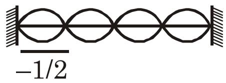
$\vec{r}_P = -2R\cos\theta\hat{j}$

$\Rightarrow y = 2R\cos\omega t$

Hence path is straight line.

19. Ans. (2)

Sol.



3rd overtone, 4th harmonic

T = 10 N

m = 1 gm L = 4 m

$v = \sqrt{\frac{T}{\mu}} = 200 m/s$

$4 \times \frac{\lambda}{2} = 4$

$\lambda = 2m$

$n = \frac{200}{2} = 100Hz$

20. Ans. (4)

Sol. $v_{rms} = \sqrt{\frac{3RT}{M}}$, $v_{rms} > v_{av} > v_{mp}$

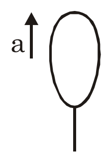
$V_{mps} = \sqrt{\frac{2RT}{M}}$

$V_{av} = \sqrt{\frac{8RT}{\pi M}}$

21. Ans. (4)

Sol. $v = 20\ m^3$

$s = \frac{1}{2}at^2$



$180 = \frac{1}{2}a \times 900$

$a = \frac{360}{900} = 0.4 m/s^2$

$M_{HC} = 0.18 \times 20 = 3.6$ kg

$B = e_{adv}vg = 1.29 \times 20 \times 10 = 258$ N

Let mass of payload M.

$B = M(a + g)$

$258 = (3.6 + 12 + m)70.4$

$m = 24.8 - 15.6$

$= 9.2$ kg

22. Ans. (1)

Sol. $v_b = 200$ m/s

$\Delta K_{loss} = -\frac{1}{2}m\left(v_f^2 - v_i^2\right) = -\frac{1}{2}m\left(60^2 - 100^2\right)$

$ms\Delta T = 0.4 \times \frac{1}{2}m\left(160 \times 40\right)$

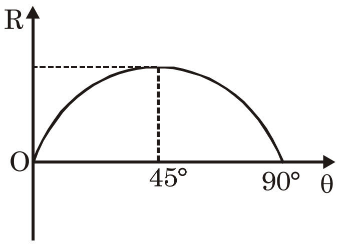
$\Delta T = \frac{0.2}{125} \times 160 \times 40$

$\Delta T = 10.2$ °C

23. Ans. (3)

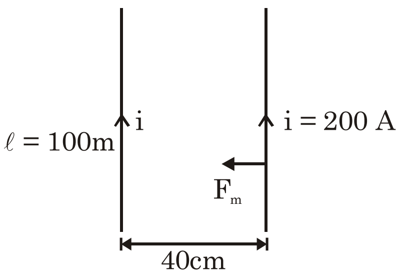
Sol. $R = \frac{u^2 \sin 2\theta}{g}$

$R \propto \sin 2\theta$



24. Ans. (2)

Sol.

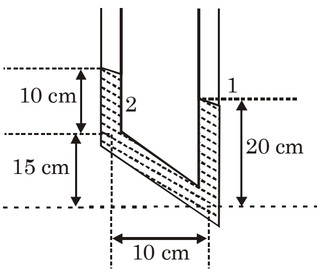


$F = \frac{\mu_0 i_1 i_2 \ell}{2\pi d} = \frac{2 \times 10^{-7} \times 4 \times 10^4 \times 1 \times 10^2}{4 \times 10^{-1}}$

= 2N Attractive

25. Ans. (1)

Sol.

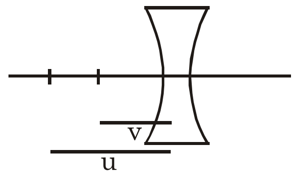


$\rho a \ell = \rho g h$

$a = \frac{gh}{\ell} = \frac{10 \times 5}{10} = 5$ m/s²

26. Ans. (3)

Sol.



m = 0.6

$\frac{v}{u} = 0.6$

$v = 0.6\,u \quad v = \frac{6}{4} = \frac{3}{2}$

$u - v = 1$m

$0.4\,v = 1$

$u = \frac{10}{4} = 2.5$ m $v = 1.5$

$f = \left(\frac{uv}{u-v}\right) = \frac{-2.5 \times 1.5}{1} = -3.75$ m

27. Ans. (4)

Sol. $B = 128\,\pi \times 10^{-4}$

R = 2cm

$\frac{mv}{eB} = r \quad P = eBr$

$ev = \frac{1}{2}mv^2$

$ev = \frac{P^2}{2m}$

$2evm = e^2B^2r^2$

$v = \frac{e^2B^2r^2}{2em}$

$v = \frac{eB^2r^2}{2m} = 57.6$ kV

28. Ans. (3)

29. Ans. (1)

30. Ans. (3)

31. Ans.(2)

32. Ans.(3)

33. Ans.(3)

34. Ans.(1)

35. Ans.(1)

36. Ans.(2)

37. Ans.(3)

38. **Ans.(2)**

39. **Ans.(3)**

40. **Ans.(2)**

41. **Ans. (1)**

42. **Ans.(3)**

43. **Ans.(2)**

44. **Ans.(1)**

45. **Ans.(1)**

46. **Ans.(2)**

47. **Ans.(3)**

48. **Ans.(3)**

49. **Ans.(1)**

50. **Ans.(3)**

51. **Ans.(2)**

52. **Ans.(1)**

53. **Ans.(2)**

54. **Ans.(3)**

55. **Ans.(2)**

56. **Ans.(1)**

57. **Ans.(4)**

58. **Ans.(4)**

59. **Ans.(3)**

60. **Ans.(3)**

61. **Ans. (2)**

Dividing Nr. and Dr. by $\cos^4 x$ in integrand

$$\int \frac{(2\tan x+1)\sec^2 x dx}{(\tan^2 x+\tan x)^2+1}$$

Put $\tan^2 x + \tan x = \alpha$

So, $\int \frac{d\alpha}{\alpha^2+1} = \tan^{-1}\alpha + c$

$= \tan^{-1}(\tan^2 x + \tan x) + c$

62. **Ans. (1)**

Ellipse $\frac{x^2}{b^2}+\frac{y^2}{2b^2}=1$

Line $y = \alpha x + \beta$

for tangent $b^2 = b^2\alpha^2 + 2b^2$

$\Rightarrow \quad -\alpha^2+\frac{\beta^2}{2b^2}=1$

$\therefore$ Locus $\frac{y^2}{2b^2}-x^2=1$

63. **Ans. (2)**

Point in second quadrant with given constraint is $(-\alpha, 2\alpha)$, $\alpha > 0$

This satisfies both the lines.

$\Rightarrow \quad -6a\alpha + 4a\alpha + c = 0 \Rightarrow \alpha = \frac{c}{2a}$

and $-5b\alpha+6b\alpha+d=0 \Rightarrow \alpha=-\frac{d}{b}$

$\Rightarrow \quad \frac{c}{2a}=-\frac{d}{b} \Rightarrow bc+2ad=0$

64. **Ans. (2)**

$\vec{r}=\lambda\left(\vec{b}\times(\vec{a}\times\vec{b})\right)=\lambda\left((\vec{b}.\vec{b})\vec{a}-(\vec{b}.\vec{a})\vec{b}\right)$

$=\lambda\left(5\vec{a}+\vec{b}\right)=\lambda\left(-3\hat{i}+5\hat{j}+6\hat{k}\right)$

Also, $\vec{r}.\vec{a}=7 \Rightarrow \lambda(3+5+6)=7$

$\Rightarrow \quad \lambda=\frac{1}{2} \Rightarrow \vec{r}=\frac{(-3\hat{i}+5\hat{j}+6\hat{k})}{2}$

65. **Ans. (3)**

$x^2 + 2x\text{cosec}\theta + 1 = 0$

$x=-\text{cosec}\theta \pm \sqrt{\text{cosec}^2\theta-1}$

$= -\text{cosec}\theta + \cot\theta, -\text{cosec}\theta - \cot\theta$

for $\theta \in \left(-\frac{\pi}{4},-\frac{\pi}{6}\right)$

$\Rightarrow \quad \alpha_1=-\text{cosec}\theta+\cot\theta, \beta_1=-\text{cosec}\theta-\cot\theta$

$x^2 + 2x\cot\theta - 1 = 0$

$\Rightarrow \quad x=-\cot\theta+\text{cosec}\theta, -\cot\theta-\text{cosec}\theta$

$\Rightarrow$

$\alpha_2=-\cot\theta-\text{cosec}\theta, \beta_2=-\cot\theta+\text{cosec}\theta$

$\Rightarrow \quad \alpha_1+\beta_2=0$

66. **Ans. (4)**

$x-[x]+\frac{1}{4}=\frac{1}{4}$

$x-[x]=0$

$x = [x] \quad \Rightarrow \quad x$ is an integer.

67. **Ans. (2)**

$A_1 = {}^{35}C_0.{}^{45}C_1 - {}^{35}C_1.{}^{45}C_0 = 0$

$A_2 = {}^{35}C_0.{}^{45}C_2 - {}^{35}C_1.{}^{45}C_1 + {}^{35}C_2.{}^{45}C_0 = 10 = A_1$

68. Ans. (3)

Let numbers a – d, a, a + d

given a – d + a + a + d = 18 $\Rightarrow$ a = 6

New numbers 6 – d + 6, $6+\frac{9}{2}$, 6 + d + 3

$$\left(6+\frac{9}{2}\right)^2=(12-d)(9+d)$$

$$\frac{441}{4}=108+3d-d^2$$

$\Rightarrow$ $4d^2 - 12d + 9 = 0$

$\Rightarrow$ $(2d-3)^2=0\Rightarrow d=\frac{3}{2}$

Numbers : $\frac{9}{2},6,\frac{15}{2}$

Sum of squares $\left(\frac{9}{2}\right)^2+(6)^2+\left(\frac{15}{2}\right)^2=\frac{225}{2}$

69. Ans. (4)

Consider x_i = 1, 2, ..., 10

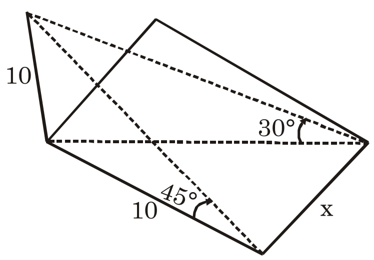
So, given obersevations are $y_i = 100x_i + 11$.

Hence $\sigma(y_i) = 100\sigma(x_i)$

Now, $\sigma(x_i)=\sqrt{\frac{10\times11\times21}{6\times10}-\left(\frac{10\times11}{2\times10}\right)^2}=\frac{\sqrt{33}}{2}$

So, $\sigma(y_i)=50\sqrt{33}$

70. Ans. (1)



$$\frac{10}{\sqrt{10^2+x^2}}=\tan30°$$

$\Rightarrow$ $3\times100 = 100 + x^2$

$\Rightarrow$ $x=10\sqrt{2}$

So area = $100\sqrt{2}\ m^2$

71. Ans. (2)

2^9 – (1 + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9)

= 512 – 46 = 466

72. Ans. (2)

Required number of ways

$= {}^{10}C_3\times{}^{7}C_3+{}^{10}C_4\times{}^{7}C_2-({}^{10}C_3\times{}^{5}C_1+{}^{10}C_4)$

= 7800

73. Ans. (2)

$$u=\frac{ds}{dt}=\frac{1}{2\sqrt{1+t}}$$

$$a=\frac{d^2s}{dt^2}=\frac{1}{2}.-\frac{1}{2}(1+t)^{-3/2}$$

$$a=-\frac{1}{4}\frac{1}{\left(\sqrt{1+t}\right)^3}$$

$$a=-\frac{1}{4}(2u)^3$$

$a = -2u^3$ $\Rightarrow$ $a\propto u^3$

74. Ans. (2)

$$\frac{1-\cos(1-\cos2x)}{x^4}=\lim_{x\to0}\frac{1-\cos(2\sin^2x)}{4\sin^4x}.\frac{4\sin^4x}{x^4}$$

$$=\frac{1}{2}.4=2$$

75. Ans. (1)

$$I=\int_0^2\frac{dx}{2^{2x}+4}\qquad ......(1)$$

apply $\int_a^b f(x)dx=\int_a^b f(a+b-x)dx$

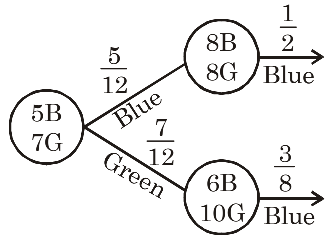
$$I=\int_0^2\frac{dx}{4^{2-x}+4}=\int_0^2\frac{4^x}{4^2+4.4^x}$$

$$=\int\frac{4^x}{4(4^x+4^1)}dx\qquad ......(2)$$

On (1) + (2)

$$2I=\int_0^2\left(\frac{1}{4^x+4^1}+\frac{4^x}{4(4^x+4^1)}\right)dx=\frac{1}{2}\Rightarrow I=\frac{1}{4}$$

76. Ans. (4)



$$P(B)=\frac{5}{12}.\frac{1}{2}+\frac{7}{12}.\frac{3}{8}=\frac{41}{96}$$

77. Ans. (1)

Let's shift one of the end of line segment at the origin and make it vector.

So, $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$

So, its length of projection on x – y plane

$= \sqrt{x^2 + y^2} = 1$ ......(i)

Similarly, $\sqrt{z^2 + y^2} = 2$ ......(ii)

$\sqrt{z^2 + x^2} = 2$ ......(iii)

$(i)^2 + (ii)^2 + (iii)^2$

$x^2 + y^2 + z^2 = \frac{9}{2}$

$\Rightarrow \sqrt{x^2 + y^2 + z^2} = \frac{3}{\sqrt{2}} = |\vec{r}|$

78. Ans. (3)

tanA tanC = 3

and tanB tanC = 6

$\frac{\tan A}{\tan B} = \frac{1}{2}$ Let $\tan A = \alpha$, $\tan B = 2\alpha$, $\tan C = \frac{3}{\alpha}$

$\therefore$ tanA + tanB + tanC = tanA tanB tanC

$\alpha + 2\alpha + \frac{3}{\alpha} = 6\alpha$

$\alpha.2\alpha.\frac{3}{\alpha}$

$\Rightarrow 3\alpha + \frac{3}{\alpha} = 6\alpha \Rightarrow \frac{3}{\alpha} = 3\alpha$

$\Rightarrow \alpha = 1$

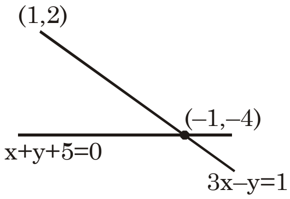
tanA = 1, tanB = 2, tanC = 3

79. Ans. (2)

Distance

$= \sqrt{(1+1)^2 + (2+4)^2}$

$= \sqrt{4+36} = 2\sqrt{10}$



80. Ans. (4)

$A = (1^3 + 2^3 + 3^3 + ... + 20^3) + (2^3 + 4^3 + ... + 20^3)$

$= 1^3 + 2^2 + ... + 20^3 + 8(1^3 + 2^3 + ... + 10^3)$

Similarly,

$B = 1^3 + 2^3 + ... + 40^3 + 8(1^3 + 2^3 + ... 20^3)$

So, $B - 2A = 6(1^3 + 2^3 + ... + 20^3) + (1^3 + 2^3 + ... + 40^3) - 16(1^3 + 2^3 + 10^3)$

$= 6 \times \left(\frac{20 \times 21}{2}\right)^2 + \left(\frac{40 \times 41}{2}\right)^2 - 16\left(\frac{10 \times 11}{2}\right)^2$

$= 6 \times (210)^2 + (20 \times 41)^2 - 16 \times 55^2$

$= (210)^2 \times 6 + 1040 \times 600 = 600(441 + 1040)$

So, $\lambda = 1481$

81. Ans. (3)

$\sin(3x - 4x^2) = \pi - 3\sin^{-1}x$, (if $\frac{1}{2} < x < 1$)

$\lim_{x \to \frac{1}{2}^+} f(3x - 4x^3) = \lim_{x \to \frac{1}{2}^+} (\pi - 3\sin^{-1} x)$

$= \pi - 3\lim_{x \to \frac{1}{2}^+} \sin^{-1} x$

$a = \pi$

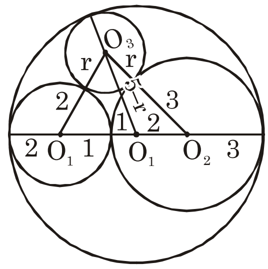
$[a] = 3$

82. Ans. (1)

For diagram we get

$(r + 2)^2.2 + (r + 3)^2.3$

$= 2.3^2 + 3.2^2 + 5(5 - r)^2$



$\Rightarrow 76r = 120$

$\Rightarrow r = \frac{120}{76}$

$\Rightarrow r = \frac{30}{19}$

83. Ans. (3)

$f(x) = (x - 1)|x - 1|\,|x - 2| + \sin|x - 1|$

At x = 1, $(x-1)|x-1|\,|x-2|$ is differentiable while $\sin|x - 1|$ is non-differentiable.

So, $f(x)$ is non-differentiable at x = 1.

Similarly, at x = 2, the former is non-differentiable while the later is differentiable.

So $f(x)$ is non-differentiable at x = 2.

At all other points $f(x)$ is differentiable.

So, $n(\bar{A}) = 2$

84. Ans. (2)

$$1 - A = \begin{bmatrix} 0 & -2 \\ -1 & 0 \end{bmatrix}$$

$$2I + A = \begin{bmatrix} 2 & 2 \\ 1 & 2 \end{bmatrix}$$

$$|I - A| = -2$$

$$\text{adj}(I - A) = \begin{bmatrix} 0 & 2 \\ 1 & 0 \end{bmatrix}$$

$$(I - A)^{-1} = \begin{bmatrix} 0 & -1 \\ -\frac{1}{2} & 0 \end{bmatrix}$$

$$\phi(A) = \begin{bmatrix} 2 & 2 \\ 1 & 2 \end{bmatrix}\begin{bmatrix} 0 & -1 \\ -\frac{1}{2} & 0 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & -2 \\ -1 & -1 \end{bmatrix} = -A$$

85. Ans. (3)

Use : $\sim(A \to B) = A \cap (\sim B)$

Now replace A by P and B by ~q

$\sim (p \to \sim q) = p \wedge (q)$

86. Ans. (1)

$P = \{(a, b) \in R \times R : |a - 5| < 1, |b - 5| < 1\}$

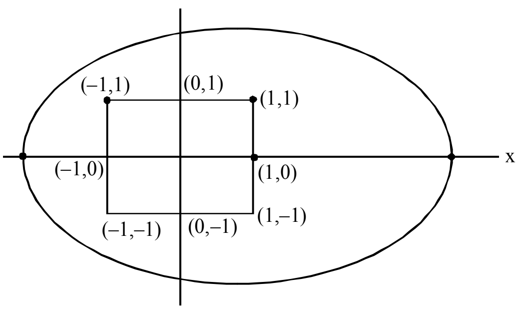
Let $a - 5 = x$, $b - 5 = y$

Set A contains all points inside $|x| < 1$, $|y| < 1$

$Q = \{(a, b) \in R \times R : 4(a - 6)^2 + 9(b - 5)^2 = 36\}$

Set Q contains all points on

$$\frac{(x-1)^2}{9} + \frac{y^2}{4} = 1$$



There is no common point.

87. Ans. (2)

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

88. Ans. (1)

$$\frac{dy}{dx} + \left(\frac{-x}{1-x^2}\right)y = \frac{1}{1-x^2}$$

So, $\text{I.F.} = e^{-\int \frac{xdx}{1-x^2}} = \sqrt{1-x^2}$

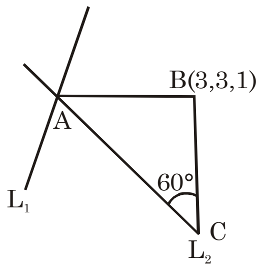
Hence, $y\sqrt{1-x^2} = \int \frac{dx}{\sqrt{1-x^2}} + C$

$\Rightarrow \quad y = (\sin^{-1}x + C)/\sqrt{1-x^2}$

Now, c = 0 as y(0) = 0

$\therefore \quad y = \frac{\sin^{-1}x}{\sqrt{1-x^2}}$

89. Ans. (3)



$\vec{r} = (111) + \lambda(110)$

$r = (1, 1, 1) + \mu(0, 1, 1)$

int pt. $A \equiv (1, 1, 1)$

Let c be $(1, 1 + \mu, 1 + \mu)$

$\overline{AC} = 011$

$\overline{BC} = 2, 2 - \mu, -\mu$

$$AC \wedge BC = 60° \Rightarrow \frac{0 + 2 - \mu - \mu}{\sqrt{2}\sqrt{4 + (2-\mu)^2 + \mu^2}} = \frac{1}{2}$$

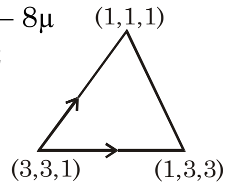
$(4 + 4\mu)^2 = 2(4 + 4 + \mu^2 - 4\mu + \mu^2)$

$16(1 + \mu^2 - 2\mu) = 16 + 4\mu^2 - 8\mu$

$12\mu^2 - 24\mu \Rightarrow \mu = 0, \mu = 2$

$\mu = 0, \qquad \mu = 2$

C(1, 1, 1) $\qquad$ (1, 3, 3)



$$\frac{1}{2}\begin{vmatrix} i & j & k \\ -2 & 0 & 2 \\ -2 & -2 & 0 \end{vmatrix} = \frac{1}{2}\{i(4) - j(4) + k(4)\}$$

$$|2\hat{i} - 2\hat{j} + 2\hat{k}| = 2\sqrt{3} = a\sqrt{b}$$

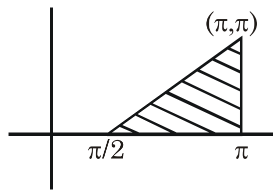
a = 2, b = 3

90. Ans. (3)

$$y = \left|\frac{\pi}{2} - \sin^{-1}(\sin x)\right| + \left|\frac{\pi}{2} - \cos^{-1}(\cos x)\right|$$

$$y = \left|\frac{\pi}{2} - (\pi - x)\right| + \left|\frac{\pi}{2} - x\right|$$

$$y = \left|x - \frac{\pi}{2}\right| + \left|\frac{\pi}{2} - x\right| = 2x - \pi \ \forall x \in \left[\frac{\pi}{2}, \pi\right]$$



Area $= \frac{1}{2}\left(\frac{\pi}{2}\right)\pi = \frac{\pi^2}{4}$