ALLEN CAREER INSTITUTE
KOTA (RAJASTHAN)
Path to Success

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CLASSROOM CONTACT PROGRAMME
(ACADEMIC SESSION 2014-2015)

TARGET : JEE (Main) 2015

LEADER & ENTHUSIAST COURSE : SCORE

ALLEN JEE (Main) TEST

DATE : 27 - 03 - 2015

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A.	1	1	2	2	3	1	3	3	3	1	3	3	1	3	4	1	1	2	1	3
Q.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A.	2	4	1	1	2	1	1	3	4	2	2	4	3	4	3	3	3	4	1	3
Q.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
A.	3	2	3	4	2	3	4	3	4	3	4	3	3	3	2	1	2	2	2	1
Q.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
A.	2	2	2	2	4	4	1	3	4	3	2	2	3	4	3	4	4	1	2	4
Q.	81	82	83	84	85	86	87	88	89	90										
A.	4	2	2	2	3	3	3	3	4	3										

SOLUTION

1. Ans. (1)

2. Ans. (1)

3. Ans. (2)

Sol. Energy = $\frac{1}{2}\epsilon_0 E^2(\text{volume})$

$8.85 \times 10^{-6} = \frac{1}{2}\times 8.85\times 10^{-12} E^2 (10^{-6})$

$E = \sqrt{2}\times 10^6 \text{ V/m}$

flux (ϕ) = EA

$= \sqrt{2}\times 10^{+6}\times 10^{-4} = 100\sqrt{2}\,(\text{V}-\text{m})$

4. Ans. (2)

Sol. In steady state, as asbestos is a poor conductor of heat than air, temperature of rod (1) will be higher.

Also as temperature of rod (1) is high

$\Rightarrow r\downarrow \Rightarrow \frac{v^2}{r}\uparrow$

5. Ans. (3)

Sol. Output equation $y = \overline{\overline{\overline{A}+\overline{B}}} = \overline{A.B}$

6. Ans. (1)

7. Ans. (3)

8. Ans. (3)

Sol. Refer page 197; 2nd paragraph (NCERT Class XI Part 1)

9 Ans. (3)

Sol. at t = 0 'L' behaves as open circuit and at t = ∞ as short circuit

10. Ans. (1)

Sol. $V_{eq} = \sqrt{V_0^2 + \left(\frac{V_0}{2}\right)^2}$

$R_{eq} = \sqrt{(\omega L)^2 + R^2}$

11. Ans. (3)

Sol. Given $\frac{N_0\;\; 1-2^{-2/t_{1/2}}}{N_0\;\; 1-2^{-4/t_{1/2}}} \quad \frac{n}{0.25\;\; 1\; n}$

{No. of β-particles emitted = No. of nuclei decayed} $\Rightarrow t_{1/2}\quad 1$ sec

12. Ans. (3)

Sol. $\lambda_\alpha = \frac{1}{1620}$ per year and $\lambda_\beta = \frac{1}{405}$ per year and it is given that the fraction of the remained activity $\frac{A}{A_0} = \frac{1}{4}$

Total decay constant

$\lambda = \lambda_\alpha + \lambda_\beta = \frac{1}{1620} + \frac{1}{405} = \frac{1}{324}$ per year

We know that $A = A_0 e^{-\lambda t} \Rightarrow t = \frac{1}{\lambda}\log_e \frac{A_0}{A}$

$\Rightarrow t = \frac{1}{\lambda}\log_e 4 = \frac{2}{\lambda}\log_e 2$

$= 324 \times 2 \times 0.693 = 449$ years

13. Ans. (1)

Sol. Object is placed at centre of curvature.

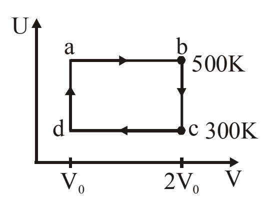
Image after reflection from mirror will form on object itself.

Hence O & image will form at same point after refraction from plane surface. so distance is zero

14. Ans. (3)

15. Ans. (4)

Sol.



Given an ideal gas whose n = 2.0 moles

In the cyclic proces ΔU = 0

Here Q = ΔU + W. As ΔU = 0,

the amount of heat absorbed,

$Q = W = W_{ab} + W_{cd}$

$= \mu R T_1 \ell n\left(\frac{2V_0}{V_0}\right) + \mu R T_2 \ell n\left(\frac{V_0}{2V_0}\right)$

$= 2 \times 8.3 \times 0.69(500 - 300) = 2291$ J

16. Ans. (1)

17. Ans. (1)

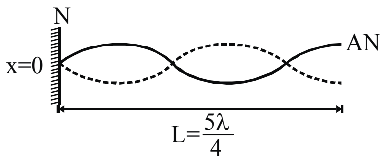
Sol. $T = 2\pi\sqrt{\frac{m}{k_{eq}}}$

$F_{net} = -(4k)(4x) = -16kx$

$\Rightarrow k_{eq} = 16K$

18. Ans. (2)

Sol.



Second overtone ⇒5th harmonic

So, $\lambda = \frac{4L}{5} = 8 \text{ cm}$

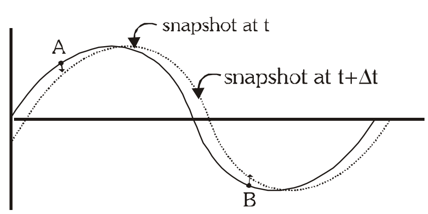
$A_S = (2\text{mm}) \sin(kx) = (2\text{mm}) \sin\left(\frac{2\pi}{\lambda}x\right)$

$= (2\text{mm}) \sin\left(\frac{2\pi}{8 \text{ cm}} \times 1 \text{ cm}\right)$

$= (2\text{mm}) \sin\left(\frac{\pi}{4}\right) = \sqrt{2} \text{ mm}$

19. Ans. (1)

$v_{Particle} = -(\text{slope})(v_{wave})$



At A : slope → +ve so v_P is –ve.

OR

At B : slope → –ve so v_P is +ve.

20. Ans. (3)

Sol. Approaching source $n' = n\left[\frac{V}{V - V_S}\right]$ constant

Receading source $n' = \left[\frac{V}{V + V_S}\right]$ constant.

21. Ans. (2)

Sol. $4mg - 4T = 4ma$, $T - \mu mg = m(4a)$

22. Ans. (4)

Sol. $\frac{mv^2}{R} = \mu mg$; $v = \sqrt{\mu Rg}$ $\therefore t = \sqrt{\frac{2h}{g}}$

Horizontal distance = vt = $\sqrt{2\mu Rh}$

23. Ans. (1)

Sol. The force exerted by ground on the block

$= \sqrt{N^2 \quad f^2}$

$= \sqrt{Mg^{\ 2} \quad \left[\left(\frac{4}{5}\right) 3Mg\right]^2} \quad \frac{13}{5}Mg \quad 2.6Mg$

24. Ans. (1)

25. Ans. (2)

26. Ans. (1)

Sol. U_1 will be positive and greatest since all forces among dipoles are repulsive. U_2 is negative as potential energy of first & second dipole pair cancels out potential energy of second and third pair, leaving only potential energy of interaction of first and third, that is negative. In (3), effect of attraction is greatest.

27. Ans. (1)

Sol. In uniform field net force is zero.

28. Ans. (3)

Sol. $I = \frac{BV\ell}{15}$

$I_1 = I_2 = \frac{I}{2}$

29. Ans. (4)

Sol. From Snell's law : initially $\mu \sin\theta_c = 1 \sin 90°$

After slab : $\mu \sin\theta_c = \mu_1 \sin r_1 = 1 \sin 90°$

so whatever be the value of μ.

30. Ans. (2)

31. Ans. (2)

32. Ans. (4)

33. Ans. (3)

$0.5 = 1.86 \times \frac{36}{180} \times \frac{1000}{W}$

W = 744 gm water i.e. mass of ice = 256 gm

34. Ans. (4)

Solubility of MX = $(4 \times 10^{-10})^{1/2}$

$MX_3 : K_{sp} = 27s^4$

$= 27(2 \times 10^{-5})^4$

$= 4.32 \times 10^{-18}$

35. Ans. (3)

$$E = -0.0591\ a \log\left(\frac{x_1}{x_2}\right)\left(\frac{P_2}{P_1}\right)^{1/2}$$

36. Ans. (3)

37. Ans. (3)

$$P.E. = -\frac{KZe^2}{r} = \frac{-1}{4\pi\epsilon_0}\times\frac{2e^2}{r} = -\frac{e^2}{2\pi\epsilon_0 r}$$

38. Ans. (4)

(1) $V_C = 3 \times b$

$= 3 \times 4 \times N_A \times$ volume of single molecule

volume of single molecule $= \dfrac{V_C}{12 \times N_A}$

(2) $b = \dfrac{V_C}{3} = \dfrac{0.123}{3}$

(3) $T_B = \dfrac{a}{Rb} \Rightarrow T_B > T_C$

(4) Above T_C (Critical tempurature) gas cannot be liquified

39. Ans.(1)

$$T_2 = T_1\left(\frac{V_1}{V_2}\right)^{\gamma-1} = 300 \times \left(\frac{1}{8}\right)^{4/3-1}$$

$$= 300 \times \left(\frac{1}{8}\right)^{1/3} = 150\ K$$

$w = nC_v\,(T_2 - T_1)$

$= 1 \times 3 \times 2\ (150 - 300) = -900$ cal.

40. Ans. (3)

Oxidation half reaction :

$2I^- \rightarrow I_2 + 2e^-$ ...... (1)

Reduction half reaction

$6H^+ + ClO_3^- + 6e^- \rightarrow Cl^- + 3H_2O$ ....(2)

Multiplying equation (1) by 3 and add in (2)

$6I^- + ClO_3^- + 6H^+ \rightarrow Cl^- + 3I_2 + 3H_2O$

$6I^- + ClO_3^- + 6H_2SO_4 \rightarrow Cl^- + 3I_2 + 3H_2O + 6HSO_4^-$

41. Ans. (3)

42. Ans. (2)

43. Ans. (3)

44. Ans. (4)

45. Ans. (2)

46. Ans. (3)

47. Ans. (4)

48. Ans. (3)

49. Ans. (4)

50. Ans. (3)

51. Ans. (4)

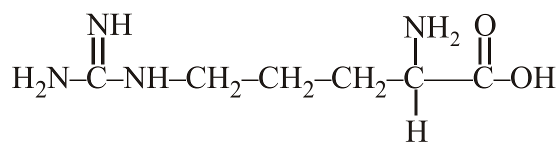
σ-complex of p-attack to —$\ddot{N}$H— is most stable

52. Ans. (3)

Anomeric –OH is not present in sucrose

53. Ans. (3)

Arginine is basic amino acid



54. Ans. (3)

Sec. amino do not give iso-cyanide test

55. Ans. (2)

(2s, 3s) - 2,3-dichloro butane is Dys-Symmetric

56. Ans. (1)

p-nitro phenol is most acidic least pK_a.

57. Ans. (2)

It is Hoffman Bromamide degradation

58. Ans. (2)

Terminal alkene & alkyne release CO_2 on oxidative ozonolysis.

59. Ans. (2)

It gives cyanide & amide as product.

60. Ans. (1)

Bredts rule.

61. Ans. (2)

Reflexive : a^2 = irrational number

$\Rightarrow$ It is not true for all real numbers

Symmetric :

If ab = irrational number , then

ba = irrational number

$\therefore$ r is symmetric relation

Transistive :

$\left(1, \sqrt{2}\right) \in r$

$\left(\sqrt{2}, 2\right) \in r$

but $(1,2) \notin r$

$\therefore$ It is not transistive

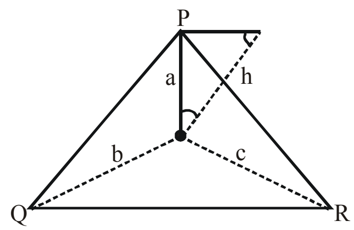
62. Ans. (2)

3^4

63. Ans. (2)

96 is not divisible by 2 or 96 is not divisible by 3

64. Ans. (2)



Let height of tower be h & it's distances from P,Q,R are a,b,c respectively. according to question

$\frac{a}{h}=\frac{b}{h}=\frac{c}{h} \Rightarrow a=b=c$ $\Rightarrow$ foot of tower is circumcentre

65. Ans. (4)

Variance $=\frac{\Sigma x_i{}^2}{n}-\left(\frac{\Sigma x_i}{n}\right)^2$

$$=\frac{{}^{20}C_{10}}{11}-\left(\frac{2^{10}}{11}\right)^2$$

$$=\frac{11.{}^{20}C_{10}-2^{20}}{121}$$

66. Ans. (4)

$\because f(x)$ is differentiable

$\Rightarrow -k\sin x-\cos k=k\cos x+\sin k$ at $x=\frac{\pi}{2}$

$\Rightarrow \sin k+\cos k=-k$

Now, $f(x)$ is continuous at $x=\frac{\pi}{2}$

$\Rightarrow \sin k+\cos k=\frac{2k}{\pi}$

$\Rightarrow \frac{2k}{\pi}=-k\Rightarrow k=0$ (rejected)

67. Ans. (1)

$$\int\frac{\frac{1}{2}\left(e^x+7\sin x+11\cos x+14\right)+\frac{1}{2}\left(e^x+7\cos x-11\sin x\right)}{e^x+7\sin x+11\cos x+14}$$

$$=\frac{1}{2}\int dx+\frac{1}{2}\int\frac{e^x+7\cos x-11\sin x}{e^x+7\sin x+11\cos x+14}$$

$$=\frac{1}{2}x+\frac{1}{2}\ell n\left(e^x+7\sin x+11\cos x\right)+C$$

68. Ans. (3)

$$=\int_0^{\frac{\pi}{2}}\left(\frac{x^2}{1+\tan x+\sqrt{1+\tan^2 x}}+\frac{x^2}{1-\tan x+\sqrt{1+\tan^2 x}}\right)dx$$

$$=\int_0^{\pi/2}\frac{x^2\left[2+2\sqrt{1+\tan^2 x}\right]}{\left(1+\sqrt{1+\tan^2 x}\right)^2-\tan^2 x}dx$$

$$=\int_0^{\frac{\pi}{2}}\frac{2x^2\left(1+\sqrt{1+\tan^2 x}\right)}{1+1+\tan^2 x+2\sqrt{1+\tan^2 x}-\tan^2 x}dx$$

$$=\int_0^{\frac{\pi}{2}}\frac{2x^2\left(1+\sqrt{1+\tan^2 x}\right)}{2\left(1+\sqrt{1+\tan^2 x}\right)}dx$$

$$=\left(\frac{x^3}{3}\right)_0^{\pi/2}\Rightarrow\frac{\pi^3}{24}$$

69. Ans. (4)

D w.r.t x

$$\frac{1}{7}f'\left(\frac{x+8y}{7}\right)=\frac{1}{7}f'(x)$$

Put x = 0

$$f'\left(\frac{8}{7}y\right)=f'(0)=2$$

$\therefore f'(y)=2$

$f(y)=2$

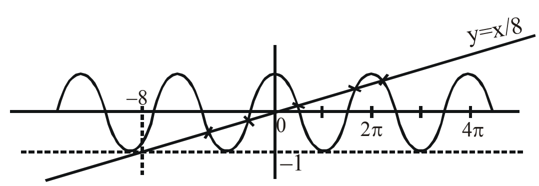
$f(y)=2y+c$

$f(0)=c=-5$

$f(y)=2y-5$

$\therefore f(7)=9$

70. Ans. (3)



71. Ans. (2)

$$\begin{vmatrix} a & -a^2 & a^3 \\ -a^2 & a^3 & a \\ a^3 & a & -a^2 \end{vmatrix}=0$$

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

$\Rightarrow a=0,-1,-\omega,-\omega^2$

$\Rightarrow a=-\omega,-\omega^2$ (non real)

72. Ans. (2)

$$\frac{P^2}{x}+\frac{Q^2}{x-1}=1 \Rightarrow \frac{P^2(x-1)+Q^2(x)}{x(x-1)}=1$$

$\Rightarrow x^2 - (P^2 + Q^2 + 1)x + P^2 = 0$

Discriminant $= (P^2 + Q^2 + 1)^2 - 4P^2$

$= (P^2 + Q^2 - 1)^2 + 4(P^2 + Q^2) - 4P^2$

$= (P^2 + Q^2 - 1)^2 + 4Q^2 > 0$

$\because$ discriminant is positive, it has two real roots.

73. Ans. (3)

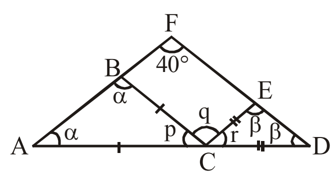
Such numbers are 10,16,.....94

If n be the number of terms, then

$94 = t_n = a + (n - 1)d = 10 + (n-1)6 \Rightarrow n = 15$

$$\therefore \text{ sum } = \frac{n}{2}(a+\ell) = \frac{15}{2}(10+94) = 780$$

74. Ans. (4)



From ΔAFD

$\alpha + 40^\circ + \beta = 180^\circ$ ...(i)

$\Rightarrow \alpha + \beta = 140^\circ$

From ΔBAC and ECD

$2\alpha + p = 180^\circ$ ...(ii)

$2\beta + r = 180^\circ$ ...(iii)

(ii) + (ii)

$\Rightarrow 2(\alpha + \beta) + p + r = 360^\circ$

$\Rightarrow p + r = 80^\circ \because p + q + r = 180^\circ \Rightarrow q = 100^\circ$

75. Ans. (3)

$$2p = \left|\frac{1}{\sqrt{\frac{1}{a^2}+\frac{1}{b^2}}}\right|$$

$$\Rightarrow \frac{1}{a^2}+\frac{1}{b^2} = \frac{1}{9p^2} = \frac{2}{8p^2}$$

$\frac{1}{a^2}, \frac{1}{8p^2}, \frac{1}{b^2}$ are in A.P.

76. Ans. (4)

Tangent at (1, –2) to $x^2 + y^2 = 5$ is

$x - 2y - 5 = 0$ ...(1)

This tangent touches circle

$x^2 + y^2 - 8x + 6y + 20 = 0$ at (x_1, y_1)

which is foot of perpendicular from centre (4,–3) upon tangent i.e. (3,–1)

77. Ans. (4)

$$\frac{x^2}{16}+\frac{y^2}{9}=1$$

$a^2 = 16 \;\; b^2 = 9$

$$e = \frac{\sqrt{7}}{4}$$

S(ae,0) or (–ae,0)

C(0,0)

CS = ae = $\sqrt{7}$

CS : 2a = $\sqrt{7} : 8$

78. Ans. (1)

Remaing cards = 40

Total ways of drawing two cards = ${}^{40}C_2$

favaroble ways = $10 \times {}^4C_2$

$$\text{Probability} = \frac{10\times 6}{{}^{40}C_2} = \frac{10\times 6\times 2}{40\times 39} = \frac{1}{13}$$

79. Ans. (2)

Let A is vertex and P(2at, at²) on $x^2 = 4ay$

$$m_{AP} = \frac{t}{2} = \tan\alpha \Rightarrow t = 2\tan\alpha$$

$$AP = \sqrt{4a^2t^2 + a^2t^4}$$

$$= at\sqrt{4+t^2} = 4a\tan\alpha\sec\alpha$$

80. Ans. (4)

$A^T = -A$

$(XA + AX^T)^T = A^TX^T + XA^T$

$= -AX^T - XA$

$= -(AX^T + XA)$

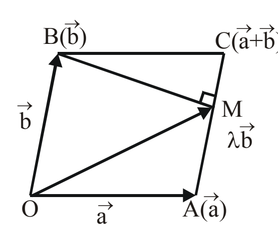
$|(XA + AX^T)^T| = |-(XA + AX^T)|$

$|XA + AX^T| = -|XA + AX^T|$

$|XA + AX^T| = 0$

81. Ans. (4)

P.V of M $\left(\vec{r} = \vec{a} + \lambda\vec{b}\right)$



$$\overrightarrow{BM} = \left(\vec{a} + (\lambda - 1)\vec{b}\right)$$

$$\overrightarrow{BM}.\overrightarrow{AC} = 0$$

$$\left(\vec{a} + (\lambda-1)\vec{b}\right).\vec{b}$$

$$\vec{a}.\vec{b} + (\lambda-1)\left(\vec{b}\right)^2 = 0$$

$4(\lambda - 1) = -1$

$$\lambda - 1 = -\frac{1}{4}$$

$\lambda = \frac{3}{4}$

$\overrightarrow{BM} = \left|\vec{a} + \frac{3}{4}\vec{b} - \vec{b}\right|$

$\overrightarrow{BM} = \left|\vec{a} - \frac{\vec{b}}{4}\right|^2 = |\vec{a}|^2 + \frac{|\vec{b}|^2}{16} - \frac{2.\vec{a}.\vec{b}}{4}$

$= 4 + \frac{1}{4} - \frac{1}{2} = \frac{16+1-2}{4} = \frac{15}{4}$

$\left|\overrightarrow{BM}\right|^2 = \frac{15}{4}$

$\left|\overrightarrow{BM}\right| = \frac{\sqrt{15}}{2}$

82. Ans. (2)

$P_1 = x + 2y + 2z - 2 = 0$

$P_2 = 2x - 2y + z + 8 = 0$

$P_1 \perp P_2$

$\therefore$ ΔPQR is right angle triangle

Perpendicular distance from A(1,1,1) to $P_1 = 1$

Perpendicular distance from A(1,1,1) to $P_2 = 3$

Area of $\Delta = \frac{1}{2} \times 1 \times 3 = \frac{3}{2}$

83. Ans. (2)

$\left(\frac{a^4+a^2+1}{a^2}\right)\left(\frac{b^4+7b^2+1}{b^2}\right)\left(\frac{c^4+11c^2+1}{c^2}\right)$

$\Rightarrow \left(a^2+\frac{1}{a^2}+1\right)\left(b^2+\frac{1}{b^2}+7\right)\left(c^2+\frac{1}{c^2}+11\right)$

$\left[\left(a-\frac{1}{a}\right)^2+3\right]\left[\left(b-\frac{1}{b}\right)^2+9\right]\left[\left(c-\frac{1}{c}\right)^2+13\right]$

clearly minimum value occurs when

$a^2 = b^2 = c^2 = 1$ and minimum value

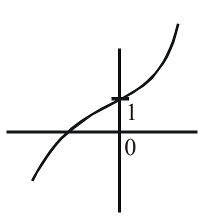
$= 3 \times 9 \times 13 = 351$

84. Ans. (2)

$f'(x) = 3x^2 + p$

Case I : If $p \geq 0$ then $f(x)$ is monotonic increasing and its range is $(-\infty,\infty)$

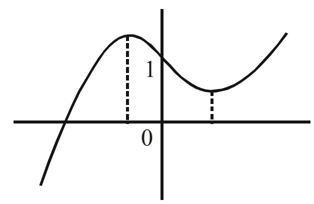
$\Rightarrow f(x) = 0$ has one negative root ($\because f(0) > 0$)



Case II : If $p < 0$, then $x = \pm\sqrt{-\frac{p}{3}}$ are point of extema

Now $f\left(\sqrt{-\frac{p}{3}}\right)f\left(-\sqrt{-\frac{p}{3}}\right) = 1 + \frac{4p^3}{27}$

which is positive for $p \in (-1,0)$



$\Rightarrow f(x)$ is non monotonic and $f(x) = 0$ has negative root.

85. Ans. (3)

$y = x^3 + px + 1$

say $p = -\lambda^2$

$y = x^3 - \lambda^2 x + 1$

point of intersection with y = 1

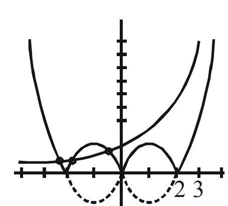
$x = 0, x = \lambda, x = -\lambda$

$\left[\int_{-\lambda}^{0}\left(x^3-\lambda^2x+1\right)dx - \lambda\right] + \lambda - \int_{0}^{\lambda}\left(x^3-\lambda x^2+1\right)dx$

$-\left(\frac{\lambda^4}{4}-\frac{\lambda^4}{2}-\lambda\right)-\lambda+\left(\lambda-\left[\frac{\lambda^4}{4}-\frac{\lambda^2}{2}+\lambda\right]\right)$

$$\left(\frac{\lambda^4}{4}\right)+\left(\frac{\lambda^4}{4}\right) = \frac{\lambda^4}{2} = \frac{p^2}{2}$$

86. Ans. (3)



Number of solutions are 3

87. Ans. (3)

$|z_1 + z_2| = 1$ and $\left|z_1^2 + z_2^2\right| = 25$

$\because (z_1 + z_2)^3 = z_1^3 + z_2^3 + 3z_1.z_2(z_1 + z_2)$

$\Rightarrow z_1^3 + z_2^3 = (z_1 + z_2)((z_1 + z_2)^2 - 3z_1z_2)$

$= (z_1+z_2)\left\{(z_1+z_2)^2 - \frac{3}{2}\left((z_1+z_2)^2 - (z_1^2+z_2^2)\right)\right\}$

$= (z_1+z_2)\left\{\frac{3}{2}(z_1^2+z_2^2) - \frac{1}{2}(z_1+z_2)^2\right\}$

$$\Rightarrow |z_1{}^3 + z_2{}^3| = |z_1 + z_2|\left|\frac{3}{2}\left(z_1^2+z_2^2\right)-\frac{1}{2}\left(z_1+z_2\right)^2\right|$$

$$\geq \left|\frac{3}{2}\left|z_1^2+z_2^2\right|-\frac{1}{2}\left|z_1+z_2\right|^2\right| \geq \left|\frac{3}{2}.25-\frac{1}{2}\right| \geq 37$$

88. Ans. (3)

The given form is $(1)^\infty$ from

$$L=\lim_{n\to\infty} n.\left[\frac{\sin n}{n^2}+\log\left(\frac{en+1}{n+e}\right)-1\right]$$

$$=\lim_{n\to\infty}\frac{\sin n}{n}+n\log\left(\frac{ne+1}{ne+e^2}\right)$$

$$=\lim_{n\to\infty}\left[\frac{\sin n}{n}+\frac{\log\left(1+\frac{ne+1}{ne+e^2}-1\right)}{\left(\frac{ne+1}{ne+e^2}-1\right)}\times n\times\left(\frac{ne+1}{ne+e^2}-1\right)\right]$$

$$\Rightarrow \frac{1-e^2}{e}$$

89. Ans. (4)

$$f'(x)=\int_0^{f(x)} f^{-1}(t)\,dt \qquad f'(0)=1$$

$$f''(x)=f^{-1}(f(x)).\,f'(x)$$

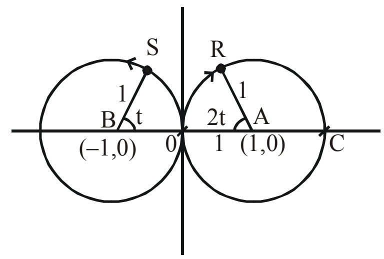
$$f''(x)=xf'(x)$$

$$\ell n\left|f'(x)\right|=\frac{x^2}{2}+c$$

$$c=0$$

$$\ell n\left|f'(x)\right|=\frac{x^2}{2} \text{ Hence } \left|f'(1)\right|=e^{\frac{1}{2}}=\sqrt{e}$$

90. Ans. (3)



Let at time 't' Ram is at R and shyam is at S

$\overset{\frown}{OR}=2t \Rightarrow \angle OAR = 2t$

$\overset{\frown}{OS}=t \Rightarrow \angle OBS = t$

coordinates of R $(1-\cos 2t, \sin 2t)$

and coordinates of S$(\cos t-1, \sin t)$

$$Rs=\sqrt{\left(\cos t+\cos 2t-2\right)^2+\left(\sin t-\sin 2t\right)^2}$$

on diffferenticting w.r.t. 't' and putting

$2t=\pi$ i.e. $t=\dfrac{\pi}{2}$

$\Rightarrow RS=\sqrt{\dfrac{5}{2}}$ at point C.