05-12-15_Sr.IPLCO_Jee-Main_RPTM-13_ Syllabus

MATHS:

Trigonometry Upto Transformations, General Solutions, Heights And Distances

PHYSICS

E M I & AC : Magnetic flux calculation, Faraday's laws Lenz's law, Motional EMF, Induced electric filed ,Self and mutual induction, L-R,C-R,L-C-R circuits, L-C Oscillations with D-C source, LCR series circuit with AC , resonance: Quality factor, Power in AC circuits,Wattless current.AC generator and transformer

CHEMISTRY

Atomic Structure, Stoichiometry, Surface Chemistry

MATHS

61. Minimum value of $\frac{\sec^4\alpha}{\tan^2\beta}+\frac{\sec^4\beta}{\tan^2\alpha}$ is ______ $\left(\alpha,\beta\neq\frac{k\pi}{2},k\in Z\right)$

1) 4 2) 16 3) 8 4) 6

62. If $\alpha=\tan 27\theta-\tan\theta$ and $\beta=\frac{\sin\theta}{\cos 3\theta}+\frac{\sin 3\theta}{\cos 9\theta}+\frac{\sin 9\theta}{\cos 27\theta}$, then

1) $\alpha=\beta$ 2) $\alpha=2\beta$ 3) $\beta=2\alpha$ 4) $\alpha=3\beta$

63. If $\left|\sqrt{\sin^2 x+2a^2}-\sqrt{2a^2-1-\cos^2 x}\right|\leq A,\forall a,x\in R$ then A is

1) $\sqrt{5}$ 2) $\sqrt{3}$ 3) $\sqrt{2}$ 4) 1

64. If $\cos\frac{2\pi}{7};\cos\frac{4\pi}{7}$ and $\cos\frac{6\pi}{7}$ are the roots of the equation $8x^3+4x^2-4x-1=0$ then the value of $\sin^2\frac{\pi}{7}\sin^2\frac{2\pi}{7}+\sin^2\frac{2\pi}{7}\sin^2\frac{3\pi}{7}+\sin^2\frac{\pi}{7}\sin^2\frac{3\pi}{7}=$

1) $\frac{\sqrt{7}}{4}$ 2) $\frac{\sqrt{7}}{2}$ 3) $\frac{\sqrt{7}}{8}$ 4) $\frac{7}{4}$

65. The number of ordered pairs (x,y) such that sinx+ siny = sin (x+y) and $|x|+|y|=1$ is

1) 0 2) 2 3) 6 4) infinite

66. The minimum value of $|\sin x+\cos x+\tan x+\sec x+\operatorname{cosec} x+\cot x|=$

1) $2\sqrt{2}+1$ 2) $2\sqrt{2}-1$ 3) $2\sqrt{2}$ 4) 6

67. The minimum value of $\cos x+\cos y+\cos(x+y)$ is

1) 0 2) – 1 3) – 2 4) $\frac{-3}{2}$

68. Let $\alpha,\beta,\gamma>0$ and $\alpha+\beta+\gamma=\frac{\pi}{2}$. If $p=\tan\alpha\tan\beta+5, q=\tan\beta\tan\gamma+5, r=\tan\gamma\tan\alpha+5$.

Then the maximum value of $\sqrt{p}+\sqrt{q}+\sqrt{r}$ is

1) 5 2) $3\sqrt{5}$ 3) $2\sqrt{3}$ 4) $4\sqrt{3}$

69. The number of points inside the circle $x^2+y^2=4$ satisfying

$\tan^4 x+\cot^4 x+1=3\sin^2 y$ is

1) 1 2) 2 3) 4 4) infinite

70. For $x\in(-\pi,\pi)$, number of solutions of x for which the given equation

$\left(\sqrt{3}\sin x+\cos x\right)^{\sqrt{\sqrt{3}\sin 2x-\cos 2x+2}}=4$ is satisfied is

1) 0 2) 1 3) 3 4) 4

71. $\prod_{k=1}^{n}\left(1+2\cos\left(\frac{2\pi.3^k}{3^n+1}\right)\right)=$

1) 2 2) 1 3) $\frac{1}{2}$ 4) $\frac{1}{3}$

72. The range of the function $f(x)=\cos\left(\sin\left(\log\left(\frac{x^2+e}{x^2+1}\right)\right)\right)+\sin\left(\cos\left(\log\left(\frac{x^2+e}{x^2+1}\right)\right)\right)$ is

1) $[\cos(\sin 1)+\sin(\cos 1), 1+\sin 1]$

2) $[\cos(\sin 1)+\sin(\cos 1), \sin 1]$

3) $[\cos(\sin 1)+\sin(\cos 1), \cos(\sin 1)]$

4) $[\cos(\sin 1), \cos(\sin 1)+\sin 1]$

73. If $0<\alpha<\frac{\pi}{6}$, Then $\alpha(\operatorname{cosec}^2\alpha)$ is

1) $<\frac{\pi}{6}$ 2) $>\frac{\pi}{6}$ 3) $<\frac{\pi}{3}$ 4) $<\frac{2\pi}{3}$

74. If $\alpha=\frac{2\pi}{7}$ then the value of $|\tan\alpha\tan 2\alpha+\tan 2\alpha\tan 4\alpha+\tan 4\alpha\tan\alpha|$ is

1) -7 2) 7 3) 0 4) $\sqrt{7}$

75. If $x\sin a + y\sin 2a + z\sin 3a = \sin 4a$; $x\sin b + y\sin 2b + z\sin 3b = \sin 4b$ and

$x\sin c + y\sin 2c + z\sin 3c = \sin 4c$ then the roots of the equation

$t^3 - \frac{z}{2}t^2 - \frac{(y+2)}{4}t + \frac{z-x}{8} = 0$, $a,b,c \neq n\pi$ are

1) sina, sinb, sinc 2) cosa, cosb, cosc

3) sin2a, sin2b, sin2c 4) cos2a, cos2b, cos2c

76. If $\cos^4\theta + \alpha, \sin^4\theta + \alpha$ are the roots of the equation $x^2 + b(2x+1) = 0$ and $\cos^2\theta + \beta; \sin^2\theta + \beta$ are the roots of the equation $x^2 + 4x + 2 = 0$ then b can be

1) 1 2) – 1 3) – 2 4) 0

77. The sides of a triangle inscribed in a given circle subtends angles α,β,γ at the centre. Then, the minimum value of the arithmetic mean of

$\cos\left(\alpha + \frac{\pi}{2}\right); \cos\left(\beta + \frac{\pi}{2}\right); \cos\left(\gamma + \frac{\pi}{2}\right)$ is

1) $-\frac{\sqrt{3}}{2}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{1}{\sqrt{2}}$ 4) 0

78. The number of solutions of the equation $16\left(\sin^5 x+\cos^5 x\right)=11\left(\sin x+\cos x\right)$ in the interval $[0,2\pi]$ is

1) 6 2) 7 3) 8 4) 9

79. If $\operatorname{Tan}\left(\frac{\pi}{4}+\frac{y}{2}\right)=\operatorname{Tan}^3\left(\frac{\pi}{4}+\frac{x}{2}\right)$ then $\sin x\left(\frac{3+\sin^2 x}{1+3\sin^2 x}\right)=$

1) cosy 2) siny 3) sin2y 4) 0

80. If $1-\cos x=\frac{\sqrt{3}}{2}|x|+a$ has no solution, then complete set of values of 'a' is

1) $\left(\frac{1}{2},\infty\right)$ 2) $\left(\frac{3}{2}-\frac{\pi}{3},4\right)$ 3) $\left(\frac{3}{2}-\frac{\pi}{\sqrt{3}},\infty\right)$ 4) $(4,\infty)$

81. Total number of solutions of $\sin \pi x = \left|\ln|x|\right|$ is

1) 2 2) 4 3) 6 4) 8

82. If $0<\alpha<\beta<\gamma<\frac{\pi}{2}$ then the equation $\frac{1}{x-\sin\alpha}+\frac{1}{x-\sin\beta}+\frac{1}{x-\sin\gamma}=0$ has

1) imaginary roots 2) real and equal roots

3) real and unequal roots 4) rational roots

83. If $\sin^4 x+\cos^4 y+2=4\sin x\cos y$ and $0\le x,y\le\frac{\pi}{2}$ then $\sin x+\cos y$ is equal to

1) -2 2) 0 3) 2 4) $\frac{3}{2}$

84. Number of solutions of the equations $y=\frac{1}{3}\left[\sin x+\left[\sin x+\left[\sin x\right]\right]\right]$ and

$\left[y+\left[y\right]\right]=2\cos x$, where $[.]$ denotes the greatest integer function is

1) 0 2) 1 3) 2 4) infinite

85. A triangle inscribed in a circle the vertices of the triangle divide the circle into three arcs of length 3,4 and 5 units, then the area of the triangle is

1) $\frac{9\sqrt{3}\left(1+\sqrt{3}\right)}{\pi^2}$sq.units
2) $\frac{9\sqrt{3}\left(\sqrt{3}-1\right)}{\pi^2}$sq.units
3) $\frac{9\sqrt{3}\left(1+\sqrt{3}\right)}{2\pi^2}$sq.units
4) $\frac{9\sqrt{3}\left(\sqrt{3}-1\right)}{2\pi^2}$sq.units

86. A pole stands vertically inside a triangular park ABC. If the angle of elevation of the top of the pole from each corner of the park is same, then in triangle ABC, the foot of the pole is at the

1) centroid
2) incentre
3) circumcentre
4) orthocentre

87. AB is a vertical pole with B at the ground level and A at the top. A man finds that the angle of elevation of the point A from a certain point C on the ground is 60°. He moves away from the pole along the line BC to a point D such that CD = 7m. From D, the angle of elevation of the point A is 45°. Then, the height of the pole is

1) $\left(\frac{7\sqrt{3}}{2}-\frac{1}{\sqrt{3}+1}\right)$m
2) $\frac{7\sqrt{3}}{2}\left(\sqrt{3}+1\right)$m
3) $\frac{7\sqrt{3}}{2}\left(\sqrt{3}-1\right)$m
4) $\left(\frac{7\sqrt{3}}{2}-\frac{1}{\sqrt{3}-1}\right)$m

88. A vertical tower PQ stands at a point P. Points A and B are located to the South and East of P respectively. M is the midpoint of AB. PAM is an equilateral triangle and N is the foot of the perpendicular from P on AB. Let AN = 20 metres and the angle of elevation of the top of the tower at N is $\tan^{-1}(2)$. The height of the tower is

1) $20\sqrt{3}$m 2) $20\sqrt{6}$m 3) 40 m 4) $40\sqrt{3}$m

89. For $0<\theta<\frac{\pi}{2}$, the number of solutions of

$$\sum_{m=1}^{6}\operatorname{cosec}\left(\theta+\frac{(m-1)\pi}{4}\right)\operatorname{cosec}\left(\theta+\frac{m\pi}{4}\right)=4\sqrt{2}$$ is

1) 1 2) 0 3) 2 4) 3

90. The number of solutions of the equation $\left|\sin\frac{\pi}{2}(1-x)+\cos\frac{\pi}{2}(1-x)\right|=\sqrt{\left|\log_e|x|\right|^3+1}$ is/are

1) 4 2) 6 3) 8 4) 10