MATHEMATICS

61. In a Δ^{le}ABC $x+y+2=0$ is the perpendicular bisector of side AB and it meets AB at (-1, -1). If $x-y-1=0$ is $\perp^{\text{lar}}$ bisector of side AC and it meets AC at (2, 1) and P is mid point of BC then distance of P from ortho centre of Δ^{le} ABC is

1) 5 2) $\sqrt{8}$ 3) $\sqrt{13}$ 4) 7

62. If a line passing through P(3, 1) meets coordinate axes in A and B and distance of AB from origin is maximum then area of Δ^{le}OAB is

1) 25 sq.units 2) $\frac{50}{3}$ sq.units 3) $\frac{100}{3}$ sq.units 4) 19 sq.units

63. If A = (4, 0) and B = (9, 0) and C (0, h) are 3 – points such that AB subtends greatest angle at C. If $h>0$ then value of h is

1) 4 2) 9 3) $\frac{13}{2}$ 4) 6

64. The line $x=0$ divides the area enclosed by the curves $|x-1|-y=0, |x|+y-3=0$ into two areas R_1 and R_2 where $R_1<R_2$ then $\frac{R_1}{R_2}=$

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

65. A line is drawn from (0, 0) Intersect the lines $2x+y=2, x-2y+2=0$ in A and B then locus of mid point of segment AB is

1) $2x^2+3xy+2y^2+x+3y=0$ 2) $2x^2-3xy-2y^2-x-3y=0$

3) $2x^2+3xy-2y^2+x+3y=0$ 4) $2x^2-3xy-2y^2+x+3y=0$

66. In the xy – plane the length of the shortest path from (0, 0) to the point P(12, 16) which does not go through inside the circle $(x-6)^2+(y-8)^2=25$.

1) 20 2) $10\sqrt{3}+\frac{5\pi}{3}$ 3) $10\sqrt{3}+5\pi$ 4) $10\sqrt{3}$

67. Let P be a point lies inside the triangle ABC and D, E, F are feet of perpendiculars from P to the lines BC, CA, AB respectively. If $\frac{BC}{PD}+\frac{CA}{PE}+\frac{AB}{PF}$ is minimum then P is

1) Orthocentre of Δ^{le} ABC 2) Circum circle of Δ^{le} ABC

3) Incentre of Δ^{le} ABC 4) Centroid of Δ^{le} ABC

68. In a right angled triangle BC = 5, AB = 4, AC = 3. Let S be the circum circle. Let S_1 be the circle touching both sides AB and AC and circle S internally. Let S_2 be the circle touching the sides AB and AC of Δ^{le}ABC, and touching the circle S externally. If r_1, r_2 are radii of circles S_1 and S_2 respectively then $r_1 r_2 =$

1) 12 2) 20 3) 15 4) 24

69. A circle passing through the vertex C of a rectangle and touches its sides AB and AD at M and N respectively. If the $\perp^{\text{lar}}$ distance from C to the line segment $\overline{MN}$ is equal to 5 then area of rectangle ABCD.

1) 5 2) 15 3) 25 4) 30

70. $A(0,0)$, $B\left(1,\sqrt{3}\right), C\left(2,0\right)$ are vertices of a $\Delta^{le}ABC$ whose one altitude is AD with D on BC. Now circle drawn on AD as diameter cuts AB at E and AC at F then $\overline{EF} =$

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

71. A circle with diameter AB and having centre at O(0, 0) is drawn. Now two circles with diameters AO and OB are drawn. In the region between circumferences a circle of radius 8, with centre D is drawn such that is touches all 3 – circles then AB =

1) 18 2) 48 3) 24 4) 12

72. Equilateral triangle DEF is inscribed in equilateral triangle ABC such that D is on BC E is on AC, F is on AB and DE $\perp^{lar}$ BC, FD$\perp^{lar}$AB, FE$\perp^{lar}$AC. Then $\frac{\text{Area of } \Delta^{le} \text{ DEF}}{\text{Area of } \Delta^{le} \text{ ABC}} =$

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

73. A chord of the circle $x^2 + y^2 - 4x - 6y = 0$ passing through origin subtends an angle $\tan^{-1}\left(7/4\right)$ at the point where circle meets positive y – axis then equation of the chord is

1) $2x - y = 0$ 2) $x - y = 0$ 3) $x - 2y = 0$ 4) $y = 3x$

74. A line passing through P(1, -2) cuts the circle $x^2 + y^2 - x - y = 0$ at A and B then the range of (PA + PB) is

1) $\left[\sqrt{24}, \sqrt{26}\right]$ 2) $\left[\sqrt{26}, \infty\right]$ 3) $\left[-\sqrt{26}, \sqrt{26}\right]$ 4) $\left[-\sqrt{24}, \sqrt{24}\right]$

75. The lengths of the arcs of a circle of radius 6 are respectively $2\pi, 5\pi, 4\pi$ respectively in Ist, IInd, IIIrd quadrants then centre of the circle is

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

76. A right angled triangle with sides 5,4,3 moving in a circle $2x^2+2y^2=25$ with hypotenuse as the chord of the circle then locus of vertex opposite to hypotenuse.

1) $x^2+y^2=1$ 2) $x^2+y^2=\frac{1}{2}$ 3) $x^2+y^2=\frac{1}{4}$ 4) $x^2+y^2=\frac{1}{16}$

77. The range of λ for which the variable line $3x+4y=\lambda$ lies between the circles $x^2+y^2-2x-2y+1=0$ and $x^2+y^2-18x-2y+78=0$ without intercepting a chord on either circles.

1) (12, 41) 2) (12, 31) 3) (12, 21) 4)(2, 41)

78. Two chords which are drawn from a point (a, b) on the circle $x(x-a)+y(y-b)=0$ are bisected by x – axis then

1) $a^2<8b^2$ 2) $a^2=8b^2$ 3) $a^2>8b^2$ 4) $3a^2>4b^2$

79. The equation of the chord of the circle $x^2+y^2=a^2$ which cuts the circle at two points which lie at a distance "d" from a point $A(\alpha,\beta)$ on the circle is $\alpha x+\beta y=\lambda$ then $\lambda=$

1) a^2-d^2 2) $\frac{a^2}{2}-d^2$ 3) $a^2-\frac{d^2}{2}$ 4) $a^2+\frac{d^2}{2}$

80. Consider a curve $ax^2 + 2hxy + by^2 = 1$. If from a point P (not on the curve) a straight line is drawn to cut the curve at A and B such that $PA \times PB$ is independent of inclination of line $\overleftrightarrow{PAB}$. Then above curve represents. (given that $a > 0$).

1) a parabola whose latusrectum is 2a
2) a circle whose radius is $\frac{1}{\sqrt{a}}$
3) an ellipse whose major axis is 2a
4) a reactangular hyperbola

81. Let P(a, b) be a variable point satisfying $a > 0, b > 0, 4 \le a^2 + b^2 \le 9$ and $b^2 - 4ab + a^2 \le 0$. Let R be the complete region represented by xy - plane in which p – lies then Area of region R is….

1) $\frac{\pi}{3}$
2) $\frac{5\pi}{3}$
3) $\frac{3\pi}{3}$
4) $\frac{5\pi}{6}$

82. An isosceles triangle ABC is inscribed in the circle whose equation is $x^2 + y^2 = 9$ with vertex at A (3, 0) and $\angle B = \angle C = 75^0$. Then product of ordinates of B and C is

1) $\frac{1}{4}$
2) $\frac{-3}{4}$
3) $\frac{-2}{3}$
4) $\frac{-9}{4}$

83. ABC be a triangle with A (1, 3) and $y = x, y = -2x$ are the equations of internal angular bisectors of $\angle B$ and $\angle C$ then area of triangle ABC is…..

1) $\frac{1}{2}$
2) $\frac{5}{2}$
3) $\frac{7}{2}$sq.units
4) $\frac{3}{2}$sq.units

84. If P is a point on the circle $x^2+y^2-2\sqrt{2}x-2\sqrt{3}y+5=0$ and Q is a point on the other circle $x^2+y^2+2\sqrt{3}x-2\sqrt{2}y+5=0$ then smallest circle passing through P and Q is

1) $x^2+y^2+\left(\sqrt{3}-\sqrt{2}\right)x-\left(\sqrt{3}+\sqrt{2}\right)y=0$

2) $x^2+y^2+\left(\sqrt{3}-\sqrt{2}\right)x-\left(\sqrt{3}+\sqrt{2}\right)y+\sqrt{6}=0$

3) $x^2+y^2+\left(\sqrt{3}-\sqrt{2}\right)x-\left(\sqrt{3}+\sqrt{2}\right)y-2\sqrt{6}=0$

4) $x^2+y^2+\left(\sqrt{3}-\sqrt{2}\right)x-\left(\sqrt{3}+\sqrt{2}\right)y+2\sqrt{6}=0$

85. All chords of the curve $3x^2-y^2-2x+4y=0$ which subtend a right angle at the origin are concurrent at a point P then coordinates of P are

1) (2, 3) 2) (3, 2) 3) (1, -2) 4) (-1, 2)

86. Through the point A on the x-axis a straight line is drawn parallel to y – axis so as to intersect pair of lines $ax^2+2hxy+by^2=0$ in B and C. If $AB=BC$ then $\frac{h^2}{ab}=$

1) $\frac{1}{8}$ 2) $\frac{3}{8}$ 3) $\frac{9}{8}$ 4) $\frac{17}{8}$

87. ABCD is a square. P is a point inside the square such that PA = 3, PB = 7 , PD = 5 then Area of the square ABCD is

1) 105 2) 35 3) 58 4)25

88. A point P moves such that the sum of its distances from the line $\sqrt{3}x - y + 1 = 0, x - \sqrt{3}y + 2 = 0$ is 2 then area bounded by locus of P is

1) 4 2) 8 3) 16 4) 32

89. Two circles of radii 1 and 2 touch internally at the point A. ABC is an equilateral triangle where B is on one circle and C is on other circle then AB =

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

90. The locus of image of (2, 3) in the line $x - 2y + 3 + \lambda(2x - 3y + 4) = 0$ is

1) $x^2 + y^2 + 2x + 4y - 3 = 0$ 2) $x^2 + y^2 - 2x - 4y + 3 = 0$

3) $x^2 + y^2 - 2x - 4y = 0$ 4) $x^2 + y^2 - 2x + 4y - 3 = 0$