

MODEL PAPER - II

TOTAL MARKS: 75

Time: 3hrs.

I. Very short answer type questions

 $10 \times 2 = 20$

1. Find the angle which the line $y = \sqrt{3}x - 4$ makes with the Y - axis.
2. Find the distance between the parallel straight lines $3x + 4y - 3 = 0$ and $6x + 8y - 1 = 0$.
3. Find the length of the perpendicular drawn from the point $(0, 0)$ to the line $x - 3y - 4 = 0$.
4. Find the incentre of the triangle whose vertices are $(1, \sqrt{3})$, $(2, 0)$ and $(0, 0)$.
5. Find the coordinates of the vertex C of ΔABC if its centroid is the origin and the vertices A, B are $(1, 1, 1)$ and $(-2, 4, 1)$ respectively.
6. Find the fourth vertex of the parallelogram whose consecutive vertices are $(2, 4, -1)$, $(3, 6, -1)$ and $(4, 5, 1)$.
7. Find the ratio in which YZ - Plane divides the line joining A $(2, 4, 5)$ and B $(3, 5, -4)$. Also find the point of intersection.
8. Find the equation of the plane whose intercepts on X, Y, Z - axes are 1, 2, 4 respectively.
9. Show that $\lim_{x \rightarrow 0^+} \left(\frac{2|x|}{x} + x + 1 \right) = 3$.
10. Compute $\lim_{x \rightarrow 0} \frac{\log_e(1 + 5x)}{x}$.
11. Evaluate $\lim_{x \rightarrow \infty} \frac{3x^5 - 1}{4x^2 + 1}$.
12. If $y = \log(\sin(\log x))$, then find $\frac{dy}{dx}$.
13. Find the derivative of the function $f(x) = x^n n^x \log(nx)$.
14. Find the approximate value of $\sqrt[3]{65}$.
15. Find the slope of the tangent to the curve $y = 3x^4 - 4x$ at $x = 4$.

II. Short answer type questions

 $5 \times 4 = 20$

16. Find the equation of locus of P, if $A = (4, 0)$, $B = (-4, 0)$ and $|PA - PB| = 4$.
17. If the distance of P from the points $(2, 3)$ and $(2, -3)$ are in the ratio 2 : 3, then find the equation of locus of P.
18. Find the locus of third vertex of a right-angled triangle, the ends of whose hypotenuse are $(4, 0)$ and $(0, 4)$.
19. When the origin is shifted to the point $(2, 3)$, the transformed equation of the curve is $x^2 + 3xy - 2y^2 + 17x - 7y - 11 = 0$. Find the original equation of the curve.

20. When the axes are rotated through an angle $\frac{\pi}{6}$, find the transformed equation of $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$
21. Find the points on the line $3x - 4y - 1 = 0$ which are at a distance of 5 units from the point (3, 2).
22. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making an intercept - 4 on the X - axis.
23. A (5, 4, 6), B (1, -1, 3) and C (4, 3, 2) are three points. Find the coordinates of the point in which the bisector of $\angle BAC$ meet the side BC.
24. Compute $\lim_{x \rightarrow 0} \frac{1 - \cos mx}{1 - \cos nx}$.
25. If $\sin y = x \sin (a + y)$, then show that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$.
26. If an error of 0.01cm is made in measuring the perimeter of a circle and the perimeter is measured as 44 cm then find the approximate error and relative error in its area.
27. Find the equations of tangent and normal to the curve $y = x^3 + 4x^2$ at (- 1, 3).

III. Long answer type questions**5 × 7 = 35**

28. Find the orthocentre of the triangle whose vertices are (5, -2), (-1, 2) and (1, 4).
29. Find the circumcentre of the triangle with sides $3x - y - 5 = 0$, $x + 2y - 4 = 0$ and $5x + 3y + 1 = 0$
30. Find the equation of the straight line making non-zero equal intercepts on the coordinate axes and passing through the point of intersection of the lines $2x - 5y + 1 = 0$ and $x - 3y - 4 = 0$.
31. Find the centroid and area of the triangle formed by the lines $2y^2 - xy - 6x^2 = 0$ and $x + y + 4 = 0$.
32. Find the angle between the lines joining the origin to the points of intersection of the curve $x^2 + 2xy + y^2 + 2x + 2y - 5 = 0$ and the line $3x - y + 1 = 0$.
33. The vertices of a triangle are A (1, 4, 2), B (-2, 1, 2), C (2, 3, -4). Find $\angle A$, $\angle B$, $\angle C$.
34. Find the derivative of the function $f(x) = \frac{\sin(x+a)}{\cos x}$.
35. If $y = \frac{x^3 \cdot \sqrt{2+3x}}{(2+x)(1-x)}$, then find $\frac{dy}{dx}$.
36. Show that the curves $6x^2 - 5x + 2y = 0$ and $4x^2 + 8y^2 = 3$ touch each other at $(\frac{1}{2}, \frac{1}{2})$.
37. The profit function $P(x)$ of a company, selling 'x' items per day is given by $P(x) = (150 - x)x - 1600$. Find the number of items that the company should sell to get maximum profit. Also find the maximum profit.

