

MODEL PAPER 1

MATHEMATICS (1B)

TIME: 3 HOURS

SEC: JR. INTER

MAX. MARKS: 75

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SECTION - A

I. Very Short Answer questions. Answer all questions. 10 x 2 = 20 M

Each question carries 'Two' marks

1. Find the value of k , if the straight lines $y - 3kx + 4 = 0$ and $(2k - 1)x - (8k - 1)y - 6 = 0$ are perpendicular
2. Find the equation of the straight line passing through the points $(at_1^2, 2at_1), (at_2^2, 2at_2)$
3. Find the fourth vertex of the parallelogram whose consecutive vertices are $(2, 4, -1), (3, 6, -1)$ and $(4, 5, 1)$
4. Reduce the equation $x + 2y - 3z - 6 = 0$ of the plane to the normal form
5. Compute $\lim_{x \rightarrow 2^+} ([x] + x)$ and $\lim_{x \rightarrow 2^-} ([x] + x)$
6. Evaluate $\lim_{x \rightarrow 0} \frac{e^x - \sin x - 1}{x}$
7. Find $\lim_{x \rightarrow 0} \frac{\sin(a + bx) - \sin(a - bx)}{x}$
8. Find the derivative of $7^{x^2+1x}, x > 0$
9. If $y = \tan^{-1}(\cos \sqrt{x})$ then find $\frac{dy}{dx}$
10. Define increasing and decreasing function

SECTION-B

II. Short Answer Questions. Answer 'Any Five' Questions. 5 x 4 = 20 M

Each question carries 'Four' marks

11. $A(5, 3)$ and $B(3, -2)$ are two fixed points. Find the equation of locus of P , so that the area of triangle PAB is 9 sq. units
12. $A(1, 2), B(2, -3)$ and $C(-2, 3)$ are three points. A point ' P ' moves such that $PA^2 + PB^2 = 2PC^2$. show that the equation to the locus of P is $7x - 7y + 4 = 0$

13. A straight line through $Q(\sqrt{3}, 2)$ makes an angle $\pi/6$ with positive direction of the X-axis. If the straight line intersects the line $\sqrt{3}x - 4y + 8 = 0$ at P, find the distance PQ.
14. Find the derivative of the $\tan 2x$ by using first principle.
15. Find the equations of tangent and normal to the curve $y = x^3 + 4x^2$ at $(-1, 3)$
16. Is f given by $f(x) = \begin{cases} \frac{x^2 - 9}{x^2 - 2x - 3} & \text{if } 0 < x < 5 \text{ and } x \neq 3 \\ 1.5 & \text{if } x = 3 \end{cases}$ continuous at the point 3?
17. Find the interval in which the function $f(x) = \sin^4 x + \cos^4 x, \forall x \in \left[0, \frac{\pi}{2}\right]$ is increasing and decreasing

SECTION-C

III. Long Answer Questions. Answer 'Any Five' Questions
Each question carries 'Seven' marks

5 x 7 = 35 M

18. Find the circumcentre of the triangle with the vertices $(-2, 3), (2, -1)$ and $(4, 0)$
19. Show that the lines joining the origin to the points of intersection of the curve $x^2 - xy + y^2 + 3x + 3y - 2 = 0$ and the straight line $x - y - \sqrt{2} = 0$ are mutually perpendicular.
20. Show that the equation $2x^2 - 13xy - 7y^2 + x + 23y - 6 = 0$ represents a pair of straight lines also find the angle between them and the co-ordinates of the point of intersection of the lines
21. Find the D.C's of the two lines which are connected by the relations $l + m + n = 0$ and $mn - 2nl - 2lm = 0$
22. If $y = x^{\tan x} + (\sin x)^{\cos x}$, find $\frac{dy}{dx}$
23. If the tangent at any point on the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ intersects the coordinate axes in A and B, then show that the length AB is a constant
24. Show that when the curved surface of right circular cylinder inscribed in a sphere of radius 'r' is maximum, then the height of the cylinder is $\sqrt{2}r$.
