

# 193

Total No. of Questions - 24 Total No. of Printed Pages - 4 Regd.

No.



# Part -III

MATHEMATICS, Paper - I (B

(English Version)

Max. Marks: 75

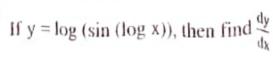
875499

Note: This question paper consists of THREE Sections - A, B and C.

 $10 \times 2 = 20$ 

# SECTION - A

- Very short answer type questions -I.
  - Answer ALL the questions.
  - (ii) Each question carries TWO marks.
  - Transform the equation 4x 3y + 12 = 0 into (a) slope intercept form (b) intercept form.
  - Find the perpendicular distance from the point (-3, 4) to the straight line 5x - 12y = 2.
  - Find x, if the distance between (5, -1, 7) and (x, 5, 1) is 9 units.
  - Find the equation of the plane whose intercepts on X, Y, Z axes are 1, 2, 4 respectively.
  - Compute  $\lim_{x\to 0} \frac{\sin ax}{\sin bx}$ ,  $b \neq 0$ ,  $a \neq b$ . 5.
  - Compute  $\lim_{x\to 2} \frac{x-z}{x^3-8}$ .





- 8. Find the second order of derivative of  $y = \tan^{-1} \left( \frac{2x}{1-x^2} \right)$
- 9. Find  $\Delta y$  and dy for the function  $y = 5x^2 + 6x + 6$ , at x = 2 and  $\Delta x = 0.001$ .
- 10. State Rolle's theorem

#### $5 \times 4 = 20$

### SECTION - B

- II. Short answer type questions -
  - Answer ANY FIVE questions.
  - (ii) Each question carries FOUR marks.
  - M. A(1, 2), B(2, -3) and C(-2, 3) are three points. A point P moves such that  $PA^2 + PB_C^2 = 2PC^2$ . Show that the equation to the locus of P is 7x 7y + 4 = 0.
  - When the axes are rotated through an angle 45°, the transformed equation of a curve is  $17x^2 16xy + 17y^2 = 225$ . Find the original equation of the curve.
    - 13. If the straight lines ax + by + c = 0, bx + cy + a = 0 and cx + ay + b = 0 are concurrent, then prove that  $a^3 + b^3 + c^3 = 3abc$ .
    - 14. Compute  $\lim_{x\to\infty} \frac{\cos x + \sin^2 x}{x+1}$ .
  - Find the derivative of the function tan2x from the first principle.

- 16. Find the equation of tangent and normal to the curve  $y = x^2$  at

  (0, 0)
- (0, 0).

  17. Find the point on the curve  $y = x^3 11x + 5$  at which the tangent is y = x 11.

### **SECTION - C**

5×7=35

### III. Long answer type questions -

- (i) Answer ANY FIVE questions.
- (ii) Each question carries SEVER marks.
- 18. Find the circumcentre of the triangle whose vertices are (1, 0), (-1, 2) and (3, 2).
- Show that the product of the perpendicular distances from a point  $(\alpha, \beta)$  to the pair of straight lines  $ax^2 + 2hxy + by^2 = 0$  is  $\frac{|a\alpha^2 + 2h\alpha\beta + b\beta^2|}{\sqrt{(a-b)^2 + 4h^2}}.$
- 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  $x^3 y + \sqrt{2} = 0$  are mutually perpendicular.
- 21. Find the direction cosines of two lines which are connected by the relations 1 + m + n = 0 and  $m_h = 2m 2lm = 0$ .

22. If  $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right) + \tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right) = \tan^{-1}\left(\frac{4x-4x^3}{1-6x^2+x^4}\right)$ , then prove that  $\frac{dy}{dx} = \frac{1}{1+x^2}$ .



- 23. Find the angle between the curve  $x^2y = 4$ ;  $y(x^2 + 4) = 8$ .
- 24. If the tangent at any point P on the curve  $x^my^n = a^{m+n}$  (mn  $\neq$  0) meets the coordinate axes in A, B, then show that AP: BP is a constant.

18754998