

**293****II**

Total No. of Questions : 24

Total No. of Printed Pages : 3

Regd. No. [REDACTED]



Part - III

2221539

**MATHEMATICS - PAPER - II (B)**

(English Version)

Time : 3 Hours

Max. Marks : 75

*Note : This question paper consists of three sections A, B and C.***SECTION - A**

10x2=20

I. Very short answer type questions :

- (i) Attempt *all* questions.
  - (ii) Each question carries *two* marks.
1. Find the equation of the circle whose end points of a diameter are (4, 2), (1, 5).
  2. If the length of the tangent from (2, 5) to the circle  $x^2 + y^2 - 5x + 4y + k = 0$  is  $\sqrt{37}$  then find k.
  3. Find k if the pairs of circles  $x^2 + y^2 + 4x + 8 = 0$ ,  $x^2 + y^2 - 16y + k = 0$  are orthogonal.
  4. Find the coordinates of the points on the parabola  $y^2 = 8x$  whose focal distance is 10.
  5. If the angle between the asymptotes is  $30^\circ$  then find its eccentricity of hyperbola.
  6. Evaluate :  $\int \sec^2 x \operatorname{cosec}^2 x \, dx$
  7. Evaluate :  $\int e^{\log(\tan^3 x)} \, dx$ .
  8. Find the value of  $\int_0^{\frac{\pi}{2}} \cos^7 x \sin^2 x \, dx$ .



9. Find the area of the region enclosed by the given curves  $x=4-y^2$ ,  $x=0$ .

10. Find the order and degree of the differential equation  $\left[ \frac{d^2y}{dx^2} + \left( \frac{dy}{dx} \right)^3 \right]^{\frac{6}{5}} = 6y$ .

## SECTION - B

5x4=20

II. Short answer type questions :

- (i) Attempt *any five* questions.
- (ii) Each question carries *four* marks.
11. Find the length of the chord intercepted by the circle  $x^2 + y^2 - x + 3y - 22 = 0$  on the line  $y = x - 3$ .
12. Show that the circles  $x^2 + y^2 - 8x - 2y + 8 = 0$  and  $x^2 + y^2 - 2x + 6y + 6 = 0$  touch each other and find the point of contact.
13. Find the equation of the tangent and normal to the ellipse  $9x^2 + 16y^2 = 144$  at the end of the latus rectum in the first quadrant.
14. If  $P(x, y)$  is any point on the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ( $a > b$ ) whose foci are  $S$  and  $S'$  then prove that  $SP + S'P$  is a constant.
15. Find the centre, foci, eccentricity, equation of the directrices, length of the latus rectum of the hyperbola.  
 $x^2 - 4y^2 = 4$ .
16. Evaluate :  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ .
17. Solve :  $\frac{dy}{dx} + \frac{3x^2}{1+x^3} y = \frac{1+x^2}{1+x^3}$ .

## SECTION - C

III. Long answer type questions :

5x7=35

- (i) Attempt *any five* questions.
- (ii) Each question carries *seven marks*.
18. If  $(2, 0)$ ,  $(0, 1)$ ,  $(4, 5)$  and  $(0, c)$  are concyclic then find  $c$ .
19. Find the transverse common tangents of the circles  $x^2 + y^2 - 4x - 10y + 28 = 0$  and  $x^2 + y^2 + 4x - 6y + 4 = 0$ .
20. Define parabola and obtain the standard form of the parabola  $y^2 = 4ax$ , ( $a > 0$ ).
21. Obtain the reduction formula for  $\int \sin^n x \, dx$  for an integer  $n \geq 2$  and deduce  $\int \sin^4 x \, dx$ .
22. Evaluate :  $\int \frac{x+1}{x^2+3x+12} \, dx$ .
23. Evaluate :  $\int_0^{\pi} \frac{\sin x + \cos x}{9+16\sin 2x} \, dx$ .
24. Solve :  $(1 + e^{x/y}) \, dx + e^{x/y} \left(1 - \frac{x}{y}\right) \, dy = 0$ .