

**293**  
**TS**

**A**

Total No. of Questions – 24

Total No. of Printed Pages – 3

Regd.

No.

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**Part - III**  
**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**

**10 × 2 = 20**

**I. Very Short Answer Type questions.**

- (i) Attempt **all** questions.  
(ii) Each question carries **two** marks.

1. Find the power of the point  $P(-1, 1)$  with respect to the circle  
 $x^2 + y^2 - 6x + 4y - 12 = 0$
2. Find the value of  $k$ , if the points  $(1, 3)$  and  $(2, k)$  are conjugate with respect to the circle  $x^2 + y^2 = 35$ .
3. Find the value of  $k$ , if the circles  $x^2 + y^2 + 4x + 8 = 0$  and  $x^2 + y^2 - 16y + k = 0$  are orthogonal.
4. Find the value of  $k$ , if the line  $2y = 5x + k$  is a tangent to the parabola  $y^2 = 6x$ .
5. Find the equation of the hyperbola whose foci are  $(\pm 5, 0)$ , the transverse axis is of length 8.
6. Evaluate  $\int \sqrt{x} \log x \, dx$  on  $(0, \infty)$
7. Evaluate  $\int \sec^2 x \cdot \operatorname{cosec}^2 x \, dx$  on  $I \subset \mathbb{R} \setminus \left( \{n\pi : n \in \mathbb{Z}\} \cup \left\{ (2n+1)\frac{\pi}{2} : n \in \mathbb{Z} \right\} \right)$

8. Evaluate  $\int_2^3 \frac{2x}{1+x^2} dx$

9. Evaluate  $\int_0^a \sqrt{a^2 - x^2} dx$

10. Form the differential equation corresponding to the family of curves  $y = c(x - c)^2$ , where  $c$  is a parameter.

### SECTION - B

5 × 4 = 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  $x^2 + y^2 - 8x - 2y - 8 = 0$  on the line  $x + y + 1 = 0$ .

12. If the two circles  $x^2 + y^2 + 2gx + 2fy = 0$  and  $x^2 + y^2 + 2g'x + 2f'y = 0$  touch each other, then show that  $f'g = fg'$ .

13. Find the eccentricity, foci, length of the Latus rectum and the equations of directrices of the ellipse  $9x^2 + 16y^2 = 144$ .

14. Find the equations of tangent and normal to the ellipse  $2x^2 + 3y^2 = 11$  at the point whose ordinate is 1.

15. Prove that the point of intersection of two perpendicular tangents to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  lies on the circle  $x^2 + y^2 = a^2 - b^2$ .

16. Find the area of the region enclosed by the curves  $y = 4x - x^2$ ,  $y = 5 - 2x$ .

17. Solve the differential equation  $\frac{dy}{dx} + y \tan x = \sin x$ .

## SECTION - C

 $5 \times 7 = 35$ 

## III. Long Answer Type questions.

- (i) Attempt any **five** questions.  
(ii) Each question carries **seven** marks.

18. Find the equation of the circle passing through the three points (1, 2), (3, -4), (5, -6)

19. Find the pair of tangents drawn from (1, 3) to the circle  $x^2 + y^2 - 2x + 4y - 11 = 0$  and also find the angle between them.

20. Show that the equation of the parabola in standard form is  $y^2 = 4ax$ .

21. Evaluate  $\int \frac{2 \sin x + 3 \cos x + 4}{3 \sin x + 4 \cos x + 5} dx$

22. Obtain the reduction formula for  $I_n = \int \operatorname{cosec}^n x \, dx$ ,  $n$  being a positive integer,  $n \geq 2$  and hence deduce the value of  $\int \operatorname{cosec}^5 x \, dx$ .

23. Evaluate  $\int_0^{\pi} \frac{x \sin x}{1 + \sin x} dx$

24. Solve the differential equation

$$\frac{dy}{dx} = \frac{3y - 7x + 7}{3x - 7y - 3}$$