

0293**A**

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

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 equation of circle with center $C = (-1, 2)$ and radius $r = 5$.
2. Find the equations of the normal at $P = (3, 5)$ of the circle $S \equiv x^2 + y^2 - 10x - 2y + 6 = 0$.
3. Find the equation of the radical axis of the following circles :
 $x^2 + y^2 - 3x - 4y + 5 = 0, 3(x^2 + y^2) - 7x + 8y - 11 = 0$.
4. Find the coordinates of the points on the parabola $y^2 = 8x$ whose focal distance is 10.



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P.T.O.

5. If $3x - 4y + k = 0$ is a tangent to $x^2 - 4y^2 = 5$, find the value of k .

6. Evaluate $\int \sqrt{1 - \cos 2x} \, dx$ on $I \subset [2n\pi, (2n + 1)\pi]$, $n \in \mathbb{Z}$.

7. Evaluate $\int \frac{x^8}{1 + x^{18}} \, dx$ on \mathbb{R} .

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

9. Find $\int_0^{\pi/2} \cos^8 x \, dx$.

10. Find the order and degree of

$$\left[\frac{d^3 y}{dx^3} \right]^2 - 3 \left[\frac{dy}{dx} \right]^2 - e^x = 4$$

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 formed by $x^2 + y^2 = a^2$ on the line $x \cos \alpha + y \sin \alpha = P$.

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12. Find the equation of the circle which cuts orthogonally the circle $x^2 + y^2 - 4x + 2y - 7 = 0$ and having the center at (2, 3).
13. Find the eccentricity, coordinates of foci, length of latus rectum and equations of directrices of the following ellipse :
 $9x^2 + 16y^2 - 36x + 32y - 92 = 0$.
14. Find the condition for the line $lx + my + n = 0$ to be a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.
15. Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are (i) parallel and (ii) perpendicular to the line $y = x - 7$.

16. Evaluate $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$.

17. Solve the differential equation

$$\frac{dy}{dx} = \frac{xy + y}{xy + x}$$

SECTION - C

5 × 7 = 35

III. Long Answer Type questions :

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

18. Find the equation of circle passing through (3, 4), (3, 2), (1, 4).
19. Find the equation of circle with center (-2, 3) cutting a chord length 2 units on $3x + 4y + 4 = 0$.

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P.T.O.

20. Derive the equation of the parabola in standard form.

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

22. Evaluate $\int \frac{dx}{x(x+1)(x+2)}$.

23. Evaluate $\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$.

24. Solve the differential equation
 $(x^2 + y^2) dy = 2xy dx$.
