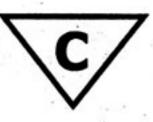
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Total No. of Questions - 24

Total No. of Printed Pages - 4

Regd.
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

 $10 \times 2 = 20$

- I. Very Short Answer Type questions.
 - (i) Attempt all questions.
 - (ii) Each question carries two marks.
 - 1. Obtain the parametric equation of the circle $4(x^2 + y^2) = 9$.
 - 2. Find the value of k, if the points (4, 2) and (k, -3) are conjugate points with respect to the circle $x^2 + y^2 5x + 8y + 6 = 0$.
 - 3. Find the angle between the circles given by the equations $x^2 + y^2 12x 6y + 41 = 0$, $x^2 + y^2 + 4x + 6y 59 = 0$.
 - 4. Find the coordinates of the points on the parabola $y^2 = 8x$ whose focal distance is 10.
 - 5. If 3x 4y + k = 0 is a tangent to the hyperbola $x^2 4y^2 = 5$ find the value of k.

6. Evaluate
$$\int \frac{1}{\cos hx + \sin hx} dx$$
 on R.

7. Evaluate
$$\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx \text{ on } I \subset \mathbb{R} \setminus \{x \in \mathbb{R} : \cos(xe^x) = 0\}$$

8. Evaluate
$$\int_{-\pi}^{\frac{\pi}{2}} \sin |x| dx.$$

9. Evaluate
$$\int_{0}^{3} \frac{x}{\sqrt{x^2 + 16}} dx$$
.

 Find the order of the differential equation of the family of all the circles with their centres at the origin.

$$5 \times 4 = 20$$

- Short Answer Type questions.
 - (i) Attempt any five questions.
 - (ii) Each question carries four marks.
 - 11. If a point P is moving such that the lengths of tangents drawn from P to the circles $x^2 + y^2 4x 6y 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$ are in the ratio 2:3 then find the equation of the locus of P.
 - 12. Find the equation and the length of the common chord of the following circles:

$$x^{2} + y^{2} + 2x + 2y + 1 = 0$$
; $x^{2} + y^{2} + 4x + 3y + 2 = 0$

0293/TS (Day-8)

- 13. Find the equation of ellipse in the standard form, if it passes through the points (-2, 2) and (3, -1).
- 14. Find the equation of the tangents to the ellipse $2x^2 + y^2 = 8$ which are
 - (i) parallel to x 2y 4 = 0
 - (ii) perpendicular to x + y + 2 = 0
- 15. If e, e₁ are the eccentricities of a hyperbola and its conjugate hyperbola prove that $\frac{1}{e^2} + \frac{1}{e_1^2} = 1$.

deduce the value of costa de.

- 16. Find the area of the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.
- 17. Solve the following differential equation $(x + y + 1) \frac{dy}{dx} = 1$.

SECTION - C

 $5 \times 7 = 35$

- III. Long Answer Type questions.
 - (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. Derive the equation of a parabola in the standard form $y^2 = 4ax$ with diagram.

- 21. Evaluate $\int \frac{9 \cos x \sin x}{4 \sin x + 5 \cos x} dx.$
- 22. If $I_n = \int \cos^n x \, dx$, then show that $I_n = \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$ and for $n \ge 2$ deduce the value of $\int \cos^4 x \, dx$.
- 23. Show that $\int_{0}^{\frac{\pi}{2}} \frac{x}{\sin x + \cos x} \, dx = \frac{\pi}{2\sqrt{2}} \log \left(\sqrt{2} + 1\right).$
- 24. Solve the differential equation (x y)dy = (x + y + 1)dx.