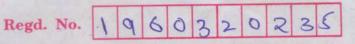
0293



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



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

 $10 \times 2 = 20$

- Very short answer type questions: I.
 - Answer ALL questions.
 - (ii) Each question carries TWO marks.
- Write the parametric equations of the circle $2x^2 + 2y^2 = 7$. 1.
- Find the value of k if the points (1, 3) and (2, k) are conjugated with 2. respect to the circle $x^2 + y^2 = 35$.
- Find the equation of radical axis of the circles $x^2 + y^2 + 4x + 6y 7 = 0$, 3. $4(x^2+y^2)+8x+12y-9=0.$
- Find the equation of the normal to the parabola $y^2 = 4x$ which is parallel 4. to y - 2x + 5 = 0.
- If the eccentricity of the hyperbola is $\frac{5}{4}$, then find the eccentricity of its 5. conjugate hyperbola.
- Evaluate: 6.

$$\int \frac{1+\cos^2 x}{1-\cos 2x} dx, \text{ on } I \subset \mathbb{R} \setminus \{n\pi : n \in z\}.$$

7. Evaluate:

$$\int \frac{1}{x \log x [\log (\log x)]} dx, \text{ on } (1, \infty)$$

8. Evaluate:

$$\int_{0}^{a} (\sqrt{a} - \sqrt{x})^{2} dx.$$

9. Find :

$$\int\limits_{0}^{\pi/2}\cos^{11}x\ dx$$

10. Find the general solution of:

$$\frac{dy}{dx} = \frac{2y}{x}.$$

SECTION B

 $5 \times 4 = 20$

II. Short answer type questions:

- (i) Answer ANY FIVE questions.
- (ii) Each question carries FOUR marks.
- 11. Find the equation of the circle which cuts orthogonally the circle $x^2 + y^2 4x + 2y 7 = 0$ and having the centre at (2, 3).
- 12. The line y = mx + c and the circle $x^2 + y^2 = a^2$ intersect at A and B. If AB = 2λ , then show that:

$$c^2 = (1 + m^2)(a^2 - \lambda^2).$$

- 13. Find the equation of the ellipse with focus at (1, -1), $e = \frac{2}{3}$ and directrix as x + y + 2 = 0.
- 14. Find the equations of tangents to the ellipse $2x^2 + 3y^2 = 11$ at the points whose ordinate is 1.

- 15. Find the foci, eccentricity, equations of the directrix, length of latus rectum of the hyperbola $x^2 4y^2 = 4$.
- 16. Find:

$$\int_{0}^{2\pi} \sin^4 x \cos^6 x \, dx$$

17. Solve the differential equation:

$$\cos x \, \frac{dy}{dx} + y \sin x = \sec^2 x.$$

SECTION C

 $5 \times 7 = 35$

- III. Long answer type questions:
 - (i) Answer ANY FIVE questions.
 - (ii) Each question carries SEVEN marks.
- 18. Show that the points (9, 1), (7, 9), (-2, 12), (6, 10) are concyclic and find the equation of the circle on which they lie.
- 19. Show that, four common tangents can be drawn for the circles given by $x^2 + y^2 14x + 6y + 33 = 0$ and $x^2 + y^2 + 30x 2y + 1 = 0$ and find the internal and external centres of similitude.
- **20.** From an external point 'P' tangents are drawn to the parabola $y^2 = 4ax$ and these tangents make angles θ_1 , θ_2 with its axis, such that $\cot \theta_1 + \cot \theta_2$ is a constant 'd'. Then show that all such P lie on a horizontal line.

P.T.O. 0

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21. Evaluate:

$$\int e^{ax} \sin(bx+c)dx; (a, b, c \in \mathbb{R}; b \neq 0) \text{ on } \mathbb{R}.$$

- 22. Obtain reduction formula for $I_n = \int \cot^n x \, dx$; n being a positive integer; $n \ge 2$ and deduce the value of $\int \cot^4 x \, dx$.
- 23. Find:

$$\int_{0}^{\pi} x \sin^7 x \cos^6 x \, dx.$$

24. Solve the differential equation:

$$\frac{dy}{dx} = \frac{2y + x + 1}{2x + 4y + 3}$$