



Total No. of Questions : 24

Total No. of Printed Pages : 3

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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

10x2=20

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° then find its eccentricity of hyperbola.

6. Evaluate : $\int \sec^2 x \operatorname{cosec}^2 x \, dx$

7. Evaluate : $\int e^{\log(1+\tan^2 x)} \, dx$.

8. Find the value of $\int_0^{\pi} 2 \cos^7 x \sin^2 x \, dx$.

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

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

SECTION - B

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 $x^2 + y^2 - x + 3y - 2 = 0$ 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

5x7=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. Define parabola and obtain the standard form of the parabola $yy^2 = 4ax$, (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 : $\int_0^{\pi/4} \frac{\sin x + \cos x}{9+16\sin 2x} \, dx$.

24. Solve : $(1 + e^{x/y})dx + e^{x/y}(1 - \frac{x}{y})dy = 0$.

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