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II

Total No. of Questions : 24
Total No. of Printed Pages : 3

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

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 $\int_0^{\frac{\pi}{2}} \cos^7 x \sin^2 x \, dx$

9. Find the area of the region enclosed by the given curves $x = 4 - y^2$, $x = 0$

10. Find the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{5}} + \left(\frac{dy}{dx}\right)^{\frac{2}{5}} = 6y$

SECTION - B

II. Short answer type questions : 6×4

(i) Attempt *any five* questions.

(ii) Each question carries *four* marks.

11. Find the length of the chord intercepted by the circle $x^2 + y^2 - x + 3y - 22 = 0$ 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

III. Long answer type questions : 5×7=35

(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 $y^2 = 4ax$, $(a > 0)$.

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 : $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} \, dx$.

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