0293 **A**

Total No. of Questions 37 Regd. No.

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 × 2 = 20

I. Very Short Answer Type questions.

(i) Answer any **ten** questions.

(ii) Each question carries **two** marks.

1. Find the equation of the circle passing through (2, –1) having the centre at (2, 3).

2. If $x^2 + y^2 - 4x + 6y + c = 0$ represents a circle with radius 6, then find the value of c.

3. Find the value of k if the points (1, 3) and (2, k) are conjugate with respect to the circle $x^2 + y^2 = 35$.

4. Find the chord of contact of (0, 5) with respect to the circle $x^2 + y^2 - 5x + 4y - 2 = 0$.

5. Find the angle between the circles $x^2 + y^2 + 6x - 10y - 135 = 0$ and $x^2 + y^2 - 4x + 14y - 116 = 0$.

6. Find the common tangent of the circles $x^2 + y^2 + 10x - 2y + 22 = 0$ and $x^2 + y^2 + 2x - 8y + 8 = 0$ at their point of contact.

7. Find the equation of the parabola whose vertex is (3, –2) and focus is (3, 1).

8. If the eccentricity of a hyperbola is $\frac{5}{4}$, then find the eccentricity of its conjugate hyperbola

9. Evaluate $\int\left[\frac{1}{1-x^2} + \frac{1}{1+x^2}\right] dx$ on (–1, 1).

10 Evaluate $\int (x^3 - 2x^2 + 3)\, dx$ on R.

11. Evaluate $\int \frac{e^{\tan^{-1} x}}{1+x^2}\, dx$ on $I \subset (0, \pi)$.

12. Evaluate $\int \frac{3x^2}{1+x^6}\, dx$ on R.

13. Evaluate $\int_0^5 (x + 1)\, dx$.

14. Evaluate $\int_0^{\pi} \sqrt{(2 + 2\cos\theta)}\, d\theta$.

15. Find the order and degree of the differential equation $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{5}{3}}$.

SECTION - B

$5 \times 4 =$

I. Short Answer Type questions

(i) Answer any **five** questions.

(ii) Each question carries **four** marks.

16. 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

17. Find the pole of $3x + 4y - 45 = 0$ with respect to $x^2 + y^2 - 6x - 8y + 5 = 0$.

18. Find the angle between the tangents drawn from (3, 2) to the circle $x^2 + y^2 - 6x + 4y - 2 = 0$.

19. 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).

20. 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.

21. Find the equation of ellipse in the standard form if it passes through the points (–2, 2) and (3, –1).

22. Find the equation of ellipse in the standard form whose distance from foci is 2 and the length of latus rectum is $\frac{15}{2}$.

SECTION - C

5×7

III. Long Answer Type questions.

(i) Answer any **five** questions.

(ii) Each question carries **seven** marks.

24. Find the equation of the circle passing through the points (3, (3, 2) and (1, 4).

26. Solve the differential equation $\frac{dy}{dx} = \frac{xy + y}{xy + x}$.

27. Solve the differential equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$.

SECTION – C

III. Long Answer Type questions.

(i) Answer any **five** questions.

(ii) Each question carries **seven** marks.

28. Find the equation of the circle passing through the points (3, 4), (3, 2) and (1, 4).

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

30. Find the equation of the circle which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at (5, 5) with radius 5.

31. Find the equation of the circle passing through origin, having its centre on the line $x + y = 4$ and intersecting the circle $x^2 + y^2 - 4x + 2y + 4 = 0$ orthogonally.

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

33. Evaluate $\int \frac{(a^x - b^x)^2}{a^x b^x}\, dx$, $(a > 0, a \neq 1, b > 0, b \neq 1)$ on R.

34. Evaluate $\int \frac{1}{(x+3)\sqrt{x+2}}\, dx$ on $I \subset (-2, \infty)$

35. Evaluate $\int \frac{dx}{\cos^2 x + \sin 2x}$ on

$$I = R - \left\{(2n+1)\frac{\pi}{2}, n \in Z\right\} \cup \left\{2n\pi + \tan^{-1}\frac{1}{2}, n \in Z\right\}.$$

36. Evaluate $\int_0^{\frac{\pi}{4}} \log(1 + \tan x)\, dx$.

37. Solve the **differential equation** $\frac{dy}{dx} = \tan^2(x + y)$.

3