293

II

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

Regd. No. | | | | | | | | | | 9 |

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) Attempt **all** questions.

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

1. Find the equation of circle with centre (1, 4) and radius 5.

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

3. Find the equation of the radical axis of the circles $2x^2 + 2y^2 + 3x + 6y - 5 = 0$ and $3x^2 + 3y^2 - 7x + 8y - 11 = 0$.

4. Find the co-ordinates of the points on the parabola $y^2 = 8x$ whose focal distance is 10.

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

6. Evaluate $\int e^x \sin e^x \, dx$ on R.

7. Evaluate $\int e^x(\sin x + \cos x) \, dx$ on R.

8. Evaluate $\int_2^3 \frac{2x}{1+x^2}\,dx$

9. Find $\int_0^{\pi/2} \sin^7 x\,dx$

10. Find the general solution of $\frac{dy}{dx} = \frac{2y}{x}$

SECTION – B

$5 \times 4 = 20$

II. Short Answer Type questions :

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

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

11. Find the pole of $x + y + 2 = 0$ with respect to the circle $x^2 + y^2 - 4x + 6y - 12 = 0$.

12. Find the equation and length of the common chord of the circles $x^2 + y^2 + 2x + 2y + 1 = 0, x^2 + y^2 + 4x + 3y + 2 = 0$.

13. Find the length of latus rectum, eccentricity, co-ordinates of centre and foci of the ellipse $9x^2 + 16y^2 = 144$.

14. Show that the locus of the feet of the perpendiculars drawn from foci to any tangent of the ellipse is the auxiliary circle.

15. Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are (i) parallel and (ii) perpendicular to the line $y = x - 7$.

16. Evaluate $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x}\, dx$.

17. Solve the differential equation :

$$\frac{dy}{dx} + y \tan x = \cos^3 x$$

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. Show that the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$ touch each other. Also find the point of contact and common tangent at this point of contact.

20. Show that the equation of the parabola in the standard form is $y^2 = 4ax$.

21. Evaluate the integral $\int \frac{3x + 1}{x^2 + 3x + 12}\, dx$.

22. Obtain the reduction formula for $\int \sin^n x\, dx$ for an integer $n \geq 2$ and deduce the value of $\int \sin^4 x\, dx$.

23. Evaluate $\int_0^{\pi/4} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$

24. Solve the differential equation $(x^2 + y^2)\, dx = 2xydy$.
