0293
(TS)

B

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

Regd. No.

Part - III

MATHEMATICS, Paper - II (B)

(Coordinate Geometry and Calculus)

(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 a circle which is concentric with $x^2+y^2-6x-4y-12=0$ and passing through $(-2, 14)$.

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 $x^2+y^2-3x-4y+5=0$ and $3(x^2+y^2)-7x+8y-11=0$.

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

5. If $3x-4y+k=0$ is a tangent to the hyperbola $x^2-4y^2=5$, then find the value of 'k'.

6. Evaluate $\int \sqrt{1-Sin\,2x}\,dx$ on $I \subset \left[2n\pi - \frac{3\pi}{4},\ 2n\pi + \frac{\pi}{4}\right]$, $n \in Z$.

7. Evaluate $\int Cos\sqrt{x}\,dx$ on IR.

8. Evaluate $\int_{-\pi/2}^{\pi/2} \frac{Cos\,x}{1+e^x}dx$.

9. Find the area of the region enclosed by $y=x^3+3$, $y=0$, $x=-1$, $x=2$. Note

10. Find the order and degree of the differential equation

$$\left[\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3\right]^{6/5} = 6y.$$

SECTION B

5 × 4 = 20

II. Short Answer Type Questions.

i) Attempt **any five** questions.

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

11. Find the equation of the tangent to $x^2+y^2-2x+4y=0$ at $(3, -1)$. Also find the equation of tangent parallel to it.

12. Find the equation of the circle passing through the points of intersection of the circles $x^2+y^2-8x-6y+21=0$, $x^2+y^2-2x-15=0$ and $(1, 2)$.

13. If the normal at one end of a latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through one end of the minor axis, then show that $e^4 + e^2 = 1$ (e = eccentricity of the ellipse).

14. Find the eccentricity, length of latus rectum, foci and the equations of directrices of the ellipse $9x^2 + 16y^2 = 144$.

15. Prove that the point of intersection of two perpendicular tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ lies on the circle $x^2 + y^2 = a^2 - b^2$.

16. Evaluate $\int_{-a}^{a} x^2 \left(a^2 - x^2\right)^{3/2} dx$.

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

SECTION C

5 × 7 = 35

III. Long Answer Type Questions.

i) Attempt **any five** questions.

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

18. Find the equation of a circle passing through (2, –3) and (–4, 5) and having a centre on $4x + 3y + 1 = 0$.

19. Show that the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $5\left(x^2 + y^2\right) - 8x - 14y - 32 = 0$ touch each other. Also find the point of contact and common tangent at this point of contact.

20. Find the equation of the parabola whose axis is parallel to X-axis and which passes through the points $(-2, 1)$, $(1, 2)$ and $(-1, 3)$.

21. Evaluate $\int\sqrt{\frac{5-x}{x-2}}\,dx$ on $(2, 5)$.

22. Obtain the reduction formula for $I_n = \int Tan^n x\,dx$, n being a positive integer $n \geq 2$ and deduce the value of $\int Tan^6 x\,dx$.

23. Evaluate $\int_0^1 \frac{Log(1+x)}{1+x^2}\,dx$.

24. Find the solution of the equation $x(x-2)\frac{dy}{dx} - 2(x-1)\,y = x^3\,(x-2)$, which satisfies the condition that $y=9$ when $x=3$.