MATHEMATICS

Paper – II (B)

(English Version)

Time : 3 Hours

Max. Marks

Note: This question paper consists of **three** sections A, B and C.

SECTION – A (10 × 2

I.   Very short answer type questions:

  (i)   Answer **all** questions.

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

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

2. Find the chord of contact of $(1,1)$ to the circle $x^2 + y^2 = 9$.

3. Find K if the pair of circles $x^2 + y^2 + 4x + 8 = 0$, $x^2 + y^2 - 16y + k =$ orthogonal.

4. Show that the line $2x - y + 2 = 0$ is a tangent to the parabola $y^2 = 16x$.

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

6. Evaluate $\int \frac{1}{(x+3)\sqrt{x+2}} dx$, $x \in I \, C \, (-2, \infty)$.

7. Evaluate $\int e^x \frac{(1 + x \log x)}{x} dx$ on $(0, \infty)$.

[P.T.O.

$(5 \times 4 = 20)$

II. Short answer type questions:

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

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

11. 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.

12. Find the radical centre of the circles $x^2 + y^2 - 4x - 6y + 5 = 0$, $x^2 + y^2 - 2x - 4y - 1 = 0$, $x^2 + y^2 - 6x - 2y = 0$. $5/6, 7/6$

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

14. If the normal at one end of a latus rectum of the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ passes through one end of the minor axis, then show that $e^4 + e^2 = 1$.
[e is the eccentricity of the ellipse].

5. Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are

(i) Parallel and

(ii) Perpendicular to the line $y = x - 7$.

Find the area of the region enclosed by the curves $y = e^x$, $y = x$, $x = 0$, $x = 1$.

Solve the differential equation $(e^x + 1)\, y\, dy + (y + 1)\, dx = 0$.

III. Long answer type questions.

(i) Answer 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 $x^2 + y^2 - 6x - 9y + 13 = 0$, $x^2 + y^2 - 2x - 16y$
    Find the point of contact and the equation of common ta
    contact.

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

1. Evaluate $\int \dfrac{dx}{4+5\sin x}$.

2. If $I_n = \int \sin^n x \, dx$ for an integer $n \geq 2$, then show that

$$I_n = \frac{-\sin^{n-1} x \cos x}{n} + \frac{(n-1)}{n} I_{n-2}.$$

3. Evaluate $\displaystyle\int_0^{\pi} \frac{x}{1+\sin x} \, dx$.