

SR. INTER MATHEMATICS-IIB**SECTION - I****I) Answer the following questions:-****10 x 2 = 20M**

- 1) 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.
- 2) Obtain the parametric equation of the circle $x-3^2 + y-4^2 = 8^2$.
- 3) Show that the angle between the circles $x^2 + y^2 = a^2$, $x^2 + y^2 = ax + ay$ is $\frac{3\pi}{4}$
- 4) If $\left(\frac{1}{2}, 2\right)$ is one extremity of a focal chord of the parabola $y^2 = 8x$, find the coordinates of the other extremity.
- 5) Define rectangular hyperbola and find its eccentricity
- 6) $\int \frac{1}{x \log x [\log \log x]} dx$ on $1, \infty$.
- 7) Evaluate $\int e^x \frac{1+x \log x}{x} dx$
- 8) Find $\int_0^2 |1-x| dx$
- 9) $\int_0^{\frac{\pi}{2}} \cos^7 x \sin^2 x dx$
- 10) Find order and degree of $\left[\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx} \right)^3 \right]^{\frac{6}{5}} = 6y$

SECTION - II**II) Answer any five of the following questions:-****5 x 4 = 20M**

- 11) If the abscissa of points A,B are the roots of the equation $x^2 + 2ax - b^2 = 0$ and ordinates of A,B are the roots of $y^2 + 2py - q^2 = 0$, then find the equation of a circle for which \overline{AB} is a diameter.
- 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 length of major axis, minor axis, latus rectum, eccentricity, coordinates of center, foci and the equation of directorix of the ellipse $4x^2 + y^2 - 8x + 2y + 1 = 0$
- 14) If P is a point of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, whose foci S and S' then show that $SP + S'P = 2a$ (constant)
- 15) Find the equations of the tangents to the hyperbola $3x^2 - 4y^2 = 12$ which are perpendicular to the line $y=x-7$
- 16) Find the area enclosed between the curves $y^2 = 4x$ and $x^2 = 4y$
- 17) Solve $\frac{dy}{dx} + y \sec x = \tan x$

SECTION – III

III) Answer any five of the following questions:

5 x 7 = 35 M

- 18) Find the value of 'C' if the points (2,0), (0,1), (4,5) and (0,C) are concyclic
- 19) Find the equation of a circle which passes through the points (4,1), (6,5) and having centre on $4x + 3y - 24 = 0$
- 20) Derive the equation of parabola $y^2 = 4ax$ in standard form
- 21) Evaluate $\int \frac{2 \sin x + 3 \cos x + 4}{3 \sin x + 4 \cos x + 5} dx$
- 22) Obtain reduction formula for $I_n = \int \sin^n x dx$ $n \geq 2$, and also evaluate $\int \sin^6 x dx$
- 23) Show that $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log \sqrt{2} + 1$
- 24) Solve $2x + y + 3 dx = 2y + x + 1 dy$
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