

Sr. INTER MATHEMATICS 2018 MODEL PAPER

MATHS PAPER - IIB

Time: 3 Hours

Max. Marks: 75

SECTION - A

Very Short Answer Questions

$10 \times 2 = 20$

Attempt All Questions. Each question carries 2 Marks.

- Find the number of common tangents that can be drawn to the two circles $x^2 + y^2 + 4x - 6y - 3 = 0$ and $x^2 + y^2 + 4x - 2y + 4 = 0$
- Find the equation of the sphere on the line joining the points $(2, 3, 4)$ and $(-5, 6, -7)$ as a diameter.
- Find the equation of the normal to the parabola $y^2 = 4x$ having slope 1.
- Find the equation of the hyperbola with foci $(\pm 2, 0)$ and eccentricity $\frac{3}{2}$.
- Find the n^{th} derivative of $e^{2x} \sin x \cos 5x$
- Evaluate $\int \frac{x^4 + x^2 + 1}{x^2 + 1} dx$
- Evaluate $\int \frac{e^x}{e^{\frac{x}{2}} - 1} dx$
- Evaluate $\int_0^{\pi} x \sin^5 x \cos^6 x dx$
- Find the area of the region bounded by one arc of the curve $y = \sin x$ and the x-axis.
- Find the order and degree (If defined) of the differential equation

$$y = 1 + \left(\frac{dy}{dx}\right) + \frac{1}{2!} \left(\frac{dy}{dx}\right)^2 + \frac{1}{3!} \left(\frac{dy}{dx}\right)^3 + \dots$$

SECTION - B

SHORT ANSWER QUESTIONS

$5 \times 4 = 20$

Attempt any 5 questions. Each question carries 4 Marks

11. Find the locus of the poles of tangents to the circle $x^2 + y^2 = a^2$ W.r.t. $(x + a)^2 + y^2 = 2a^2$
12. Show that the locus of the poles of Chords of the Parabola $y^2 = 4ax$ Which Subtend a right angle at the Vertex is $x + 4a = 0$
13. Find the mid point of the chord intercepted by the hyperbola $9x^2 - 16y^2 = 144$ on the line $9x - 8y - 10 = 0$
14. Show that the polar equation of a conic in the standard form is $\frac{l}{r} = 1 - e \cos \theta$
15. Evaluate $\int \frac{1}{(x-1)\sqrt{x^2+1}} dx$
16. Solve $\frac{dy}{dx} = \frac{2x + y + 3}{2y + x + 1}$
17. Solve $(x + y + 1) \frac{dy}{dx} = 1$

SECTION - C

LONG ANSWER QUESTIONS

$5 \times 7 = 35$

Attempt any 5 questions. Each question carries 7 marks.

18. Find the equations of common tangents to the circles $x^2 + y^2 + 22x - 4y - 100 = 0$ and $x^2 + y^2 - 22x + 4y + 100 = 0$
19. Find the equation of the circle passing through the origin, having its centre on the line $x + y - 4 = 0$ and intersecting the circle $x^2 + y^2 - 4x + 2y + 4 = 0$ orthogonally.
20. Show that the equation of an ellipse in the standard form is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
21. If $y = e^x \cdot \log x$ then show that $xy_2 - (2x - 1)y_1 + (x - 1)y = 0$ and hence deduce that $xy_{n+2} - (2x - 1 - n)y_{n+1} + (x - 1 - 2n)y_n + ny_{n-1} = 0$

22. Evaluate $\int \frac{\sqrt{5-x}}{x-2} dx$

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

24. Find the area of one of the curvilinear triangles bounded by $y = \sin x$, $y = \cos x$ and x-axis.