MATHEMATICS HSSC-II



Time allowed: 2:35 Hours

Total Marks Sections B and C: 80

NOTE: Attempt any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION - B (Marks 40)

Q. 2 Attempt any TEN parts. All parts carry equal marks.

 $\{10 \times 4 = 40\}$

- (i) Evaluate $\lim_{\theta \to 0} \frac{1 \cos \theta \theta}{1 \cos \theta \theta}$
- (ii) Find the values of m and n so that the given function f is continuous:

$$f(x) = \begin{cases} mx & \text{if } x < 3 \\ n & \text{if } x = 3 \\ -2x + 9 & \text{if } x > 3 \end{cases}$$

- (iii) If $y = \sqrt{x} \frac{1}{\sqrt{x}}$, then show that $2x \frac{dy}{dx} + y 2\sqrt{x}$
- (iv) Differentiate ab ignition w.r.t x if $y = \sin \sqrt{x}$
- (v) Prove that $e^{X+h} = e^{X} \{1 + h + \frac{h^2}{12} + \frac{h^2}{13} + \dots \}$
- (vi) Evaluate f(lnx)² dx
- (vii) Write the equation of the parabola with focus (-1,0) and vertex (-1,2).
- (viii) Solve $\frac{dy}{dx} = \frac{y^2 + 1}{e^{-x}}$
- (ix) Find an equation of an ellipse with foci $(-3\sqrt{3},0)$ and vertices $(\pm 6,0)$.
- (x) Write the equation of the tangent to the conic $3x^2 7y^2 = 20$ at the points where y = -1
- (xi) Show that 10xy + 8x 15y 12 = 0 represents a pair of straight lines.
- (xii) Find the values of "a" and "b" so that the vectors 3i j + 4k and ai + bj 2k are parallel.
- (xiii) Find 'k' so that the line joining A(7,3); B(k,-6) and the line joining C(-4,5) and D(-6,4) are perpendicular.
- (xiv) Find measure of the angle between the lines represented by $x^2 xy 6y^2 = 0$.

SECTION - C (Marks 40)

Note: Attempt any FIVE questions. All questions carry equal marks.

 $(5 \times 8 = 40)$

- Q. 3 Prove that $\lim_{x \to 0} \frac{\sqrt{x+a} \sqrt{a}}{x} = \frac{1}{2\sqrt{a}}$
- Q. 4 Expand a^x in the Maclaurin series.
- Q. 5 Evaluate $\int \frac{e^x(x^2+1)}{(x-1)^2} dx$
- **Q.6** If $x = a(\theta + \sin \theta)$; $y = a(1 \cos \theta)$ then show that $y^2 \frac{d^2y}{dx^2} + a = 0$
- Q. 7 The points A(-1,2), B(6,3) and C(2,-4) are vertices of a triangle. Show that the line joining the midpoint D of AB and mid point E of AC is parallel to BC and $DE = \frac{1}{2}BC$
- Q. 8 Find the center, foci, eccentricity and vertices of $\frac{(x-1)^2}{2} \frac{(y-1)^2}{6} = 1$.
- Q. 9 Find a vector perpendicular to each of the vectors $\vec{a} = 2\vec{l} + \vec{j} + \vec{k}$ and $\vec{b} = 4\vec{l} + 2\vec{j} \vec{k}$

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