

(2)

4. Write short answers to any Nine parts.

(9 x 2 = 18)

- Graph the solution set of the linear inequality $3x - 2y \geq 6$ in xy -plane.
- Define Corner Point.
- Find an equation of the circle with ends of a diameter at $(-3, 2)$ and $(5, -6)$.
- Write down the equation of normal to the circle $x^2 + y^2 = 25$ at $(4, 3)$.
- Find the focus and directrix of the parabola $x^2 = 4(y-1)$.
- Find the length of the tangent drawn from the point $(-5, 4)$ to the circle $5x^2 + 5y^2 - 10x + 15y - 131 = 0$.
- Find the foci and eccentricity of $\frac{y^2}{16} - \frac{x^2}{9} = 1$.
- Find an equation of the ellipse with Foci $(\pm 3, 0)$ and minor axis of length 10.
- Let $A = (2, 5)$, $B = (-1, 1)$, $C = (2, -6)$ find $2\overline{CB} - 2\overline{CA}$.
- If " O " is the origin and $\overline{OP} = \overline{AB}$, find the point P when A and B are $(-3, 7)$ and $(1, 0)$ respectively.
- Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k}$, $-2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are coplanar.
- If $\underline{v} = 3\underline{i} - 2\underline{j} + 2\underline{k}$ and $\underline{w} = 5\underline{i} - \underline{j} + 3\underline{k}$. Find $|3\underline{v} + \underline{w}|$.
- Find the direction cosines of $\underline{v} = 6\underline{i} - 2\underline{j} + \underline{k}$

SECTION - C

(Each question carries 10 marks)

$$5. (a) \text{ If } f(x) = \begin{cases} 3x & \text{if } x \leq -2 \\ x^2 - 1 & \text{if } -2 < x < 2 \\ 3 & \text{if } x \geq 2 \end{cases}$$

Discuss the continuity at $x = 2$ and $x = -2$

$$(b) \text{ If } y = e^x \sin x, \text{ prove that } \frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 2y = 0$$

$$6. (a) \text{ Evaluate } \int \frac{\sqrt{2}}{\sin x + \cos x} dx$$

$$(b) \text{ Find an equation of the perpendicular bisector of the segment joining the points } A(3, 5) \text{ and } B(9, 8).$$

$$7. (a) \text{ Evaluate } \int_0^{\frac{\pi}{4}} \frac{\cos \theta + \sin \theta}{2 \cos^2 \theta} d\theta$$

$$(b) \text{ Minimize } f(x, y) = 2x + y \text{ subject to the constraints } x + y \geq 3, 7x + 5y \leq 5, x \geq 0, y \geq 0$$

$$8. (a) \text{ Find the condition that the lines } y = m_1 x + c_1; y = m_2 x + c_2 \text{ and } y = m_3 x + c_3 \text{ are concurrent.}$$

$$(b) \text{ Determine the equation of tangent to the circle } x^2 + y^2 = 2 \text{ parallel to the line } x - 2y + 1 = 0$$

$$9. (a) \text{ Find the centre, foci, eccentricity, vertices and equation of directrices of } \frac{x^2}{4} - \frac{y^2}{9} = 1$$

$$(b) \text{ Prove that } \cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$