

19. (a) Prove that the equation

$$12x^2 + 7xy - 10y^2 + 13x + 45y - 35 = 0$$

represents a pair of two straight lines and find the angle between them.

(b) Calculate the arithmetic mean, median of the frequency distribution given below.

$x$ :	0-10	10-20	20-30	30-40
$f$ :	5	8	3	4

**9198/A11**

**OCTOBER 2010**

**MATHEMATICS**

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. Evaluate  $\lim_{x \rightarrow 1} \frac{\sqrt{1+x} - 1}{x}$ .

2. Find  $\frac{dy}{dx}$ , when  $x^3 + 3axy + y^3 = a^3$ .

3. Evaluate  $\int \frac{dx}{\sqrt{2x^2 + 3x + 4}}$ .

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

5. Prove that the diagonals of a parallelogram bisect each other.

6. Find the inverse of the matrix.

$$A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$$

7. Prove that  $x^2 + 9y^2 + 6xy + 4x + 12y - 5 = 0$  represents two parallel straight lines.

8. Find the equation of the circle which passes through the points (3, 4), (3, 6), (-1, 2).

9. Calculate the Arithmetic mean from the following frequency table:

$x$ :	50	48	46	44	42	40
$y$ :	12	14	16	13	11	9

10. Obtain the standard deviation of the following data:

$x$ :	2.0	2.5	3.0	3.5	4.0	4.5	5.0
$y$ :	5	38	65	92	70	40	10

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Find the  $n^{\text{th}}$  derivative of  $y$ , when

$$y = \frac{x^2}{(x-1)^2(x+2)}.$$

12. Prove that  $\int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} dx = \frac{1}{\sqrt{2}} \log(\sqrt{2} + 1)$ .

13. Solve the system of equations;

$$x + 2y + 3z = 1$$

$$2x + 3y + 2z = 2$$

$$3x + 3y + 4z = 1$$

by matrix method.

14. Solve  $(x^2 - y^2) dx + 2xy dy = 0$ .

15. Solve  $\sqrt{p} + \sqrt{q} = 2x$ .

16. Obtain the correlation coefficient from the following:

$x$ :	65	66	67	67	68	69	70	72
$y$ :	67	68	65	68	72	72	69	71

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. (a) Find the  $n^{\text{th}}$  differential coefficient of  $x^2 \log x$ .

(b) Obtain the equation to the tangent to  $y = f(x)$  at  $(x_1, y_1)$ .

18. (a) Evaluate  $\int_0^{\pi/2} \log \sin x dx$ .

(b) Prove that

$$\vec{i} \times (\vec{a} \times \vec{i}) + \vec{j} \times (\vec{a} \times \vec{j}) + \vec{k} \times (\vec{a} \times \vec{k}) = 2\vec{a}.$$