

18. (a) Find by vector method the angle between the diagonals of the cube.
- (b) Prove that the equations $12x^2 + 7xy - 10y^2 + 13x + 45y - 35 = 0$ represent a pair of straight lines and find the angle between them.

19. Calculate the arithmetic mean and the median of the frequency distribution given below. Hence calculate mode.

Class limits :	130-134	135-139	140-144	145-149
Frequency :	5	15	28	24
Class limits :	150-154	155-159	160-164	
Frequency :	17	10	1	

5211/A11

MAY 2011

MATHEMATICS

Time : Three hours Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

- Find the derivative of $x^2 \sin x + \sqrt{x}$.
- If $xy = ae^x + be^{-x}$ prove that $x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} - xy = 0$.
- Evaluate $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$.
- Evaluate $\int x \log x dx$.
- Determine λ and μ by using vectors such that the points $(-1, 3, 2)$, $(-4, 2, -2)$ and $(5, \lambda, \mu)$ lie on a straight line.

6. Find the value of

(a) $2A+B$

(b) $B-3C$ where $A = \begin{pmatrix} 1 & 0 \\ -1 & 2 \end{pmatrix}$ $B = \begin{pmatrix} 3 & 1 \\ 0 & -1 \end{pmatrix}$.

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

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

9. Find the G.M. and H.M. of the following distribution.

$x:$	1	2	3	4	5
$f:$	2	4	3	2	1

10. A random variable has the following distribution.

$x:$	4	5	6	8
probability:	0.1	0.3	0.4	0.1

Find the mean and standard deviation of x .

PART B — $(4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Find the equations of tangent to the curve $x^2 - 2xy + 2y^2 - 7x + 6y + 6 = 0$ which is perpendicular to $6x + 5y - 4 = 0$.

12. Evaluate $\int \frac{x-2}{\sqrt{2x^2-6x+5}} dx$.

13. Show that the equations $x+y+z=6$, $x+2y+3z=14$, $x+4y+7z=30$ are consistent and solve them.

14. Find the equations of the circle which touches the straight line $3x+y-4=0$ at the point $(\frac{1}{2}, \frac{5}{2})$ and has its center on the line $x+y-5=0$.

15. Solve $x^2(y-z)p + y^2(z-x) = z^2(x-y)$.

16. Calculate the correlation coefficient from the following data

$x:$	1	2	3	4	5	6	7	8	9	10
$y:$	9	8	10	12	11	13	14	16	15	12

PART C — $(2 \times 15 = 30$ marks)

Answer any TWO questions.

17. (a) Find $y^{(n)}$ when $y = \frac{x^2}{(x-1)^2(x+2)}$.

(b) Evaluate $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}}$.