

2. If two lines with slopes m_1 and m_2 respectively are parallel then _____.

- (a) $m_1 = m_2$ (b) $m_1 m_2 = 1$
(c) $m_1 m_2 = -1$ (d) $m_1 + m_2 = 0$

3. $\frac{d}{dx}(e^x) =$ _____.

- (a) xe^{x-1} (b) e^x
(c) e (d) 1

4. $\frac{d}{dx}(x^3) =$ _____.

- (a) $3x$ (b) x^2
(c) $3x^2$ (d) $3x^3$

5. If a function $y = f(x)$ has a maximum at $x = a$, if

$\frac{dy}{dx}$ _____.

- (a) equals zero
(b) less than zero
(c) greater than zero
(d) none

6. At the stationary points of the function $y = f(x)$,
 _____.
- (a) the slope is zero
 (b) the slope is positive
 (c) the slope is negative
 (d) none
7. Simple interest $SI =$ _____.
- (a) Pni (b) $\frac{Pn}{i}$
 (c) $\frac{Pi}{n}$ (d) $\frac{P}{ni}$
8. A series of payments of equal amount and are payable regularly at equal intervals is called
 _____.
- (a) simple interest (b) compound interest
 (c) annuity (d) discount
9. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$, then $A + B =$
 _____.
- (a) $\begin{pmatrix} 1 & 1 \\ 0 & 0 \end{pmatrix}$ (b) $\begin{pmatrix} 3 & 3 \\ 6 & 8 \end{pmatrix}$
 (c) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ (d) $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$

10. If Rank of $A \neq$ Rank of $[A : B]$, then the system is _____.
- (a) consistent
 - (b) consistent with unique solution
 - (c) inconsistent
 - (d) inconsistent with unique solution

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Find the equation of the line joining the points (1,2) and (0,4).

Or

- (b) If the total cost of producing x units is given by $y = 5x + 30$ and if 100 are produced, find (i) the fixed cost (ii) the variable cost (iii) the total cost (iv) the average cost per unit.

12. (a) Find $\frac{d}{dx}(x + 3x^2 + e^x)$.

Or

- (b) Find $\frac{d}{dx}(e^{2x+3})$.

13. (a) Examine the cost function $y = 20 - 6x + x^2$ for maximum or minimum.

Or

- (b) Discuss the criteria for maxima and minima.

14. (a) Find the rate of interest per annum if the simple interest on a principal of Rs. 5,000 is Rs. 800 for 4 years.

Or

- (b) Find the compound interest on Rs. 8,000 for 5 years at 12% per annum.

15. (a) If $A = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$, then find AB .

Or

- (b) Find the rank of the matrix $A = \begin{pmatrix} 1 & 2 & 5 \\ 2 & 4 & 10 \\ 3 & 6 & 13 \end{pmatrix}$.

SECTION C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) (i) Find the equation of the line which passes through (5,4) with slope 3.
- (ii) Find the equation of the line which passes through the points (2,4) and (3,4).

Or

- (b) A company expects fixed costs of Rs. 37,500 and variable cost of Rs. 50,000 on sales of Rs. 80,000.
- (i) Write down the equation relating the cost and sales.
- (ii) Find the break-even point.
- (iii) What will be the profit for a sale or Rs. 90,000?

17. (a) Find

(i) $\frac{d}{dx} \left(\frac{1}{x} + \sqrt{x} + e^x \right)$.

(ii) $\frac{d}{dx} \left(\frac{x^3}{x^2 + 1} \right)$.

Or

(b) Find

(i) $\frac{d}{dx}(x^5 e^x)$

(ii) $\frac{d}{dx}((2x + 5)^3)$.

18. (a) Examine the function $y = 2x^2 - x^3 + 5$ for maximum and minimum.

Or

(b) The production manager of a company plans to include 180 square centimeter of actual printed matter in each page of a book under production. Each page should have a 2.5 cm margin along the top and bottom and 2.0 cm wide margin along the sides. What are the most economical dimensions of each printed page?

19. (a) Find the amount for an annuity of Rs. 10,000 per year paid at the end of each year for 10 years allowing compound interest at 4.5%.

Or

(b) Find the number of years in which a sum of money will triple itself at a compound interest at 10% p.a.

20. (a) Find the inverse of $A = \begin{pmatrix} 1 & 4 & 2 \\ 2 & 1 & 2 \\ 2 & 3 & 1 \end{pmatrix}$.

Or

(b) Solve : $2x + 3y - z = 9$

$$x - y + z = 9$$

$$3x - y - z = -1$$
