

JH-101

January-2024

B.B.A., Sem.-I**MDC-BMT-114 : Business Mathematics**

Time : 2 Hours]

[Max. Marks : 50

- Instructions :** (1) Figures on right indicate marks.
(2) Use of simple calculator is allowed.

1. (A) Define the following terms with example :

- (1) Infinite Set (2) Equal Sets (3) Disjoint Set
(4) Venn-Diagram (5) Complement of a Set

(B) If $A = \{-3, -2, -1, 0, 1, 2, 3\}$, $B = \{1, 2\}$, $C = \{-1, 0, 1\}$ then

Verify $A \times (B \cap C) = (A \times B) \cap (A \times C)$

OR

1. (A) If

$$U = \{a, b, c, d, e, f, g\};$$

$$A = \{a, b, c, d, e, f\};$$

$$B = \{a, b, c, d, e\};$$

$$C = \{b, c, d, e, f\};$$

Verify that $(A \cup B) - B = A \cap B'$

- (B) In a class, 85 students saw atleast one of the three movies ANIMAL, RRR and PUSHPA. The number of students who watched all these three movies are same. 20 students watched both ANIMAL and RRR, 25 students watched both RRR and PUSHPA and 35 students watched both PUSHPA and ANIMAL. The number of students who watched all the three movies are 15. Find the number of students who watched each of the three movies.

2. (A) Obtain $\lim_{x \rightarrow 2} \frac{x^2 + 3x + 9}{x^2 + 9x + 3}$

- (B) The daily cost of production for 'x' units is given by $C(x) = 15x + 600$, if it is known that 200 units can be sold daily, what price per unit should be charged to guarantee no loss ?

OR

2. (A) Obtain $\lim_{x \rightarrow \infty} \left(1 + \frac{5}{x}\right)^x$

- (B) The fixed function is ₹ 80,000 and the variable cost per unit of production is ₹ 100. If the selling price per unit is ₹ 150, find cost function, revenue function, and break-even point. 5

3. (A) If $y = e^{-6x} + e^{6x}$, prove that $\frac{d^2y}{dx^2} = 36y$. 5

(B) If $y = e^x \cdot \log x$, find $\frac{dy}{dx}$. 5

OR

3. (A) If $y = xe^{2x}$, find $\frac{d^2y}{dx^2}$. 5

(B) Using definition, find the derivative of $y = \sqrt{x}$. 5

4. (A) Find minimum value of $y = 6x^2 - 12x + 5$. 5

(B) The demand function of a commodity is $2p = 10 - x$. Find elasticity of demand at $p = 4$. 5

OR

4. (A) Prove that Elasticity of Demand $\eta = \frac{AR}{AR - MR}$. 5

(B) The demand of a monopolist is $p = 27 - x$ and $C(x) = 30 + 3x$; find maximum profit. 5

5. Do as directed : (any 10) 10

(1) In set theory, $A \times B = B \times A$. (True/False)

(2) Show $A \cap B$ in Venn Diagram by shading it.

(3) If A and B are disjoint sets then $n(A \cap B) = n(A) + n(B)$. (True/False)

(4) $\lim_{x \rightarrow 0} a^x = \underline{\hspace{2cm}}$

(5) $\Sigma n = \underline{\hspace{2cm}}$

(6) For $f(x) = 3x - 1$, $x \in \{1, 2, 3\}$, then range is $\underline{\hspace{2cm}}$.

(7) If $y = \frac{1}{x}$, then $\frac{dy}{dx} = -x^{-2}$ (True/False)

(8) Write multiplication rule of differentiation.

(9) The cost of producing an extra unit at any level of production is called Marginal Cost. (True/False)

(10) Stationary values are obtained by substituting $\frac{dy}{dx} = \underline{\hspace{2cm}}$

(11) Derivative of any supply function is $\underline{\hspace{2cm}}$. (positive/negative)

(12) Second derivative of any constant term is $\underline{\hspace{2cm}}$