

Seat No. : 01778

MF-106

May-2023

B.B.A., Sem.-II

CC-112 : Business Mathematics

Time : 2:30 Hours]

[Max. Marks : 70

1. (A) Jannet Ltd. is producing Ball Pens. The cost of manufacturing 400 pens is ₹ 1,400 and that of manufacturing 600 pens is ₹ 1,900. If the cost function is linear, find its exact form and also find the cost of manufacturing 1,000 pens. 7
- (B) Find the derivatives of the following functions with respect to x : 7
- (i) $y = 1 + \frac{1}{1 + \frac{1}{x}}$
- (ii) $y = \frac{x}{1+x^2}$, put $x = 2$ and find the value.

OR

- (A) Give the definition of Derivative and explain the rules of Derivative. 7
- (B) In Johaana Ltd., the demand function of a commodity is $x = \frac{100-p}{2}$, find marginal revenue when its demand is 15 units. 7
2. (A) Obtain the maximum and minimum values of $y = x^3 - 9x^2 + 24x + 2$. 7
- (B) The demand and cost functions of a monopolist are as under :

$$x = 75 - 3p$$

$$C = 100 + 3x$$

Determine the output for maximum profit and also find maximum profit. 7

OR

- (A) If $(x, y) = x^3 + 2x^2y + xy^2 - y^3$, find $\frac{\partial^2 f}{\partial x^2}$, $\frac{\partial^2 f}{\partial y^2}$, $\frac{\partial^2 f}{\partial x \partial y}$ and $\frac{\partial^2 f}{\partial y \partial x}$. 7
- (B) Joyaan Ltd. is producing x tons per week, the cost function of a commodity is $\frac{x^3}{10} - 3x^2 - 90x + 500$. Prove that the cost is minimum when the production is 30 tons per week. 7

3. (A) Find adj. A and prove that $A \cdot (\text{adj. } A) = |A| I$. 7

$$A = \begin{pmatrix} 1 & 0 & 7 \\ 2 & 2 & 5 \\ 0 & 3 & 6 \end{pmatrix}$$

- (B) Using inverse matrix to solve the following equations : 7

$$2x + 3y - z = 5$$

$$3x + 2y + z = 10$$

$$x - 5y + 3z = 0$$

OR

- (A) Define the following matrices with illustrations : 7

(a) Square Matrix

(b) Triangular Matrix

- (B) Find the inverse of the following matrix and verify that $AA^{-1} = I$: 7

$$A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix}$$

4. (A) A man borrows ₹ 50,000 from his friend and promises that he will pay ₹ 2,500 at the end of the every three months on account of principal and in addition to that the simple interest of 8% on the outstanding principal. Find out total amount of interest that the man has to pay. 7

- (B) A person has taken a loan of ₹ 7,00,000 at 16% rate of interest from TK Finance. If the repayment period is of 15 years then find what amount he has to pay in the beginning of each month. ($1.0133^{180} = 9.772$) 7

OR

- (A) A compound interest on a certain sum of money for two years is ₹ 1,000 and the simple interest for the same period is ₹ 950. Find the sum and rate of interest. 7

- (B) What amount should be deposited in the beginning of January, April, July & October of every year at 15% rate of compound interest to receive ₹ 40,00,000 on maturity at the end of 10 Years ? ($1.0375^{40} = 4.406$) 7

5. Choose the correct option : (Attempt any 7 out of 12)

- (1) If $y = x^3 + x^2 + x - 2$, find $\frac{dy}{dx}$.
- (A) $3x^2 + 2x + 1$ (B) $3x^2 + 2x - 1$
 (C) $2x + 1$ (D) None
- (2) What is the differentiation of e^x ?
- (A) e^x (B) x^e
 (C) Both (D) None
- (3) The process of obtaining derivative of a function is known as _____.
- (A) Differentiation (B) Integration
 (C) Both (D) None
- (4) For solving Maximization of Profit and Minimization of Cost along with first order derivative, the knowledge of _____ is necessary.
- (A) Differentiation (B) Second order derivative
 (C) Limit (D) None
- (5) The _____ of a commodity is the utility derived from consumption of an extra or additional unit of the commodity.
- (A) Utility (B) Marginal Utility
 (C) Demand (D) None
- (6) If $y = x$, what will be the value of $\frac{d^2y}{dx^2}$?
- (A) 1 (B) 0
 (C) Any (D) None
- (7) A / An _____ is an arrangement of numbers in rows and columns.
- (A) Determinant (B) Adjoint
 (C) Matrix (D) None
- (8) If $|A| = 0$, then A^{-1} is possible.
- (A) Can't Say (B) True
 (C) False (D) None

(9) Identify the following Matrix :

$$\begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}$$

- (A) Symmetric Matrix (B) Zero Matrix
(C) Unit Matrix (D) None
- (10) When the interest is calculated uniformly on the original principal throughout the period under consideration, then it is called _____ interest.
(A) No interest (B) Rate
(C) Compound (D) Simple
- (11) When the fund is created by a company or person to meet predetermined debts or certain liabilities out of their profit at the end of the accounting year at compound rate of interest, this fund is known as ____ fund.
(A) Simple (B) Compound
(C) Both (A) & (B) (D) Pay-Back
- (12) A sequence of equal payment made / received at equal interval of time is called _____.
(A) S.I. (B) C.I.
(C) Both (A) & (B) (D) Annuity