Seat No. : _____

ME-202

May-2025

B.B.A., Sem.-II

CC-112 : Business Mathematics

Time : 2:30 Hours] **[Max. Marks : 70**

1. (A) Find $\frac{dy}{dx}$ if $(x + 1)(y + 1) = 18$. **7**

   (B) Find $\frac{dy}{dx}$ if $xy + x + y - 2 = 0$. **7**

OR

1. (A) Give the definition of Derivative and explain the rules of Derivative. **7**

   (B) In Johaana Ltd., if the cost function is $C = x^3 + 7x^2 + 5x + 200$, find marginal cost and average cost functions. **7**

2. (A) 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**

   (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

2. (A) If $f(x) = 2x^3 + 7x^2 - 5x + 11$, obtain the value of x such that $f''(x) = 38$. **7**

   (B) Obtain the maximum and minimum values of $y = x^3 - 9x^2 + 24x + 2$. **7**

3. (A) Define the following matrices with Illustrations : **7**

   A. Unit Matrix

   B. Diagonal Matrix

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

   $2x + 3y - z = 5$

   $3x + 2y + z = 10$

   $x - 5y + 3z = 0$

OR

3. (A) Find A^{-1} and verify that $AA^{-1} = 1$. **7**

$$A = \begin{bmatrix} 6 & 3 \\ 4 & 5 \end{bmatrix}$$

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

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

4. (A) Joyaan borrows ₹ 5,000 from his friend and promises that he will pay ₹ 250 at the end of the every three months, on account of principle 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) Jannet has taken a loan of ₹ 70,00,000 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

4. (A) A Compound interest on a certain sum of money for two years is ₹ 100 and the simple interest for the same period is ₹ 95. Find the sum and rate of interest. **7**

(B) What amount should be deposited for 3J in the beginning of January, April, July & October of every year at 15% rate of Compound interest to receive ₹ 4,00,000 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**) **14**

(1) The process of obtaining derivative of a function is known as _____.

(A) Differentiation (B) Integration

(C) Both (D) None

(2) 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

(3) What is the differentiation of $\sqrt{x}$?

(A) $\frac{1}{2\sqrt{x}}$ (B) $2\sqrt{x}$

(C) Both (D) None

(4) If $y = x$, what will be the value of $\frac{d^2y}{dx^2}$?

(A) 1 (B) 0

(C) Any (D) None

(5) 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

(6) 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

(7) If $|A| = 0$, then A^{-1} is possible.

(A) Can't Say (B) True

(C) False (D) None

(8) Identify the following Matrix :

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

(A) Symmetric Matrix (B) Zero Matrix

(C) Unit Matrix (D) None

(9) A / An _____ is an arrangement of numbers in rows and columns.

(A) Determinant (B) Adjoint

(C) Matrix (D) None

(10) 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

(11) 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

(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