

Seat No. : _____

OE-103

October-2018

B.B.A., Sem.-II

CC-112 : BUSINESS MATHEMATICS

Time : 2:30 Hours]

[Max. Marks : 70

1. (a) Answer the following : (any seven) 14

(1) $(x^3 + 11x^2 + 9)^{7/2}$

(2) $\log (11x^2 + 7x + 3)$

(3) If $y = \log (e^x x^e e^e)$, find $\frac{dy}{dx}$

(4) $x^{11} \log x$

(5) If $f(x) = x^2 + 5$ find $f(1)$

(6) $7x^2 + 9x - 32$

(7) $(x^2 + 1)(x + 1)$

(8) $y = x^x$

(9) $y = \frac{1}{x^3} - \frac{1}{x^2} + \frac{1}{x} - x + 10$

(10) $xy + 3x + 5y - 1 = 0$

OR

(i) The demand function of a commodity is $x = 10 - 2p$. Find the elasticity of demand at $p = 4$. 7

(ii) If the cost function for producing x units is $C = \frac{1}{25} x^2 - 6x + 100$, what is marginal cost when 75 units are produced ? 7

(b) Answer the following questions : (any **four**)

4

- (1) If $y = 5x^2 - 8x + 1$, find $\frac{dy}{dx}$.
- (2) If the cost function is $C = x^3 + 6x^2 + 4x + 100$, find marginal cost.
- (3) Give an example of chain rule.
- (4) Define Elasticity of Demand.
- (5) If $f(x) = e^{-x}$, then find $f'(3) = \underline{\hspace{2cm}}$.

2. (a) (i) The following are demand and cost function of a commodity for a monopolist. 7

$$P = 40 - x \text{ (Demand function)}$$

$$C = 10 + 5x + \frac{1}{4}x^2 \text{ (Cost function)}$$

Find the production for the maximum profit. Also obtain the price corresponding to it.

- (ii) Define the following terms :

7

Utility, Partial Derivative

OR

- (i) Define Maximum and Minimum value of a function at a point. 7

- (ii) If $y = x \log x$, prove that $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$. 7

(b) Answer the following : (any **four**)

4

- (1) What are the conditions for obtaining maximum value ?
- (2) Define cost function.
- (3) If $f(x) = x^3 - 8x^2 + 1$, find $f'(0)$
- (4) If $f(x) = \frac{1}{x}$ then $f''(x)$
- (5) If $f(x, y) = x^3 + x^2y + xy^2 + y^3$, then find $\frac{\partial^2 f}{\partial x^2}$, $\frac{\partial^2 f}{\partial y^2}$, $\frac{\partial^2 f}{\partial x \partial y}$, $\frac{\partial^2 f}{\partial y \partial x}$
- (6) If $Z = 2x^2 - 3xy + 2y^2$, find $\frac{\partial^2 Z}{\partial x^2}$ and $\frac{\partial^2 Z}{\partial y^2}$.

3. (a) (i) Find AB and BA.

7

$$A = \begin{bmatrix} 1 & -1 & 1 \\ -3 & 2 & -1 \\ -2 & 1 & 0 \end{bmatrix}; B = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$$

- (ii) Find $A^2 + B^2$

7

$$A = \begin{bmatrix} 1 & -1 & 1 \\ -3 & 2 & -1 \\ -2 & 1 & 0 \end{bmatrix}; B = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 1 & 2 & 3 \end{bmatrix}$$

OR

- (i) Solve the equations using inverse matrix :

7

$$x + 2y + 3z = 6$$

$$2x + 4y + z = 7$$

$$3x + 2y + 9z = 14$$

- (ii) Explain the following terms :

7

(1) Identity Matrix

(2) Symmetric Matrix

(3) Adjoined of a Matrix

(4) Diagonal Matrix

- (b) Answer the following : (any **three**)

3

- (1) Find the adjoint of the following matrices : $\begin{bmatrix} 2 & -5 \\ 7 & 9 \end{bmatrix}$;

- (2) If $A = \begin{bmatrix} 10 & a & 3 \\ 2 & 7 & c \\ b & 4 & 5 \end{bmatrix}$ is a symmetric matrix find a, b and c.

- (3) If $[3 \ 2 \ 1] \cdot \begin{bmatrix} 3 & 0 & 2 \\ 0 & 9 & 4 \\ 1 & 9 & 0 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ 2 \\ 5 \end{bmatrix} = [x \ 2 \ 1] \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$, find the value of X.

- (4) Give necessary condition for adding two matrices.

4. (a) (i) Mr. Yogesh deposited a sum of ₹ 1,00,000 in a bank. After 2 years he withdraw ₹ 40,000 and at the end of 5 years he received an interest of ₹ 75,200. Find the rate of interest. 7
- (ii) Find the compound interest of ₹ 20,000 at the rate of 5% p.a. for 1.5 year if the interest is calculated half yearly. 7

OR

- (i) Mr. X borrowed ₹ 15,000 for 8 years at 6% p.a. compounded interest for the first two years, 8% p.a. for the next three years and 10% p.a. for the remaining 3 years. Find the amount paid after 8 years. 7
- (ii) The simple interest on a sum equals to $\frac{1}{4}$ of itself in 5 years. Find out the rate of interest. 7

- (b) Answer the following : (any **four**) 3

- (1) Give difference between simple interest and compound interest.
- (2) Define Nominal interest rate.
- (3) Give formula for calculating Annuity.
- (4) After how many years ₹ 3,00,000 will amount ₹ 5,62,800 at 14.6% rate of interest.
- (5) What sum of money will yield ₹ 17.8 as interest in 5 years at 2% per annum ?
- (6) In what time a sum of ₹ 20,000 becomes ₹ 22,050 at compound rate of 5% p.a. ?
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