Seat No. : _____

AT-102

May-2016

B.B.A, Sem.-II

CC – 112 : Business Mathematics

Time : 3 Hours] **[Max. Marks : 70**

1. (a) Define differentiation using definition. Find derivative for $y = 3x^2 - 7x + 10$. **4**

OR

Define the following terms :

(1) Marginal Revenue Function

(2) Elasticity of Supply.

(b) Find the derivatives of the following functions w.r.t. x ! **5**

(1) $y = 5 \cdot x^4 \cdot 4^x \cdot e^{3x}$

(2) $y = 3^{x^4 - 7x^3 + 120}$

OR

Find the derivatives of the following functions w.r.t. x :

(1) $y = \dfrac{3x^2 - 5x + 10}{x - 3}$

(2) $y = \dfrac{1}{x^4} - \dfrac{1}{x^3} + \dfrac{1}{x} - 2x + 15$

(c) Find average revenue function and marginal revenue function for revenue function $R(x) = 200x + 15x + \dfrac{4x^2}{3}$. Also find AR and MR when $x = 3$. **5**

OR

When the price of Mobile charger increased from ₹ 65 per unit to ₹ 80 per unit, is supply also increases from 1500 units to 2400 units. Calculate the elasticity of supply and interpret the result.

2. (a) Define the following terms : **6**

(1) Partial Derivative

(2) Utility

OR

Find the following second order derivatives of the function $Z = 3x^2 + 5xy + 7y^3$.

(i) $\frac{\partial^2 z}{\partial x^2}$ (2) $\frac{\partial^2 z}{\partial y^2}$ (3) $\frac{\partial^2 z}{\partial x \cdot \partial y}$

(b) Find the maximum and minimum value for the given function **4**

$f(x) = 4x^3 + 16x^2 + 16x + 11$

OR

If $z = 3x^2 - 7xy + y^3 + 5x + 3y - 51$, find $\frac{\partial^2 z}{\partial x^2}$ and $\frac{\partial^2 z}{\partial y^2}$.

(c) Find $\frac{d^2y}{dx^2}$ of $y = e^x \cdot \log x$. **4**

OR

Find $\frac{d^2y}{dx^2}$ of $y = \frac{x-3}{x+3}$.

3. (a) Define following materials with illustrations ! **4**

(1) Symmetric Matrix

(2) Scalar Matrix

OR

State difference between matrix and determinant.

(b) If $A = \begin{bmatrix} 3 & 4 & -1 \\ 2 & 1 & 3 \\ 1 & 4 & 1 \end{bmatrix}$, Find $3A^2 - 2A + 4I$. **5**

OR

If $A = \begin{bmatrix} 3 & -1 & 5 \\ 4 & 2 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 4 \end{bmatrix}$, then find AB and BA if possible.

(c) Solve the following equations using inverse of a matrix. **5**

$2x + y - 4z = 10$, $x + 2y - z = 8$, $x + 3y - 3z = 13$

OR

If $A = \begin{bmatrix} 2 & 3 \\ -1 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 2 & -4 \end{bmatrix}$, $C = \begin{bmatrix} 1 & -4 \\ 3 & 0 \end{bmatrix}$, then prove that

$(A + B) \cdot C = AC + BC$.

4. (a) Ram borrows ₹ 35,000 for 3 years at 8% p.a. Simple interest. He immediately leads it to Shyam for 3 years at 7.5% per annum on compound interest. Find gain or loss of Ram in the transaction. **5**

OR

What is nominal rate of interest corresponding to effective rate of 8% if it is compounded quarterly ?

(b) A person buys a car on instalment and pays ₹ 25,000 cash and the balance payment in 10 equal instalments of ₹ 15,000 payable at the end of the year. If the rate of interest is 10% compounded annually, find cash price of car. **5**

OR

For his daughter's study purpose, a father has started investing ₹ 4,500 on quarterly basis for upcoming 20 years. What amount he will receive at the end of a term if rate of interest is 12% per annum ? [Give $(1.03)^{80} = 10.64$]

(c) The Chairman of the company wishes to award a cash prize of ₹ 11,000 to a student getting highest marks in statistics. If the rate of compound interest is 18%, what amount he is required to deposit ? **4**

OR

Find compound interest for ₹ 45,000 at 7.5% for 3 years when (1) It is calculated quarterly and (2) It is calculated monthly.

5. Do as directed : **14**

(1) $A = \begin{bmatrix} 5 \\ -1 \\ 0 \\ -4 \end{bmatrix}$, which type of matrix ?

(2) Define identify Matrix.

(3) Define Sinking fund.

(4) $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, find A^2.

(5) $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & -1 & 0 \end{bmatrix}$, is A^{-1} possible ? (Yes/No)

(6) Give a formula of annuity due for present value.

(7) If $f(x) = \frac{2}{x^2}$, find $f'(x) =$ _____.

(8) If $z = 2x^2 - 5xy + y^2$, find $\frac{\partial z}{\partial y}$.

(9) At the end of 1st year, CI and SI are same. (T/F)

(10) $y = 3x^2 + 33x - 999$, find $\frac{dy}{dx}$.

(11) Define Annuity.

(12) Give a matrix of an order 5×4.

(13) Find simple interest for ₹ 1,000 at 5% for 3 years.

(14) If $|A| = 0$, A^{-1} is possible. (T/F)

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