Seat No. : _____

# 12D-102

**May-2015**

## B.B.A. Sem.-II

## CC-112 : Business Mathematics

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

1. (a) State Multiplication rule of differentiation and using it find $\frac{dy}{dx}$ of $y = x^{11} \log x$. **4**

**OR**

If demand function of a commodity is $p = 40 - 3x$, then find Marginal Revenue and Average Revenue.

(b) Find $\frac{dy}{dx}$ of following : **6**

(1) $y = 2 + \frac{3}{4 + \frac{1}{x}}$

(2) $y = 5^{2x^2 - 7x+1}$

**OR**

Find $\frac{dy}{dx}$ of following :

(1) $y = \log (x^2 + a^2)$

(2) $y = \frac{x + 7}{x - 3}$

(c) The demand function is $x = 4\left(9 - \sqrt{p}\right)$, find the elasticity of demand at $p = 4$. **4**

**OR**

Find $\frac{dy}{dx}$ of $y = 4x^2 + 5x + 1$ using definition.

2. (a) Find $\frac{d^2y}{dx^2}$ of $y = xe^x$. **4**

**OR**

Find $\frac{d^2y}{dx^2}$ of $y = \frac{x + 1}{x - 1}$.

(b) Find Maximum and Minimum values of $f(x) = x^3 + x^2 - 5x + 7$. **5**

**OR**

The demand function is $p = 12 - 4x$. Find the value of $x$ so that total revenue is maximum.

(c) If $f(x, y) = x^3 + x^2y + xy^2 + y^3$, then find $\frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial y^2}, \frac{\partial^2 f}{\partial x \partial y}, \frac{\partial^2 f}{\partial y \partial x}$. **5**

**OR**

If $u = x^3 - 3xy^2$, $r = 3x^2y - y^3$, then prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = \frac{\partial^2 r}{\partial x^2} + \frac{\partial^2 r}{\partial y^2}$.

3. (a) Define following matrices with illustrations : **4**

(i) Row Matrix

(ii) Rectangle Matrix

**OR**

State difference between symmetric and skew symmetric matrix.

(b) If $A = \begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$, then find matrix B such that, $A + 2B = A^2$. **5**

**OR**

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

(c) If $A = \begin{bmatrix} 3 & -1 \\ 2 & 5 \end{bmatrix}$, then prove that, $A (\text{adj. } A) = |A| I_2$. **5**

**OR**

Solve following equations using inverse of a Matrix.

$x + y + 2 = 3$, $2x - y - 2 = 3$, $x - y + 2 = 9$.

4. (a) Find simple interest and amount on ₹ 20,000 for 7 years at 10% rate of interest per annum. **4**

**OR**

In what time will ₹ 12,000 amount to ₹ 24,000 at 6% p.a. simple interest ?

(b) What is nominal rate of interest corresponding to effective rate of 10% if it is compounded half yearly ? **5**

**OR**

Find compound interest on ₹ 50,000 at 5% p.a. at end of 2 years if interest is calculated (i) half yearly, (ii) quarterly.

(c) A man deposit ₹ 10,000 on 31st December 2006. What amount he receive on 31st December, 2018, if the interest is 10% compounded annually ? **5**

**OR**

A person deposit ₹ 5000 in beginning of every year. If the rate of interest is 14% p.a. compounded annually, then find amount after 10 years.

5. Answer the following questions : **14**

(1) State division rule of derivative.

(2) If $f(x) = x^2 - 3x + 1$, then find $f'(-1)$.

(3) If $y = \log x$, then find $\frac{d^2y}{dx^2}$.

(4) Write a condition to have a minimum value of a function.

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

(6) If $f(x) = e^{-3x}$, then find $\frac{d^2y}{dx^2}$.

(7) Define : Utility.

(8) Write type of A = [3 –1 7 4]

(9) Define : Null matrix.

(10) If A : $4 \times x$ and B : $2 \times 3$ and AB is possible, then find value of $x$.

(11) Is $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ a non-singular Matrix or Not ?

(12) If $A = \begin{bmatrix} -5 & 7 \\ 0 & -3 \end{bmatrix}$, then find adj. (A).

(13) Give formula for obtaining depreciated value.

(14) Write formula for present value of annuity due.

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