Seat No. : _____

ZM-116

May-2014

B.B.A. (Sem.-II)

CC-112 : Business Mathematics

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

Instructions : (1) **All** questions are compulsory.
(2) Right side figure are indicate marks.
(3) Use of simple calculator is allowed.

1. (a) Find $\frac{dy}{dx}$: **6**

(i) $y = x^3 \cdot \log x$

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

OR

Find $\frac{dy}{dx}$

(i) $y = \frac{x^2+3x+5}{x-3}$

(ii) $y = \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right) \cdot \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)$

(b) Find $\frac{dy}{dx}$ if $y = \log(5x^2 + 3x - 1)$ **4**

OR

Find $\frac{dy}{dx}$ if $y = (x^3 + 3x^2 - 9)^7$

(c) Find average revenue function and marginal revenue function for revenue function $R(x) = 100 + 5x + \frac{7x^2}{2}$. Also find AR and MR when $x = 2$. **4**

OR

When the price of sugar was ₹ 3.00 per kg its supply was of 1000 kg and the price of sugar was ₹ 2.50 per kg, its supply was 900 kgs. Find the elasticity of supply of sugar and explain its meaning.

2. (a) If $y = e^{3x} + e^{-3x}$ prove that $\frac{d^2y}{dx^2} = 9y$. **4**

OR

If $y = x^3 \cdot e^x$ find $\frac{d^2y}{dx^2}$.

(b) If $z = x^2 + 8xy + y^2 + 6x + 9y + 7$, find $\frac{\partial^2 z}{\partial x^2}$ and $\frac{\partial^2 z}{\partial y^2}$. **4**

OR

If $f(x, y) = 2x^2 - 3xy + 2y^2$ find $\frac{\partial^2 f}{\partial x \partial y}$ and $\frac{\partial^2 f}{\partial^2 x}$.

(c) Find the minimum and maximum value for the given function : **6**

$f(x) = 3x^3 - 36x^2 + 135x - 13$

OR

The production cost of an item of x units is $C' = \frac{x^2}{20} - 2.5x + 350$, then find marginal cost of 75 units of production. How many units of production for marginal cost become zero ?

3. (a) If $A = \begin{bmatrix} 3 & 8 \\ 1 & 5 \end{bmatrix}$; $B = \begin{bmatrix} 2 & 3 \\ -1 & 0 \end{bmatrix}$ then verify $(AB)' = B' \cdot A'$ **4**

OR

If $A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}$ find A^2.

(b) Show that matrix $X = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ satisfies $X^2 - 4X = 5j$. **4**

OR

If $A = \begin{bmatrix} 2 & 4 & 1 \\ 8 & -2 & 2 \\ 6 & 8 & 3 \end{bmatrix}$ find matrix B such that $3A' + 3B = A^2$.

(c) Solve the following equations by inverse matrix method : **6**

$2x + 3y + z = 10$; $3x - 5y + 3z = 10$; $x + 5y + z = 10$

OR

If $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 3 & -1 \\ 2 & 5 & 3 \end{bmatrix}$ then verify **6**

A . (adj A) = (adj A.) . A.

4. (a) Prasad has deposited ₹ 20,000 in HDFC Bank. The bank pays simple interest 5% annum. Find the interest and amount to be received by him after 5 years. **4**

OR

Simple interest on sum equal to ¼ of itself in 4 years. Find the rate of interest.

(b) What sum will amount to ₹ 17,908.50 in 5 years at 12% compound interest per year payable half yearly ? **4**

OR

A certain principle doubled in 6 years. What is the rate of compound interest ?

$\left(\sqrt[6]{2} = 1.123\right)$ $\left(2^{1/6} = 1.123\right)$

(c) If a sum of ₹ 5000 is deposited with a Bank at the end of every year for 10years at 15% compound rate of interest, find the total amount of annuity at the end of 10years. **6**

OR

In order to purchase a manufacturing unit Maheshlal has taken a loan of ₹ 15,00,000 from ICICI Bank at 12% rate of interest. If he repay the amount in 10 yearly installments then find the installment amount.

5. Do as directed : **14**

(i) Define : Row matrix

(ii) Define : Identity matrix

(iii) If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ then its adj A = _____

(iv) If $y = 8x^2 + \frac{1}{x}$ find $\frac{dy}{dx}$

(v) If $f(x) = 3x^2 + 5x - 9$; $f'(3)$ = _____

(vi) If $f(x) = \frac{1}{x}$ then $f''(x)$ = _____

(vii) If $z = 3x^2 + 5y^2$ then $\frac{\partial^2 z}{\partial x^2}$ = _____

(viii) Give formula for calculating compound interest.

(ix) Give formula for calculating Annuity.

(x) Calculate simple interest on ₹ 10,000 at the rate of 5% for 3 years.

(xi) At the end of 1st year simple interest and compound interest are same. True or False.

(xii) If $f(x) = e^{-x}$, then $f'(3) =$

(xiii) If $A = \begin{bmatrix} 2 & 3 \\ 5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 3 & -1 \end{bmatrix}$ find A – B.

(xiv) Define Marginal Cost.
