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**MANIPAL UNIVERSITY  
DUBAI CAMPUS**

**FIRST SEMESTER B.B.A. DEGREE EXAMINATION – JANUARY 2008**

**SUBJECT: MATHEMATICS FOR BUSINESS (MAT 101)**

Sunday, January 13, 2008

Time: 3 Hrs.

Max. Marks: 100

Answer any Five Questions (Qn 1 is compulsory)

**5 \* 20 = 100 Marks**

1. a) Verify the Commutative, Associative and the Identity property under matrix multiplication. OR

Explain ten types of matrices with suitable examples.

- b) Explain the Cramer's rule to find the inverse of a matrix. OR

Explain five properties of determinant with suitable examples.

2. a) At Shimla two types of games, viz., horse riding and skating are available on hourly rent. Mr. X spends AED140 and AED130 during the 1<sup>st</sup> and 2<sup>nd</sup> week of DEC. During the first week he spent hours riding and 10 hours skating and during the 2<sup>nd</sup> week he spent 10 hours riding and 5 hours skating. Find the hourly charges for the two games.

b) If  $A = \begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 4 \\ 1 & 6 & 2 \end{pmatrix}$ , then calculate  $A^3 - 6A^2 + 7A + 4I$ .

3. a) Find the Maximum and Minimum value of the function  $x^3 - 62x^2 + 120x + 9$

b) If  $A = \begin{pmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & 2 & 2 \end{pmatrix}$ , Find the inverse of A .

4. a) Differentiate with respect to  $x$ :

I.  $[x^2 - 4x + 5] [x^3 - 2]$

II.  $(2x^2 - 4) / (3x^2 + 7)$

III.  $\log[\log(\log x)]$

b] (i) Evaluate  $\int \frac{2x + 3}{x^2 + 3x + 7} dx$  (ii)  $\int (\log x) x^n dx$

5. a] Solve by Cramer's Rule  $x + y + 3z = 5;$

$x + 3y + z = 5;$

$3x + y - z = 3.$

b] Suppose that the revenue function for a product is given by

$$R(x) = 10x + \frac{100x}{3x^2 + 5}$$

Where  $x$  is the number of units sold and is in dollars.

(a) Find the marginal revenue function and its value when  $x = 15$

(b) Find the maximum revenue.

6. a] Suppose the demand function of some article is  $p(x) = 75 - 2x$  and the cost function is  $C(x) = 350 + 12x + [x^2/4]$ , find the number of units and the price at which the total profit is maximum. What is the maximum profit?

b] The 'XYZ' Company Ltd. has approximated the marginal revenue function for one of its products by  $MR = 20x - 2x^2$ , where  $x$  is the number of products produced. The marginal cost function is approximated by  $MC = 81 - 16x + x^2$ . The Cost is 40 when  $x = 1$  and  $R=0$  when there is no production. Determine the profit function.

7. a] Evaluate  $\int_1^3 \frac{(1 - \log x)^2}{x} dx$

b] Evaluate  $\int_0^2 \frac{[x - 1] [2x + e^x] dx}{x}$