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RB-1714

First Year B. B. A. (Sem. II) Examination

April / May – 2010

Quantitative Methods - I

(Mathematics Oriented)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

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 Fillup strictly the details of signs on your answer book.

Name of the Examination :

Name of the Subject :

Subject Code No. : Section No. (1, 2,.....) :

Seat No. :

- (2) All questions are compulsory.
- (3) Indicate your options clearly.
- (4) Figures to the right indicate full marks.
- (5) Use of one simple calculator is allowed.

1 Answer the following questions : 10

- (1) Define powerset with illustration.
- (2) If cost function is $C(x) = 2x^3 - x^2 + 1$ then find total cost when $x = 2$.
- (3) Evaluate $\lim_{n \rightarrow \infty} \left(1 - \frac{3}{n}\right)^n$
- (4) Define absolute value of a real number.
- (5) If $A = \begin{bmatrix} 2 & -3 \\ 1 & x \end{bmatrix}$ and $|A| = 3$ then find x .
- (6) If $y = x^n + n^x$ then find dy/dx .

- (7) If cost function is $C(x) = 2x + 9$ and if selling price is Rs. 15 then find profit function.
- (8) State demand law.
- (9) Evaluate $\int 9^x dx$.
- (10) If marginal revenue function is $4x^3 - 3x^2 + 1$ then find total revenue when $x = 1$.

- 2 (a) For two real number a and b prove that, $|a - b| \geq |a| - |b|$ 4
- (b) A manufacturer of electronics company is planning production of new varieties of laptops. The fixed cost of production is Rs. 3 lakhs and a variable cost is Rs. 200 for producing each laptop. If each laptop can be sold at Rs. 450 then find break even point. 4
- (c) In a group of 100 students of M.B.A., 65 have taken finance, 55 have taken marketing and all the students have taken atleast one of the two subjects. How many students have taken both finance and marketing ? How many students have taken any finance ? 4

OR

- 2 (a) In usual notation prove that, 4
 $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- (b) If $A = \{x | x \in N, |x^2 - 2| \leq 10\}$ 4
 $B = \{y | y \in N, |y - 1| < 3\}$
 $C = \{z | z \in N, |z| \leq 1\}$
then prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$

- (c) The cost function of an item is $C(x) = 5x + 100$ and selling price per item is Rs. 25 then find break even point. If the profit is Rs. 1000 then find the number of units produced. 4

- 3 (a) Evaluate : 4

(i)
$$\lim_{n \rightarrow \infty} \frac{2n^2 - 5n + 1}{3n^4 + 8n^3 - 1}$$

(ii)
$$\lim_{x \rightarrow 1/3} \frac{27x^3 - 1}{205x^5 - 1}$$

- (b) Find dy/dx if 4

(i) $x = \frac{2at}{1+t}$ and $y = \frac{2at^2}{1+t}$

(ii) $y = \frac{5^x}{x}$

- (c) The demand function of a firm is $x = 400 - 20p$ and its average cost function is $C(x) = 6 + \frac{x}{50}$. Find the output at which the profit of the firm is maximum. 4

OR

- 3 (a) Evaluate : 4

(i)
$$\lim_{x \rightarrow -3} \frac{2 - \sqrt{1-x}}{3+x}$$

(ii)
$$\lim_{x \rightarrow 0} \frac{3^{5x} - 3^{3x}}{x}$$

(b) If $y = \left(\frac{e}{5}\right)^x$ then find dy/dx . 4

(c) Find maximum and minimum values of $f(x) = x + 9/x$. 4

4 (a) Find $\int \frac{4x - 3}{\sqrt{2x^2 - 3x + 9}} dx$ 4

(b) Find $\int_{-1}^1 (x^2 - 5x + 6) dx$ 4

(c) The marginal cost function of firm is given by 4
 $MC = 50 - 0.004x$. Find total cost function and average
cost if fixed cost is Rs. 50.

OR

4 (a) Find $\int \left(x^2 + \frac{1}{x^2}\right) dx$ 4

(b) Find :

(i) $\int_5^6 \frac{x^2 - 5x + 6}{x - 3} dx$

(ii) $\int_2^3 \frac{\log x}{x} dx$

- (c) If the marginal revenue and marginal cost for an output x of a commodity are given as, 4

$$MR = 20 - 3x - 4x^2$$

$$MC = 10 - 2x - x^2$$

Find the profit function and find output of which profit is maximum and total profit at that point.

- 5 (a) Solve the following equations using matrix inversion : 4

$$4x - y - z = 32$$

$$3x + y + 2z = 39$$

$$3x - y + z = 24$$

- (b) If $A = \begin{bmatrix} 4 & 2 & 3 \\ -1 & 0 & 2 \\ 1 & 5 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 0 & 1 \\ 5 & 2 & 1 \\ 1 & 0 & 8 \end{bmatrix}$ then find matrix 4

C such that $2A + C = 3B$.

- (c) If $A = \begin{bmatrix} 0 & 2 & 3 \\ -2 & 0 & 5 \\ -3 & -5 & 0 \end{bmatrix}$ then find $\frac{1}{2}(A + A^T)$ and 4

$$\frac{1}{2}(A - A^T).$$

OR

- 5 (a) Prove that 4

$$\begin{vmatrix} x & y & z \\ z & x & y \\ y & z & x \end{vmatrix} = (x^3 + y^3 + z^3 - 3xyz)$$

(b) A man buys 8 dozen of mangoes, 10 dozen of apples and 4 dozen of bananas. Mangoes cost Rs. 180 per dozen, apples cost Rs. 120 per dozen and banana Rs. 20 per dozen. Find the total cost using matrix multiplication. 4

(c) If $A = \begin{bmatrix} -1 & 2 \\ 0 & 8 \end{bmatrix}$, $B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $AB = \begin{bmatrix} -13 & 6 \\ -10 & 8 \end{bmatrix}$ then 4
find a, b, c, d .

6 Attempt any two : 12

(a) Solve the following L.P.P. using graphical method :

Minimum $Z = 30x + 50y$

subject to the constraints,

$$3x + y \geq 15$$

$$x + 2y \geq 12$$

$$3x + 2y \geq 24$$

$$x, y \geq 0$$

(b) Solve the following assignment problem to minimize the cost :

	I	II	III	IV	V
A	8	4	2	6	7
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

(c) Find the optimum solution of the following transportation problem :

	D_1	D_2	D_3	D_4	D_5	a_i
O_1	7	5	6	5	9	8
O_2	8	7	8	5	4	12
O_3	9	8	7	10	6	14
b_j	4	4	6	10	10	

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