



SB-1364

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

March / April - 2011

Quantitative Methods - I

(New Course)

Time : Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दृश्यावेक निशानियाणी विगतो उत्तरवही पर अवश्य कभवी.  
Fillup strictly the details of signs on your answer book.

Name of the Examination :  
F. Y. B. B. A. (SEM. 2)

Name of the Subject :  
QUANTITATIVE METHODS - 1 (NEW)

Subject Code No. : 1 3 6 4 Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

- (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) If  $A = \{1, 2, 3, 4, 5\}$ ,  $B = \{1, 3, 2, 6\}$  and  $C = \{2, 4, 6, 8\}$  then find  $(A - B) \cup (B - C)$ .
- (2) If cost function is  $C(x) = 2x + 3$  and selling price is Rs. 5 then find profit function.

(3) Evaluate 
$$\begin{vmatrix} a & a & a \\ a & b & c \\ 1 & 1 & 1 \end{vmatrix}$$

(4) If  $A = \begin{bmatrix} -1 & 4 \\ -5 & 3 \end{bmatrix}$  then find adj.A.

(5) Evaluate  $\lim_{x \rightarrow 0} \frac{2^{3x} - 1}{x}$

(6) If  $y = e^x + 2^x + e$  then find  $dy/dx$ .

(7) State demand law.

(8) Evaluate  $\int_0^1 4x^3 dx$

(9) Evaluate  $\int(px^2 + qx + r)dx$

(10) Define symmetric matrix.

- 2 (a) For two real numbers  $a$  and  $b$  P.T.,  $|a+b| \leq |a|+|b|$ . 4  
(b) The expenditure of a hostel depends upon the number of students when there are 40 students, the expenditure is Rs. 50,000 and for 50 students the expenditure is Rs. 62,000. If the relationship between the number of students and hostel expenditure is linear. Find the relationship and also find the expenditure when there are 60 students in hostel. 4  
(c) If  $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ ,  $A = \{1, 2, 3, 4\}$ ,  $B = \{2, 4, 6\}$ ,  $C = \{1, 2, 5\}$  then find (i)  $A \cup (B - C)$  (ii)  $A \cap (B - C)$  (iii)  $A - (B' - C')$  (iv)  $A \cap (B' \cap C')$  4

OR

- 2 (a) In usual notation P.T.  $A \cap (B \cap C) = (A \cap B) \cap C$ . 4  
(b) In a college there are 20 teachers who teach Mathematics or Statistics of these 12 teach Mathematics and 4 teach both Mathematics and Statistics. How many teach Statistics ? How many teach only Mathematics ? 4  
(c) If the demand function is  $d = f(p) = 2000 - 3p^2$  then find the demand when  $p = 25$  and find  $p$  when demand is 4. 4

- 3 (a) If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ ,  $C = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$  then verify that 4

$$A(B+C) = AB+AC$$

- (b) Solve the following equations using Cramer's rule : 4  
 $3x+4y+7z=14$ ,  $2x-y+3z=4$ ,  $x+2y-3z=0$

- (c) Prove that  $\begin{vmatrix} x+a & b & c \\ c & x+b & a \\ a & b & x+c \end{vmatrix} = x^2(x+a+b+c)$  4

OR

- 3 (a) Prove that  $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ b+c & c+a & a+b \end{vmatrix} = 0$  4

(b) If  $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$  then find matrix  $B$  such that, 4

$$2A + 3B = A^2.$$

(c) Solve the following equations by inverse matrix method : 4

$$x + y + z = 1, \quad 2x + 2y + 3z = 6, \quad x + 4y + 9z = 3$$

4 (a) Evaluate : 4

$$(i) \lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1-3x}}{x} \quad (ii) \lim_{x \rightarrow 0} \frac{15^x - 3^x - 5^x + 1}{x}$$

(b) Find  $\frac{dy}{dx}$  if  $y = \left(x - \frac{1}{x}\right) \left(x^2 - \frac{1}{x^2}\right)$  4

(c) Total cost function for producing  $x$  units of a firm is 4  
 $C = 60 - 12x + 2x^2$ . Find the output at which total cost  $C$  is minimum. Also find the minimum cost.

OR

4 (a) Evaluate : 4

$$(i) \lim_{x \rightarrow 1} \frac{x^{2/7} - 1}{x^{5/7} - 1} \quad (ii) \lim_{n \rightarrow \infty} \frac{7n^3 - 5n^2 + 1}{13n^3 - 12n^2 + n}$$

(b) Find  $dy/dx$  if  $x = at^2$  and  $y = \frac{t}{1+t}$  4

(c) The total cost function of a commodity with output 4  
 $x$  units is given by  $C' = x^2 + 9x + 9$ , then find  
(i) Average cost  
(ii) Marginal cost  
(iii) find the output for which marginal cost equal to average cost.

5 (a) Evaluate  $\int \frac{\sqrt{2 + \log x}}{x} dx$  4

(b) Evaluate  $\int_6^{10} \frac{(x-2)}{(x+2)} dx$  4

(c) Marginal cost of units of product produced  $x$  is given 4  
by  $MC = 1.064 - 0.005x$ . Find the total cost and average cost functions, if fixed cost is 16.3.

OR

5 (a) Evaluate  $\int \left(x^3 - \frac{1}{x^3}\right) \left(x^3 + \frac{1}{x^3}\right) dx$  4

(b) Evaluate  $\int_{-1}^1 (2x^2 - x^3) dx$  4

(c) The marginal cost of production is found to be 4  
 $MC = 1000 - 50x + 3x^2$  where  $x$  is the number of units produced. The fixed cost of production is Rs. 2,000. Find the cost function and average cost function.

6 Attempt any **two** : 12

(a) Solve the following LPP using graphical method :

Maximize  $Z = 5x_1 + 3x_2$

Subject to the constraints,

$$2x_1 + x_2 \leq 1000$$

$$x_1 \leq 400$$

$$x_2 \leq 700$$

$$x_1, x_2 \geq 0$$

(b) Solve the following assignment problem so as to minimize the total cost. :

		Destinations				
Origins		$D_1$	$D_2$	$D_3$	$D_4$	$D_5$
$O_1$		3	5	4	6	5
$O_2$		8	5	7	9	5
$O_3$		3	10	9	11	5
$O_4$		9	7	13	8	5
$O_5$		3	9	6	9	9

(c) Find the optimal solution to the following transportation problem :

		TO				
From		I	II	III	IV	Availability
$A$		15	10	17	18	2
$B$		16	13	12	13	6
$C$		12	17	20	11	7
Requirement		3	3	4	5	