* K A - 3 5 0 6 *

KA-3506

First Year B. B. A. (Sem. I) (CBCS) Examination

October / November – 2012

Quantitative Method - I

(Mathematics Oriented)

Time : Hours] [Total Marks : 70

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ F. Y. B. B. A. (SEM. 1) (CBCS)

Name of the Subject :

☛ QUANTITATIVE METHOD-1

☛ Subject Code No. : 3 5 0 6 ☛ Section No. (1, 2.....) : Nil

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) Indicate your option clearly.

(4) Use of simple calculator is allowed.

1 Answer the following : 10

(1) $\begin{pmatrix} 1 & 5 & 3 \\ 1 & x & 2 \\ -1 & 2 & 4 \end{pmatrix} = 0$, then find the value of x.

(2) If A is a symmetric matrix then find the value of p, q, r where, $A = \begin{bmatrix} 1 & p & q \\ 3 & 4 & r \\ 9 & 2 & 6 \end{bmatrix}$.

(3) Explain unbalanced transportation problem.

(4) Find IBFS of the following transportation problem by North-west corner Rule :

3	5	7	10
2	9	4	20
3	2	1	30
15	15	30	

(5) Find IBFS of following assignment problem

	A	B	C
p	2	5	7
q	3	1	10
r	11	7	4

2 (a) If $A=\begin{pmatrix}1 & -1\\ 2 & -1\end{pmatrix}$, $B=\begin{pmatrix}a & 1\\ b & -1\end{pmatrix}$ and $(A+B)^2=A^2+B^2$, find the values of a and b. 6

(b) If $A=\begin{pmatrix}5 & 3 & 1\\ 2 & -1 & 2\\ 4 & 1 & 3\end{pmatrix}$ then find $A^3-7A^2-5A+131=?$. 6

OR

2 (a) Solve the following system of equations by matrix inversion method : 6

$$2x+4y-z=9,\ 3x+y+2z=7,\ x+3y-3z=4$$

(b) Three firms X, Y and Z supplied 40, 35 and 25 units of item A and 10, 5, 8 units of item B respectively. If the cost of item A and item B are Rs. 1200 and Rs. 500 per unit. Find the total amount paid by the contractor to each of these firms, by using matrix method. 6

3 (a) Solve the following system of equation by Cramer's Rule : 6

$$3x+2y-3z=4$$
$$-2x+4y+z=2$$
$$x+y-z=3$$

(b) Using Properties of determinant prove that 6

$$\begin{vmatrix} x-y & y-z & z-x \\ y-z & z-x & x-y \\ z-x & x-y & y-z \end{vmatrix} = 0$$

OR

3 (a) Solve the following system of equation by Cramer's Rule : 6

$$4x-y=3,\ -3x+z=2,\ 5y-3z=5$$

(b) Using Properties of determinant prove that 6

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

4 (a) A firm manufactures two products A and B. 6

The profit per unit are Rs. 30, Rs. 20 respectively.

The firm has two machines G and H and given below is the required processing time in minutes for each machine on each product. machine G and H have 2000 and 2500 machine minutes respectively. Formulate the above problem and solve by graphical method :

Machine	Product	
	A	B
G	4	3
H	3	2

(b) Solve following linear programming problem by graphical method : 6

Maximize $Z = 104\, x_1 + x_2$

Subject to $2x_1 + x_2 \leq 8$

Constraints $3x_1 + 4x_2 \leq 24$

$x_1, x_2 \geq 0$

OR

4 (a) The manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the inputs and outputs per production run are as follows : 6

Process	Input Units		Output units	
	Grade-I	Grade-II	Petrol (superior)	Petrol (inferior)
A	10	6	10	16
B	12	15	12	12

The availability of the two varieties of crude is limited to the extent of 400 units and 450 units respectively. The market demand indicates that at least 200 units and 240 units of Superior and ordinary quality of Petrol is required. The profitability analysis indicates that process A contributes Rs. 180 per day and the process B contributes Rs. 240 per day. The manager is interested in determining an optimal product mix for maximizing the profit. Find solution graphically.

(b) Solve the following linear programming problem graphically **6**

Minimize $Z = x_1 + x_2$

Sub to $x_1 + x_2 \geq 3$

Contraints $2x_1 + 3x_2 \leq 18$

$x_1 \leq 6$

$x_1, x_2 \geq 0$

5 Attempt any two : **12**

(1) Find the optimal solution to the following transportation problem

	I	*II*	*III*	*IV*	Availibility
A	15	10	17	18	2
B	16	13	12	13	6
C	12	17	20	11	7
Requirement	3	3	4	5	

(2) Find Initial Basic feasible solution for the following TP by Vogal's Approximation method :

Plant	x_1	x_2	x_3	x_4	x_5	*Supply*
A_1	5	8	6	6	3	800
A_2	4	7	7	6	5	600
A_3	8	4	6	6	4	800
Demand	400	400	600	400	600	

(3) A store wishes to stock the following quantities of a popular product in three types. Tenders are submitted by four dealers. The store estimates the profit per unit with the dealers as shown below. How should order be placed to maximize total profit ?

	D_1	D_2	D_3	D_4	*Demand*
1	8	9	8	3	170
2	6	11	5	10	200
3	3	8	7	9	180
Supply	150	160	150	130	

6 Attempt any two : 12

(1) Solve the following assignment problem to minimize the total time :

Job / *Person*	*A*	*B*	*C*	*D*
I	12	7	9	7
II	8	9	6	6
III	7	17	12	14
IV	15	14	6	6

(2) Four different air-planes are to be assigned to handle three cargo consignments with a view to maximize profit. The profit matrix is as follows :

	Cargo consignment		
Air plane	*A*	*B*	*C*
P	1	4	5
Q	2	3	3
R	3	3	3
S	5	1	2

(3) Solve the following assignment problem to maximize the sales :

District

Salesman	1	2	3	4	5
A	42	48	50	38	50
B	50	34	38	31	46
C	51	37	43	40	47
D	52	48	51	46	46
E	39	43	50	45	49