Total No. of Questions : 5]

SEAT No. :

P2649

[Total No. of Pages :4

[4666]-55
M.C.A. (Commerce)
506-OPERATION RESEARCH
(Semester-V) (2008 Pattern)

Time : 3 Hours] *[Max. Marks : 80*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Give illustrations wherever necessary.***
4) ***Use of calculator is allowed.***

Q1) Attempt Any Three of the following: **[15]**

a) What is general linear programming problem? Write in mathematical form when the LPP is in standard form.

b) Food X contains 5 units of vitamin A per gram and 12 units of Vitamin B per gram. Food Y contains 10 units of Vitamin A per gram and 6 units of Vitamin B per gram. Cost of food X and food Y are 12 paise and 20 paise per gram respectively. The daily minimum requirement of Vitamin A is 100 units and that of B is 120 units. Formulate a LPP.

c) Solve the following L.P.P. by Simplex method

Max $Z = 5x + 3y$

Subject to $x + y \le 2$

$5x + 2y \le 10$

$3x + 2y \le 12$

$x \ge 0, y \ge 0$

d) Find the dual of L.P.P.

Min $Z=10x_1 + 6x_2 + 2x_3$

Subject to $-x_1 + x_2 + x_3 > 1$

$3\,x_1 + x_2 - x_3 \ge 2$

$x_1, x_2\ x_3 \ge 0$

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Q2) Attempt any three of the following: **[15]**

a) Define Operation Research and give any two examples.

b) Find IBFS by least cost method of the following TP

		Destination				
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	2	3	11	7	6
	O_2	1	0	6	1	1
	O_3	5	8	15	9	10
		7	5	3	2	17

c) Solve the following assignment problem for minimization.

	I	II	III	IV
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	5

d) Determine the dual of following primal

Max $Z=7y_1+9y_2$

Subject to

$$y_1+2y_2 \le 1$$
$$-y_1+3y_2 \le 2$$

Where y_1, y_2 are unrestricted

Q3) Attempt any three of the following: **[15]**

a) Write basic difference between PERT and CPM.

b) Solve the following game by algebraic method.

		Player B	
		I	II
Player A	I	20	−6
	II	−4	3

c) Find IBFS for the T.P. by North -West Corner method.

Destination

	D_1	D_2	D_3	D_4	Supply
O_1	7	3	8	6	6
O_2	4	2	5	10	10
O_3	2	6	5	1	4
Demand	2	5	5	8	20

d) Define

i) Event ii) Activity iii) Critical Path iv) Float

Q4) Attempt any three of the following: **[15]**

a) Solve the following game graphically

Player B

Player A			
	6	7	15
	20	12	10

b) Solve the following A.P. to minimize the lost such that machine M_2 cannot be assigned job C and machine M_3 cannot be assigned job A.

Jobs

Machine	A	B	C	D	E
M_1	9	11	15	10	11
M_2	12	9	–	10	9
M_3	–	11	14	11	7
M_4	14	8	12	7	8

c) Define

i) Slack Variable ii) Surplus Variable

iii) Feasible Solution iv) Degenerate basic feasible solution

d) Convert the following LPP to canonical form

Max Z=5x+3y

Subject to

$$x - 3y = 2$$

$$-x + y \geq 1$$

$$x, y \geq 0$$

Q5) Attempt any two of the following: **[20]**

a) A building construction project has the following time schedule.

Activity	Time in months
1–2	2
2–3	1
2–4	4
4–5	5
5–6	8
5–7	2
6–8	3
7-8	1

i) Draw an arrow diagram for this project.
ii) Find critical path and its duration.

b) Obtain initial basic feasible solution of the following T.P by Vogel's approximation method. Is this solution optimal? If not find optimal solution by MODI method.

	Destination				
Origin	5	6	2	3	8
	1	2	6	9	9
	5	6	7	2	11
	8	5	6	9	28

c) Solve the following LPP by Simplex Method.

Max Z=3x+2y+5z

Subject to

$$x + 2y + z \leq 43$$
$$3x + 2z \leq 46$$
$$x + 4y \leq 12$$
$$x, y, z \geq 0$$

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