Seat No. : 01216

NG-101

November-2018

B.B.A, Sem.-V

CC – 304 : Operation Research & Q.T.

Time : 2 :30 Hours] [Max. Marks : 70

1. (A) (i) What is LPP ? State its uses. 7

(ii) Solve the following LPP by graphical method : 7

Min. $Z = 3x + 5y$

S.t.c. $x + 3y \geq 3$

$x + y \geq 2$

$x, y \geq 0.$

OR

(i) A dietician has to develop a special diet using two foods P and Q. Each packet (containing 30 g) of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of Vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of Vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron, and at most 300 units of cholesterol. How many packets of each food should be used to minimize the amount of Vitamin A in the diet ? Solve by graphically. 7

(ii) Convert the given LPP into dual problem : 7

Minimize $Z = 2x_2 + 5x_3$

S.t.c. $x_1 + x_2 \geq 2$

$2x_1 + x_2 + 6x_3 \leq 6$

$x_1 - x_2 + 3x_3 = 4$

$x_1, x_2, x_3 \geq 0$

(B) Short questions : (Any **four**) 4

(i) Define : Objective function

(ii) All constraints in LPP as well as its objective function must be linear in nature. (True/False)

(iii) An LPP can have only two decision variables. (True/False)

(iv) Every LPP is associated with another LPP is called _____.

(v) LPP involving only two variables can be solved by _____.

(vi) LPP involving more than two variables can be solved by _____.

2. (A) (i) Solve the following T. P. by NW-Rule. 7

	I	II	III	IV	Supply
I	8	10	9	7	150
II	6	5	18	11	250
III	3	8	9	10	100
Demand	125	75	130	170	

(ii) Solve the following T.P. by Vogel Method : 7

	I	II	III	Supply
I	8	3	8	75
II	6	5	9	225
III	4	3	7	100
Demand	80	300	20	

OR

(i) What is T.P ? State the solving step of NW Rule. 7

(ii) Solve the following T.P. by matrix minima method : 7

	I	II	III	IV	Supply
I	8	4	11	7	16
II	9	5	8	6	24
III	8	3	14	10	60
Demand	32	24	30	14	

(B) Short questions : (Any **four**) 4

(i) The purpose of the transportation approach for locational analysis is to minimize _____.

(ii) Define Balanced transformation problem.

(iii) Define Degeneracy.

(iv) When total supply is not equal to total demand in a transportation problem, the problem is said to be _____.

(v) The solution to T.P. with m rows and n columns is feasible if number of positive allocations are _____.

(vi) The method used for getting optimum solution is called _____.

3. (A) (i) State the differences between PERT and CPM. 7

(ii) Draw PERT diagram for given details : Determine critical path and time. 7

Activity	1 – 2	1 – 3	1 – 4	2 – 3	2 – 5	3 – 4	3 – 6	4 – 6	5 – 6
Optimistic time	2	6	6	2	11	15	3	9	4
Most likely time	4	6	12	5	14	24	6	15	10
Pessimistic time	6	6	24	8	23	45	9	27	16

OR

(i) Draw PERT diagram. 7

A < D; A < E; B < F; D < F; C < G; C < H; F < J; G < J

(ii) Draw PERT diagram. Also find EPT, EFT, LST, LFT and float time. 7

Activity	1 – 2	1 – 3	1 – 4	2 – 5	3 – 6	3 – 7	4 – 6	5 – 8	6 – 9	7 – 8	8 – 9
Duration	2	2	1	4	8	5	3	1	5	4	3

(B) Short questions : (Any **three**) 3

(i) CPM sands for _____.

(ii) PERT sands for _____.

(iii) Define : Expected time.

(iv) What is PERT time for activity with optimistic, most likely and pessimistic time estimates of 6, 10, 14 days ?

(v) Define Activity.

4. (A) (i) Solve the following assignment problem : 7

		Employee I	II	III	IV	V
Job I	I	59	28	71	94	57
	II	99	17	98	13	99
	III	3	71	92	72	85
	IV	3	44	18	19	27
	V	50	68	23	22	31

(ii) The payoff matrix is given below. Find the solution of the game to A and B. 7

A \ B	I	II	III	IV	V
I	–4	–2	–2	3	1
II	1	0	–1	0	0
III	–6	–5	–2	–4	4
IV	3	1	–6	0	–8

OR

(i) Solve the following assignment for maximize cost : 7

	I	II	III	IV
I	50	80	37	27
II	60	86	15	76
III	58	10	25	71
IV	43	15	55	91

(ii) Apply the principle of dominance in game theory and solve adjoining game: 7

X \ Y	1	2	3	4
1	8	10	9	14
2	10	11	8	12
3	13	12	14	13

(B) Short questions : (Any **three**) 3

(i) Solving method of Assignment problem is called _____.

(ii) In Game theory, a situation in which one firm can gain only what another firm loses is called _____.

(iii) Chess is zero-sum game. (True/False)

(iv) The assignment problem is a special case of _____ model.

(v) An assignment problem is to obtain _____.