Seat No. : _____

MJ-103

May-2022

BBA, Sem.-V

CC-304 : Operation Research

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) Any **two** from first **4** questions.
(2) **Fifth** question is compulsory.

1. (A) What is LPP ? Explain its uses. **10**

(B) One unit of product A contribution ₹ 7 and for product B per unit contribution is ₹ 5. One unit of product A requires 3 units of raw material and 2 hours of labours. One unit of product B requires 1 unit of raw material and 1 hour of labour. Availability of raw material at present is 48 units and 40 hours of labour can be used. Formulate it as a linear programming problem and solve it by graphical method. **10**

2. (A) Solve the following transportation problem by NW rule and Matrix minima method. **10**

	D_1	D_2	D_3	D_4	Capacity
O_1	6	5	1	3	100
O_2	4	8	7	2	125
O_3	6	3	9	3	75
Demand	70	90	80	60	300

(B) Obtain an optimum solution to the following transportation problem. **10**

	D_1	D_2	D_3	Capacity
O_1	(30) 8	9	(10) 7	40
O_2	4	(25) 3	5	25
O_3	8	(5) 5	(30) 6	35
Demand	30	30	40	100

3. (A) Draw PERT diagram for the following and calculate total float. **10**

Activity	1-2	1-3	2-4	2-5	3-4	3-6	4-5	4-6	5-7	6-7
Time	4	5	2	12	3	8	10	6	8	10

(B) Time estimates and predecessors of each activity in a project are given below : **10**

Activity	A	B	C	D	E	F	G	H	I
Predecessors	–	–	–	A	A	B, D	C	C	F, G
Time	8	10	8	10	16	17	18	14	9

Draw PERT diagram. Also find critical path.

4. (A) A company has four districts, I, II, III and IV to sell its products and four salesmen A, B, C and D for it. The district wise sales record of each salesman is as given in the table below : **10**

Salesman	**Districts**			
	I	**II**	**III**	**IV**
A	420	350	280	210
B	300	250	200	150
C	300	250	200	150
D	240	200	160	120

(B) Find solution of game theory problem using dominance method. Also find game value. **10**

Player B → / **Player A ↓**	B_1	B_2	B_3	B_4
A_1	3	5	4	2
A_2	5	6	2	4
A_3	2	1	4	0
A_4	3	3	5	2

5. Do as Directed : (Any **ten**) **10**

(1) Which method usually gives very good initial basic solution to the transportation problem ?

(a) North West Corner rule

(b) Vogel's approximation method

(c) Modi method

(d) Stepping stone method

(2) In a transportation problem, we must make the number of ____and _____ equal.

(a) Destinations; sources

(b) Units supplied; units demanded

(c) Columns; rows

(d) Positive cost coefficients; negative cost coefficients

(3) The solution to a transportation problem with "m" rows and "n" columns is feasible if number of positive allocations are ____.

(a) m + n (b) m * n

(c) m + n – 1 (d) m + n + 1

(4) In transportation problem, if total supply > total demand we add _____.

(a) Dummy Column with cost 0 (b) Dummy Row with cost 0

(c) Dummy Row with cost 1 (d) Dummy Column with cost 1

(5) The method used for solving an assignment problem is called _____.

(a) Reduced matrix method (b) MODI method

(c) Hungarian method (d) None of given

(6) The assignment problem is _____.

(a) Requires that only one activity be assigned to each resource

(b) Is a special case of transportation problem

(c) Can be used to maximize resources

(d) All of the given

(7) Graphical method can be applied to solve a LPP when there only ___ variable.

(a) One (b) More than one

(c) Two (d) Three

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

(a) Primal (b) Dual

(c) Non-linear programming (d) None of given

(9) Linear programming is a _____.

(a) Constrained optimization technique

(b) Technique for economic allocation of limited resources

(c) Mathematical technique

(d) All of the above

(10) PERT is analysis based on _____

(a) Optimistic time (b) Pessimistic time

(c) Most likely time (d) All of the given

(11) What is the earliest start time rule ?

(a) It compares the activity's starting time for an activity successor

(b) It compares the activity's end time for an activity predecessor

(c) It directs when a project can start

(d) It regulates when a project must begin

(12) What is a critical path ?

(a) It is a path that operates from the starting node to the end node

(b) It is a mixture of all the parts

(c) It is the longest path

(d) It is the shortest path

(13) If the losses of player A are the gains of the player B, then the game is known as _____.

(a) Fair Game (b) Unfair Game

(c) Non – a zero – sum game (d) Zero – sum game

(14) What happens when maximin and minimax values of the game are same ?

(a) No solution exists (b) Solution is mixed

(c) Saddle point exists (d) None of the given