Seat No. : _____

DC-107

December-2025

4th Year M.Sc. (CA & IT) Integrated, Sem.-VII

Operation Research

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

Instructions : (1) Use of simple calculator is allowed during examination.

(2) The graph paper is to be provided if needed.

1. Attempt any **two** : **2 × 7 = 14**

(a) Solve the following LPP by Simplex method.

max $Z = 2x_1 + 4x_2 + x_3$

Subject to,

$x_1 + x_2 \leq 4$

$2x_1 + x_2 \leq 3$

$x_2 + 4x_3 \leq 3$

$x_1, x_2, x_3 \geq 0$

(b) Use Big M method to Minimize $z = 12x + 20y$

Subject to,

$6x + 8y \geq 100$, $7x + 12y \leq 120$

$x, y \geq 0$

(c) Solve the following LPP by Graphical method.

Minimize $Z = 2000\,x + 1600\,y$

Subject to,

$6x + 2y \geq 12$, $2x + 2y \geq 8$, $4x + 12y \geq 24$, $x \leq 7$, $y \leq 7$

$x, y \geq 0$

2. Attempt any **two** : **2 × 7 = 14**

(a) Solve the following Transportation problem to minimize the total cost by Vogel's method.

	1	**2**	**3**	**4**	**Supply**
A	5	6	4	7	50
B	4	7	8	4	70
C	2	5	2	3	80
Requirement	50	40	90	20	

(b) Find an optimal solution of the following transportation problem by MODI method.

	1	**2**	**3**	**4**	**Supply**
A	20	18	22	13	10
B	10	20	17	24	9
C	19	17	18	12	11
Demand	10	7	8	5	

(c) Solve the following transportation problem to obtain maximum profit.

	E	**F**	**G**	**H**	**Supply**
p	33	30	37	38	70
Q	25	19	14	15	90
R	30	31	30	28	115
Demand	50	60	70	95	

3. Attempt any **two** : **2 × 7 = 14**

(a) Solve the following maximization assignment problem. The data regarding production on different machines are given in the following table.

	a	**b**	**c**	**d**
1	15	10	12	13
2	16	9	14	15
3	13	9	14	12
4	12	10	11	9
5	13	14	12	10

(b) Solve the following assignment problem to minimize the total cost of doing all the jobs.

	a	**b**	**c**	**d**	**e**	**f**
1	41	62	39	52	25	51
2	22	29	49	65	81	50
3	27	29	60	51	32	32
4	45	50	48	52	37	43
5	29	40	39	26	30	33
6	82	40	40	60	51	30

(c) An airline that operates seven days a week has a time-table in the following manner.

Flight no.	**Jaipur (Depart)**	**Mumbai (Arrive)**	**Flight no.**	**Jaipur (Depart)**	**Chennai (Arrive)**
201	7.00 am	9.00 am	101	9.00 am	11.00 am
202	9.00 am	11.00 am	102	10.00 am	12.00 noon
203	1.30 pm	3.30 pm	103	3.30 pm	5.30 pm
204	7.30 pm	9.30 pm	104	8.00 pm	10.00 pm

Crews must have a minimum layover of 6 hours between flights. Obtain the pairing of flights that minimize layover time away from home. Also, for each pair mention the town where the crew should be based.

4. Attempt any **two** : **2 × 7 = 14**

(a) Find the minimum spanning Tree of following using Prim's algorithm.

Edge	**Weight**
A-B	2
A-C	3
A-D	6
B-C	1
B-D	4
B-E	5
C-E	7
D-E	2

(b) Explain Maximum flow Problem and write applications of network models in Field of IT.

(c) Explain Kruskal's algorithm for finding shortest path with example.

5. Attempt any **two** : **2 × 7 = 14**

(a) Determine Critical path for following project. Find EFT, LFT and Total float.

Job	Time
1-2	2
1-3	5
2-4	4
3-4	3
3-5	5
4-6	6
5-7	2
6-7	4

(b) What is Linear programming? Write and explain 7 Uses of LP in IT field.

(c) The details regarding a project is as follows. Find the expected time of the activities and Critical Path.

Activity	Optimistic time (days)	Most likely time (days)	Pessimistic time (days)
1-2	3	3	5
2-3	4	8	10
2-4	1	3	6
3-4	2	4	7
3-5	2	6	8
4-6	2	3	4
5-8	2	5	8
6-7	6	8	10
6-10	3	4	5
7-9	2	5	7
8-9	3	5	8
9-10	6	7	8