Sr. No. 015704

Dec 2023

B.Tech(ECE)- VII SEMESTER

Operational Research (OEL-707)

Time: 90 Minutes **Max. Marks:75**

Instructions:

1. *It is compulsory to answer all the questions (1 marks each) of Part -A in short.*
2. *Answer any three questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) What do you mean by a Linear Programming Problem? What are its limitations? (1.5)

(b) Define the term Sensitivity Analysis. (1.5)

(c) State Bellman's principle of optimality. (1.5)

(d) What is an assignment problem? Explain. (1.5)

(e) Write the steps to find the initial basic feasible solution by North West Corner method. (1.5)

(f) Write a short note on shortest route problem. (1.5)

(g) Briefly explain resource allocation with example in relation of network analysis (1.5)

(h) Write short note on characteristics of dynamic programming. (1.5)

(i) Discuss in brief dummy activity, free float and independent float. (1.5)

(j) Distinguish between pure and mixed integer programming problem (1.5)

PART -B

Q2 (a) Solve the following LPP by graphical method: (7)

$$Max.Z = 3x_1 + 5x_2$$

Subject to the constraints:

$x_1 + 2x_2 \leq 2000,\ x_1 + x_2 \leq 1500, x_2 \leq 600\ and\ x_1, x_2 \geq 0$

(b) Solve the following LPP by Simplex method: (8)

$$Max.Z = 3x_1 + 5x_2$$

Subject to the constrains:

$3x_1 + 2x_2 \leq 18,\ x_1 \leq 4,\ x_2 \leq 6,\ x_1, x_2 \geq 0$

Q3 (a) Using the Dual Simplex method solve the following LPP: (8)

$$Min.z = 10x_1 + 6x_2 + 2x_3$$

Subject to the constraints:

$-x_1 + x_2 + x_3 \geq 1,\ \ 3x_1 + x_2 - x_3 \geq 2,\ \ x_1, x_2, x_3 \geq 0$

015704/110/111/631

(b) Solve the following cost minimizing assignment problem: (7)

Job→ Man ↓	A	B	C	D	E
I	11	10	18	5	9
II	14	13	12	19	6
III	5	3	4	2	4
IV	15	18	17	9	12
V	10	11	19	6	14

Q4 (a) Find the initial basic feasible solution by Vogel's approximation method of the following transportation problem: (10)

From	To				Available
	A	B	C	D	
I	1	5	3	3	34
II	3	3	1	2	15
III	0	2	2	3	12
IV	2	7	2	4	19
Demand	21	25	17	17	

(b) Write a short note on maximum flow problem. (5)

Q5 Solve by cutting plane algorithm: (15)

$$Maximize\ z = 2x_1 + 2x_2$$

Subject to:

$$5x_1 + 3x_2 \leq 8$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0\ and\ integer$$

Q6 A research and development department is developing a new power supply for a console television set. It has broken the job down into the following: (15)

Job	Description	Immediate Predecessors	Time(days)
A	Determine output voltage	-	5
B	Determine whether to use solid-state rectifiers	A	7
C	Choose rectifiers	B	2
D	Choose filter	B	3
E	Choose transformer	C	1
F	Choose chassis	D	2
G	Choose rectifier mounting	C	1
H	Layout chassis	E, F	3
I	Build and test	G, H	10

(i)Draw the network diagram of activities involved in the project and indicate the critical path.

(ii) What is the minimum completion time for the project?

Q7 (a) Describe the recursive equation approach to solve the Dynamic programming. (5)

(b) Find the maximum value of (10)

$$z = x_1^2 + 2x_2^2 + 4x_3^2$$

Subject to the constraints

$$x_1 + 2x_2 + x_3 \leq 8, \qquad x_1, x_2, x_3 \geq 0$$

****