

F-2749

Sub. Code

7BITA4

U.G. DEGREE EXAMINATION, NOVEMBER 2019

Information Technology

Allied – OPERATION RESEARCH

(CBCS – 2017 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 2 = 20)

Answer **all** questions.

1. What are the different types of model?
2. What is a model?
3. What is Artificial Variable?
4. What is feasibility region in an LPP?
5. Define Integer Programming Problem.
6. State Fundamental theorem of Duality.
7. What are Assignment Problem?
8. What is travelling salesman problem?
9. What is a Balanced Transportation Problem?
10. What is degeneracy of a Transportation Problem?

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the principles of modeling.

Or

- (b) What are the different phases of O.R?

12. (a) Explain the working procedure for Graphical Method.

Or

- (b) Solve the following LPP by the Simplex Method:

$$\text{Minimize } Z = 8x_1 - 2x_2$$

$$\text{Subject to } -4x_1 + 2x_2 \leq 1$$

$$5x_1 - 4x_2 \leq 3$$

$$\text{and } x_1, x_2 \geq 0.$$

13. (a) Write the dual of the following Primal LPP

$$\text{Maximize } Z = x_1 + 2x_2 + x_3$$

$$\text{Subject to: } 2x_1 + x_2 - x_3 \leq 2$$

$$-2x_1 + x_2 - 5x_3 \geq -6$$

$$4x_1 + x_2 + x_3 \leq 6$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

Or

- (b) Using dual simplex method to solve the LPP

$$\text{Minimize } Z = 2x_1 + x_2$$

$$\text{Subject to } 3x_1 + x_2 \geq 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \geq 1$$

$$\text{and } x_1, x_2 \geq 0.$$

14. (a) What are the job-assignments which will minimize the cost for the following?

		Machines			
		W	X	Y	Z
Jobs	A	18	24	28	32
	B	8	13	17	18
	C	10	15	19	22

Or

- (b) Solve the following Travelling Salesman Problem in order to minimize the cost per cycle.

		To				
		A	B	C	D	E
From	A	—	3	6	2	3
	B	3	—	5	2	3
	C	6	5	—	6	4
	D	2	2	6	—	6
	E	3	3	4	6	—

15. (a) Solve the following by North-West Corner Rule:

		To			
		D	E	F	Supply
From	A	6	4	1	50
	B	3	8	7	40
	C	4	4	2	60
Demand		20	95	35	

Or

- (b) Solve the Transportation Problem by VAM

		Destination				
		A	B	C	D	Supply
Source	1	11	20	7	8	50
	2	21	16	20	12	40
	3	8	12	18	9	70
Demand		30	25	35	40	

Part C $(3 \times 10 = 30)$ Answer any **three** questions.

16. Explain the different classification of models.
17. Use Two-Phase Simplex Method to Solve:
 Maximize $Z = 5x_1 + 8x_2$
 Subject to $3x_1 + 2x_2 \geq 3$
 $x_1 + 4x_2 \geq 4$
 $x_1 + x_2 \leq 5$
 and $x_1, x_2 \geq 0$.
18. Use bounded variable technique. solve the following LPP:
 Maximize $Z = x_2 + 3x_3$
 Subject to: $x_1 + x_2 + x_3 \leq 10$
 $x_1 - 2x_3 \geq 0$
 $0 \leq x_1 \leq 8, 0 \leq x_2 \leq 4, 0 \leq x_3 \leq \infty$.
19. Find the optimal solution for the Assignment Problem with the following cost matrix:

	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	14	10	12	11	15

20. Find the optimal solution of the following transportation problem using MODI Method.

		Destination				
		D1	D2	D3	D4	Supply
Origin	O1	6	1	9	3	70
	O2	11	5	2	8	55
	O3	10	12	4	7	70
Demand		85	35	50	45	