A–8977

Sub. Code
4BITSA2

U.G. DEGREE EXAMINATION, NOVEMBER 2019

Information Technology

Allied — OPERATION RESEARCH

(CBCS – 2014 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 2 = 20)$

Answer **all** questions.

1. Give any two characteristics of O.R.

2. List out the different phases of O.R.

3. Define : surpus variable.

4. What is feasible solution?

5. What do you understand by duality in linear programming?

6. What is complementary slackness?

7. When an assignment problem is said to be unbalanced?

8. What is travelling salesman problem?

9. Give the necessary and sufficient condition for the existence of a feasible to a transportation problem.

10. What are the methods available to obtain an initial basic feasible solution for a transportation problem?

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

Answer **all** questions.

11. (a) Describe the different types of models used in operations research.

Or

(b) Describe the scope of operations research.

12. (a) A company produces two types of cow-boy hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits on daily sales of the first and second types are 150 and 250 hats. Assuming that the profits per hat are Rs. 8 for first type and Rs. 5 for second type. Formulate the problem as a LPP.

Or

(b) Use graphical method to solve:

Min $Z = -x_1 + 2x_2$

Subject to the constraints:

$$-x_1 + 3x_2 \le 10$$

$$x_1 + x_2 \le 6$$

$$x_1 - x_2 \le 2$$

$$x_1, x_2 \ge 0$$

13. (a) Show that dual of dual is primal.

Or

(b) Write the dual of the following LPP:

Max $Z = 2x_1 + 5x_2 + 6x_3$

Subject to the constraints:

$$5x_1 + 6x_2 - x_3 \le 3$$

$$-2x_1 + x_2 + 4x_3 \le 4$$

$$x_1 - 5x_2 + 3x_3 \le 1$$

$$-3x_1 - 3x_2 + 7x_3 \le 6$$

$$x_1, x_2, x_3 \ge 0$$

14. (a) Explain the Hungarian Assignment method.

Or

(b) Solve the following assignment problem:

		A	B	C
				Plant
Product	P_1	10	8	12
	P_2	18	6	14
	P_3	6	4	2

15. (a) Describe the procedure for Vogel's approximation method.

Or

(b) Obtain the initial solution using North-West corner rule for the following transportation problem:

		To					
		D	E	F	G	H	
From	A	5	8	6	6	3	800
	B	4	7	7	6	5	500
	C	8	4	6	6	4	900
		400	400	500	400	800	

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the applications of O.R.

17. Use Big M method to solve:

Min $Z = 12x_1 + 20x_2$

Subject to the constraints:

$$6x_1 + 8x_2 \geq 100$$
$$7x_1 + 12x_2 \geq 120$$
$$x_1, x_2 \geq 0$$

18. Find the optimum integer solution to the LPP:

Max $Z = x_1 + x_2$

Subject to the constraints:

$3x_1 + 2x_2 \leq 5$

$x_2 \leq 2$

$x_1, x_2 \geq 0$ and are integers

19. Solve the following assignment problem:

Job

Machine		a	b	c	d	e
	1	2.5	5	1	6	1
	2	2	5	1.5	7	3
	3	3	6.5	2	8	3
	4	3.5	7	2	9	4.5
	5	4	7	3	9	6
	6	6	9	5	10	6

20. Is $x_{13} = 50, x_{14} = 20, x_{21} = 55, x_{31} = 30$, $x_{32} = 35$ and $x_{34} = 25$ an optimum solution to the transportation problem

					Available
	6	1	9	3	70
	11	5	2	8	55
	10	12	4	7	90
Requirements	85	35	50	45	

If not, modify it to obtain a better feasible solution.