

M.Tech Even Semester (CBCS) Exam., April—2017

AGRICULTURAL ENGINEERING

(Food Process Engineering)

(2nd Semester)

Course No. : MAEEL-04

(Operation Research and Industrial Management)

Full Marks : 50

Pass Marks : 15

Time : 2 hours

Note : 1. Attempt **any five** questions.

2. Begin each answer in a new page.

3. Answer parts of a question at a place.

4. Assume reasonable data wherever required.

5. The figures in the margin indicate full marks for the questions.

1. (a) Discuss the applications of operations research. 3

(b) Find the optimal solution by applying the graphical techniques : 7

Maximize,

$$Z = 2x_1 + x_2$$

Subject to,

$$x_1 + 2x_2 = 10$$

$$x_1 + x_2 = 6$$

$$x_1 + x_2 = 2$$

$$x_1 + 2x_2 = 1$$

$$x_1, x_2 \geq 0$$

2. (a) What do you mean by feasible solution? Write down the types of solutions in LPP. 2

(b) Solve the LPP by applying simplex method : 8

Maximize,

$$Z = 4x_1 + 3x_2$$

Subject to,

$$2x_1 + x_2 = 1000$$

$$x_1 + x_2 = 800$$

$$x_1 \leq 400, x_2 \leq 700, \text{ where } x_1, x_2 \geq 0$$

(3)

3. Find the optimal solution to the assignment problem with the cost matrix as given below : 10

	I	II	III	IV
A	200	200	400	100
B	300	100	300	300
C	400	100	100	500
D	200	200	400	200

4. Solve the following transportation problem using all the three methods and perform optimality test : 10

	D_1	D_2	D_3	D_4	D_5	Available
O_1	68	35	4	74	15	18
O_2	57	88	91	3	8	17
O_3	91	60	75	45	60	19
O_4	52	53	24	7	82	13
O_5	51	18	82	13	7	15
Req.	16	18	20	14	14	

5. (a) What is network analysis? What do you mean by time overrun and cost overrun? 6
- (b) What do you mean by CPM and PERT? 4
6. What are the types of decision? List the approaches for decision under risk and decision under uncertainty. 10

(4)

7. Explain the following terms : 2×5=10

- (a) Simulation
(b) Slack variable
(c) Optimal solution
(d) Inventory
(e) Surplus variable

8. A company wishes to plan its advertising strategy. There are two media under consideration, call them magazine I and II, respectively. Magazine I has a reach of 2000 potential customers and magazine II has a reach of 2500 potential customers. The cost per page of advertising is ₹ 400 and ₹ 600 in magazines I and II, respectively. The firm has a monthly budget of ₹ 6,000. There is an important requirement that the total reach for the income group under ₹ 20,000 per annum should not exceed 4000 potential customers. The reach in magazines I and II for this income group is 400 and 200 potential customers. How many pages should be bought in the two magazines to maximize the total reach? Solve it using graphical method. 10
