74457

M. Sc. (Mathematics) 2nd Semester
Examination – May, 2016

OPERATIONS RESEARCH TECHNIQUES (NEW) w.e.f. 2014-15

Paper : MM-425-B

Time : Three Hours]   [Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting one question from each of the four units I, II, III and IV. Unit-V contains one question with eight parts and is *compulsory*.

UNIT – I

1. (a) Discuss methodology and scope of operations research.   12

(b) What are linear programming problems ? Give mathematical formulation of general linear programming problem. 4

2. (a) Solve the following linear programming problem using Big-M method : 12

Maximize $Z = 3x_1 - x_2$

subject to constraints

$$2x_1 + x_2 \le 2$$
$$x_1 + 3x_2 \ge 3$$
$$x_2 \le 4$$
$$x_1, x_2 \ge 0$$

(b) Write a short note on 'duality' in linear programming. 4

UNIT – II

3. (a) What are 'balanced' and 'unbalanced' transporation problem ? Give one example of each. Explain how an unbalanced transporation is solved. 6

(b) Solve the following transporation problem : 10

		To			Supply
		1	2	3	
From	1	2	7	4	5
	2	3	3	1	8
	3	5	4	7	7
	4	1	6	2	14
Demand		7	9	18	34

4. (a) Solve the following assignment problem : 10

Man

		I	II	III	IV	V
	A	1	3	2	3	6
	B	2	4	3	1	5
Task	C	5	6	3	4	6
	D	3	1	4	2	2
	E	1	5	6	5	4

(b) What is the travelling salesman problem ? Which situations can be treated as the travelling

salesman problem ? How does its solution differ from the solution of the assignment problem ?

6

UNIT – III

5. (a) With respect to queue system, explain the following : 6

   (i) Input process

   (ii) Queue discipline

   (iii) Traffic intensity

   (iv) Steady state.

   (b) Discuss M/M/C queuing model. Also give its important characteristics. 10

6. (a) A company uses Rs. 10,000 worth of an item during the year. The ordering costs are Rs. 25 per order and carrying charges are 12.5% of the average inventory value. Find the economic order quantity, number of orders per year, time period per order and the total cost. 8

   (b) Explain the economic lot size model when shortages are allowed (instantaneous supply case). 8

UNIT – IV

7. (a) Explain the following terms and give one example of each : 8

   (i) Two-person zero-sum game

   (ii) Mixed strategy games,

   (iii) Saddle point, and

   (iv) Fair game.

   (b) Solve the game whose pay-off matrix is given by : 8

		I	II	III	IV
	I	3	2	4	0
A	II	2	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

8. (a) Discuss the concept of dominance in game theory. Give suitable example. **8**

(b) Find an optimal sequence for the following sequencing problem involving four jobs and five machines when passing is not allowed, if each processing time (in hours) is given as under : **8**

Job	Machine				
	M_1	M_2	M_3	M_4	M_5
J_1	7	5	2	3	9
J_2	6	6	4	5	10
J_3	5	4	5	6	8
J_4	8	3	3	2	6

Also find minimum elapsed time.

UNIT – V

9. (a) What do you mean by operations research ? Explain.

(b) Differentiate between 'slack' and 'surplus' variables. Give suitable examples.

(c) Give mathematical formulation of general transporation problem.

(d) What is a transhipment problem ?

(e) What are general birth-death equations ?

(f) Give any *two* objectives of the inventory control.

(g) State maximin and minimax principle in game theory.

(h) Mention four principal assumptions made while dealing with sequencing problems. **2 × 8**