

Exam. Code : 115305

Subject Code : 8262

B.Com. (Financial Services) 5th Semester

OPERATIONS RESEARCH

Paper—II

Time Allowed—3 Hours]

[Maximum Marks—50

Note :— Attempt FIVE questions in all, selecting at least ONE question from each section. The fifth question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. Define Operations Research. Discuss the scope of Operations Research as modern management tool.
2. (a) What do you mean by Sequencing ? How is it useful in manufacturing industry ?
(b) Solve the following L.P.P. through Simplex method :

$$\text{Maximize } Z = 10x_1 + 20x_2$$

$$\text{subject to } 2x_1 + 4x_2 \geq 16$$

$$x_1 + 5x_2 \geq 15$$

$$x_1, x_2 \geq 0$$

SECTION—B

3. A company has four salesmen who are to be assigned to four different sales territories. The monthly increases, estimated for each salesman in different territories (in lakh rupees), are shown in the table below :

Salesmen	Sales territories				
	I	II	III	IV	V
A	75	80	85	70	90
B	91	71	82	75	85
C	78	90	85	80	80
D	65	75	88	85	90

Suggest optimal assignment for the salesmen. Which sales territory will remain unassigned ? What will be the maximum sales increase every month ?

4. Solve the following transportation problem for optimality :

From	To				Availability
	1	2	3	4	
1	8	8	5	12	7
2	6	9	11	9	7
3	10	15	6	13	10
4	6	8	7	8	6
5	11	10	11	13	5
6	8	14	5	12	6
Demand	9	10	8	14	

SECTION—C

5. (a) 'Game Theory provides a systematic quantitative approach for analysing competitive situations in which the competitors make use of logical processes and techniques in order to determine an optimal strategy for winning.' Comment.

- (b) Using the dominance property obtain the optimal strategies for both the players and determine the value of the game. The pay off matrix for player A is given.

		Player B				
		I	II	III	IV	V
Player A	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3

6. (a) Write a note on types of inventory.
- (b) A manufacturing company uses an Economic Order Quantity approach in planning its production of gears. The following information is available. Each gear costs Rs. 250 per unit, annual demand is 60,000 gears, set up costs are Rs. 4000 per setup and the inventory carrying cost per month

is established at 2% of the average inventory value. When in production, these gears can be produced at the rate of 400 units per day and this company works only for 300 days a year. Determine the economic lot size, the number of production runs per year and the total inventory cost.

SECTION—D

7. Customers arrive to a typist, who is known for quality typing, according to Poisson probability law with an average inter-arrival time of 20 minutes. The customers wait if the typist is not free. The typist completes the typing jobs in an average time of 15 minutes, the time taken being distributed exponentially. From this information, determine :

- (i) What fraction of time is the typist busy ?
- (ii) What is the probability of having less than 3 customers with the typist at any time ?
- (iii) What is the expected number of customers with the typist ?
- (iv) What is the expected number of customers waiting in the queue ?
- (v) How much time a customer is expected to spend in the queue ?

- (vi) What time would, on an average, elapse between a customer reaching and leaving the typist ?
- (vii) The expected time a customer would spend in the system.
- (viii) The probability that a customer shall wait for more than 10 minutes in the queue.
- (ix) The probability that a customer shall be in the system for more than 10 minutes.

8. A small project is having seven activities. The relevant data about these activities is given below :

Activity	Dependence	Normal Duration (Days)	Crash Duration (Days)	Normal Cost (Rs.)	Crash Cost (Rs.)
A	—	7	5	500	900
B	A	4	2	400	600
C	A	5	5	500	500
D	A	6	4	800	1000
E	B,C	7	4	700	1000
F	C,D,	5	2	800	1400
G	E,F	6	4	800	1600

- (i) Find out the normal duration and the minimum duration.
- (ii) What is the percentage increase in cost to complete the project in 21 days ?