

Code No: 842AD

R17
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, June/July - 2018
OPERATIONS RESEARCH
Time: 3hrs
Max.Marks:75
Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A
5 × 5 Marks = 25

- 1.a) State the degeneracy in the transportation problem. How is it resolved? [5]
- b) State the optimal policy for replacement when time value of money is considered.[5]
- c) State the assumptions of M/M/c queuing model. [5]
- d) State the optimal policy for single period stochastic demand model. [5]
- e) State the dominance rules for the solving the Game theory problems without saddle point. [5]

PART - B
5 × 10 Marks = 50

- 2.a) Define Model. Explain about various types of models with respect to their physical configuration.
- b) The ABC company wishes to plan its advertising strategy. There are two media under consideration, call them magazines I and II. Magazine I has a reach of 2000 potential customers and magazine II has a reach of 3000 potential customers. The cost of page of advertising is Rs.400 and Rs.600 for magazines I and II respectively. The firm has a monthly budget of Rs.6000. There is an important requirement that the total reach for the income group under Rs.20000 per annum, should not exceed 4000 potential customers. The reach in magazine I and magazine II for this income group is 400 and 200 potential customers. How many pages should be brought in the two magazines to maximize the total reach? Formulate the problem as LPP. Solve it by Graphical method. [5+5]

OR

3. A company has three factories I,II,III and four warehouses 1, 2, 3, 4. The transportation cost (in Rs.) per unit from each factory to each ware house is given in table. The requirements of each warehouse and the capacity of each factory are given below.

Warehouse	1	2	3	4	Availability
Factory					
I	25	17	25	14	400
II	15	10	18	24	600
III	16	20	8	13	600
Requirement	300	300	500	500	

Find the minimum cost of transportation schedule. Use least cost method to generate initial BFS. [10]

- 4.a) State the traveling salesman problem.
 b) Give the following across city distance table, find the minimum distance root provided his home town is in A [5+5]

	To				
From	A	B	C	D	E
A	∞	7	6	8	4
B	7	∞	8	5	3
C	6	8	∞	9	7
D	8	5	9	∞	8
E	4	6	7	8	∞

Find the assignment of salesmen to various districts which will yield maximum profit?

OR

- 5.a) State the group replacement policy
 b) The following failure rates have been observed for a certain type of light bulbs:

End of week	Probability of failure to date
1	0.05
2	0.13
3	0.25
4	0.43
5	0.68
6	0.88
7	0.96
8	1.00

The cost of replacing an individual failed bulb is Rs.1.25. The decision is made to replace all bulbs simultaneously at fixed intervals and also to replace individual bulbs as they fall in service. If the cost of group replacement is 30 paise per bulb, what is the best interval between group. [5+5]

- 6.a) Explain how the queues are classified and give their notations
 b) In a bank, cheques are cashed at a single "teller" counter. Customers arrive at the counter in a Poisson manner at an average rate of 30 customers/hr. The teller takes on an average 1.5 minutes to cash cheque. The service time has been shown to be exponentially distributed.
 i) Calculate the percentage of time the teller is busy.
 ii) Calculate the average time a customer is expected to wait. [5+5]

OR

7. Customers arrive at one –window drive-in bank according to a Poisson distribution with mean of 10 per hour. Service time per customer is exponential with a mean of 5 minutes. The space in front of the window, including that for the serviced car, can accommodate a maximum of 3 cars. The other cars can wait outside this space.
 a) What is the probability that an arriving customer can drive directly to the space in front of the window?
 b) What is the probability that an arriving customer will have to wait outside the indicated space?
 c) How long is an arriving customer expected to wait before starting service? [10]

8. If a product is to be manufactured within the company, the details are as follows:

Annual demand rate, $r=36000$ units

Production rate, $k=72000$ units

Setup cost, $C_0=\text{Rs. } 250$ per setup

Carrying cost, $C_c=\text{Rs. } 25/\text{unit/year}$.

Find the a) EOQ and b) Cycle time after deriving relevant expressions. [10]

OR

9. Annual demand for an item is 5400 units. Ordering cost is Rs.400 per order. Inventory carrying cost is 30% of the purchase price/unit/year. The price breaks are shown as:

Quantity	Price(Rs.)
$0 \leq Q_1 < 2400$	12
$2400 \leq Q_2 < 3000$	10
$3000 \leq Q_3$	08

Find the optimal order size. If the order cost is changed to Rs.200 per order, find the optimal order size. [10]

- 10.a) Explain the terms i) rectangular games. ii) types of strategies.
 b) Solve the following game graphically where pay off matrix for player A is given below. [5+5]

1	5	-7	4	2
2	4	9	-3	1

OR

11. Find the shortest path from vertex A to K along arcs joining various vertices lying between A to K. Length of each path is given. [10]

	B	E	H
A	7	6	5

	C	F	I
B	3	4	-
E	6	7	10
H	-	7	10

	D	G	J
C	9	7	-
F	7	6	5
I	-	4	3

	K
D	3
G	9
J	8