

Register No.: Name.:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER MBA DEGREE EXAMINATION (S), December 2021

Course Code : 20MBA110

Course Name: Operations Research

Max. Marks : 60

Duration: 3 Hours

Use of statistical tables and graph sheets are permitted. Any missing data shall be assumed. All assumptions must be clearly stated.

PART A

(Answer all questions. Each question carries 2 marks)

1. Explain the term 'Basic Feasible Solution' in the context of transportation problem.
2. What is the role of Operations Research in management decision making?
3. Define total float and free float.
4. With respect to the Queue System, explain the following: (a) Reneging (b) Jockeying.
5. Describe briefly the EOQ concept.

PART B

(Answer any 3 questions. Each question carries 10 marks)

6. Use Simplex Method to
 Maximize $Z = 2x_1 - x_2 + x_3$
 subject to the constraints
 $3x_1 + x_2 + x_3 \leq 60$
 $x_1 - x_2 + 2x_3 \leq 10$
 $x_1 + x_2 - x_3 \leq 20$
 and $x_1, x_2, x_3 \geq 0$
7. Consider a movie theatre ticket window being manned by a single individual. Customers arrive to purchase their tickets according to a Poisson input process with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with mean of 90 seconds. Find the following:
 - i. Expected number of customers in the system
 - ii. Expected queue length
 - iii. Expected waiting time in the system
 - iv. Expected waiting time in the queue
8. A car hire company has one car at each of the five depots a, b, c, d, and e. A customer in each of the five towns A, B, C, D, and E requires a car. The distance (in miles) between the depots (origins) and the towns (destinations) where the customers are is given in the following distance matrix:

Towns\Depots	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How should the cars be assigned to the customers so as to minimize the distance travelled?

9. a) Define 'Saddle point'. (3 marks)
 b) For the following payoff matrix, determine the optimal strategies for both players and the value of the game (using maximin-minimax principle): (7 marks)

Player A\Player B	B1	B2	B3	B4	B5
A1	9	3	1	8	0
A2	6	5	4	6	7
A3	2	4	3	3	8
A4	5	6	2	2	1

10. Machine A costs Rs. 45,000 and its operating costs are estimated to be Rs. 1,000 for the first year increasing by Rs. 10,000 per year in the second and subsequent years. Machine B costs Rs. 50,000 and operating costs are Rs. 2,000 for the first year, increasing by Rs. 4,000 in the second and subsequent years. If at present we have a machine of type A, should we replace it with B? Assume that both machines have no resale value and their future costs are not discounted.

PART C

(Compulsory question, the question carries 20 marks)

11. A small project is composed of seven activities whose time estimates are listed in the table as follows:

Activity	Estimated Duration (Weeks)		
	Optimistic	Most Likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- i. Draw the project network. (3 marks)
 ii. Find the expected duration and variance of each activity. (5 marks)
 iii. Identify the critical path. What is the expected project length? (2 marks)
 iv. Calculate the variance and the standard deviation of the project length. (2 marks)
 v. What is the probability that the project will be completed in (5 marks)
 a) 13 weeks
 b) 21 weeks
 vi. If the project due date is 19 weeks, what is the probability of meeting the due date? (3 marks)
