

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER MBA DEGREE EXAMINATION (S), SEPT 2022**(2021 Scheme)****Course Code :** 21MBA110**Course Name:** Operations Research**Max. Marks :** 60**Duration: 3 Hours****PART A***(Answer all questions. Each question carries 2 marks)*

1. What are the areas where linear programming can be applied?
2. What is an unbalanced assignment problem and how do we make one in to a balanced problem?
3. What are the uses of decision tree?
4. What is Gradual Failure?
5. Define payoff matrix of a game.

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

6. Using simplex method, solve the following L.P.P
 Maximize $Z = X_1 + X_2 + 3X_3$
 Subject to $3X_1 + 2X_2 + X_3 \leq 3$
 $2X_1 + X_2 + 2X_3 \leq 2$
 $X_1, X_2, X_3 \geq 0$
7. Find the initial basic feasible solution to the following transportation problem using North west corner method and Least cost method.

		To			Demand
		x	y	z	
From	P	18	12	3	150
	Q	9	24	21	120
	R	12	12	6	180
Supply		60	285	105	

8. The number of customers arriving in a tailor's shop according to poisson distribution with an average of 6 customers per hour. Tailor attends customers as they come in the shop and customers have to wait until their number does not come. The tailor provides services to its customers at a mean rate of 10 customers per hour and service time is exponentially distributed. Determine:
 - i) Probability of the number of arrivals (0 through 5) during an interval of 15 minute.
 - ii) The utilization factor
 - iii) The probability that queuing system is idle.
 - iv) Average time that tailor do not have any customer on a 10 hour working day, i.e., tailor is free.
 - v) The probability related with customers (0 through 5) in the queuing system.

vi) Average number of customers in the shop.

9. A machine A has purchasing cost Rs.5,000. The maintenance cost of this machine is Rs.1,000 first four years, and then rises by Rs.200 in next coming years. The other machine B has purchasing cost Rs.8,000 and their maintenance cost is Rs.200 for the first year and rises by Rs.400 in next coming years. Assume that:

- i) There is no salvage value of both machines.
- ii) Time value money is 10% per annum.
- iii) Operating and maintenance costs are incurred in the start of each year.

- a) Determine the Optimal replacement period (8 Marks)
- b) Which machine is to be replaced based on minimum average cost? (2 Marks)

10. Reduce the following game with the help of dominance rule and then determine the value of the game.

		Player B			
		B1	B2	B3	B4
Player A	A1	3	2	4	0
	A2	3	4	2	4
	A3	4	2	4	0
	A4	0	4	0	8

PART C

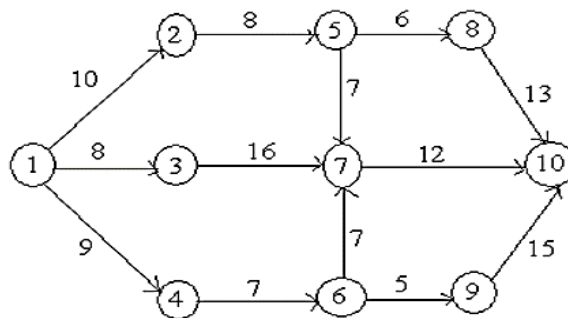
(Compulsory question, the question carries 20 marks)

11. Solve the following assignment problem

		Sales region			
		1	2	3	4
Salesman	A	32	26	35	38
	B	27	24	26	32
	C	28	22	25	34
	D	10	10	16	16

10 Marks

a) Determine the early start and late start in respect of all node points and identify critical path for the following network.



Marks (10)
