

Register No.: Name.:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER MBA/ MBA (Logistics and Supply Chain Management) DEGREE EXAMINATION (R,S), MAY 2024 (2021 Scheme)

Course Code : 21MBA110 / 23MBL110

Course Name: Operations Research

Max. Marks : 60

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 2 marks)

1. Explain the meaning of degenerate solution in a linear programming problem
2. Explain the concept of unbalanced assignment problem.
3. List any four quantitative methods that can be used for decision making under uncertainty.
4. Define EOQ.
5. What is pure strategy in Game theory?

PART B

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

6. Solve the following LPP by using simplex method

$$\text{Max } Z = 6x_1 + 4x_2$$

$$\text{Subject to } -2x_1 + x_2 \leq 2$$

$$x_1 - x_2 \leq 2$$

$$3x_1 + 2x_2 \leq 9$$

$$\text{And } x_1, x_2 \geq 0$$

7. A company is producing a single product and selling it through five agencies situated in different cities. All of a sudden, there is a demand for the product in five more cities that do not have any agency of the company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the product to the additional cities in such a way that the travelling distance is minimized. The distances (in km) between the surplus and deficit cities are given in the following distance matrix. Determine the optimum assignment schedule.

Deficit City	I	II	III	IV	V
Surplus city					
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

8. A vendor buys newspapers at the rate of Rs 3 per newspaper and sells at the rate of Rs 4 per newspaper. Assume that a newspaper which is not sold on the same day goes to scrap and pays him Rs 0.50 as regret value. The information for the past 200 days about the sale of the newspapers is shown in the following table

Number of Newspapers Demanded	200	204	206	208	Total
Number of Days	40	100	40	20	200
Probability	0.2	0.5	0.2	0.1	

On the basis of this information, how many newspapers should be bought by the vendor so that his profit is maximum?

9. The following failures have been observed for a certain type of transistors in a digital computer:

End of Week	1	2	3	4	5	6	7	8
Probability of failure to date	.05	.13	.25	.43	.68	.88	.96	1.00

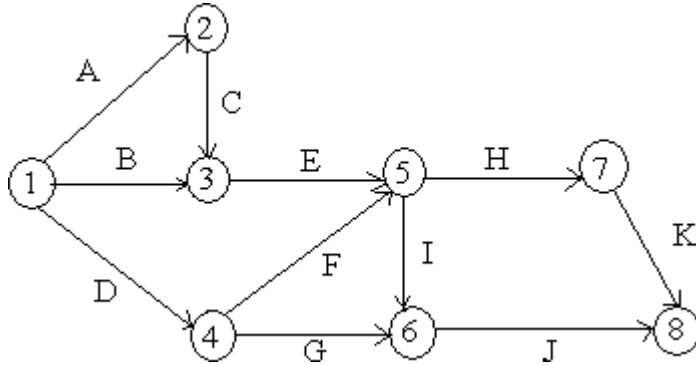
Total number of transistors at the beginning of assembly is 1000 units. The cost of replacing the individual failed transistors is Rs. 1.25/-. The decision is made to replace all these transistors simultaneously at fixed intervals and to replace the individual transistors as they fail in service. If the cost of group replacement is 30 paise per transistors, what is the best interval between group replacement?

10. Two player A and B match coins. If the coins' match, then A wins two units of value, if the coin does not match, then B win 2 units of value. Construct the payoff matrix and determine the optimum strategies for the players and the value of the game.

PART C

(Compulsory question, the question carries 20 marks)

11. a) For the project



Task:	A	B	C	D	E	F	G	H	I	J	K
Least time:	4	5	8	2	4	6	8	5	3	5	6
Greatest time:	8	10	12	7	10	15	16	9	7	11	13
Most likely time:	5	7	11	3	7	9	12	6	5	8	9

Find the earliest and latest expected time to each event and also critical path in the network. (10Marks)

b) Find the initial basic feasible solution for the following transportation problem by VAM:

	D1	D2	D3	D4	Supply
S1	11	13	17	14	250
S2	16	18	14	10	300
S3	21	24	13	10	400
Requirement	200	225	275	250	

(6Marks)

b) Consider the following single-server queue: the inter-arrival time is exponentially distributed with a mean of 10 minutes and the service time is also exponentially distributed with a mean of 8 minutes, find the (i) mean wait in the queue, (ii) mean number in the queue, (iii) the mean wait in the system, (iv) proportion of time the server is idle. (4Marks)
