

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***MBA DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026****Second Semester****Business Administration****BA4201/PMBT2421 - QUANTITATIVE TECHNIQUES FOR DECISION MAKING****Regulations – 2021/2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	What is meant by feasible solution in a Linear Programming Problem?	L1	1	2
2.	Compare Slack variable & Surplus Variable.	L2	1	2
3.	How will you resolve degeneracy in Transportation Problem?	L2	2	2
4.	What have you understood about Travelling salesman problem?	L1	2	2
5.	Interpret the concept of two people zero sum game and a saddle point.	L2	3	2
6.	Classify the environments of decision making	L2	3	2
7.	Define inventory	L1	4	2
8.	Discuss the types of failures that occur for a replacement to take place.	L1	4	2
9.	Interpret the Characteristics Of Queuing Models	L2	5	2
10.	Discuss the advantages of simulation.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11. a i	A patient visits the doctor to get treatment for ill health. The doctor examines the patient and advises him to consume at least 40 units of vitamin A and 50 units of vitamin B daily for a specified time period. He also advises the patient that to get vitamin A and vitamin B he has to drink tonic X and tonic Y that have both vitamin A and vitamin B in a proportion. One unit of tonic X consists 2 units of vitamin A and 3 units of vitamin B and one unit of tonic Y consists of 4 units of vitamin A and 2 units of vitamin B. These tonics are available in medical shops at a cost of Rs.3.00 and Rs.2.50 per unit of X and Y respectively .Formulate a LP model to minimise the total cost	L3	1	6
ii	Solve the following LPP by graphical method $\text{Maximize } Z = 2x_1 + x_2$ $\text{Subject to } x_1 + 2x_2 \leq 10,$ $x_1 + x_2 \leq 6,$ $x_1 - x_2 \leq 2, x_1 - 2x_2 \leq 1$ $x_1, x_2 \geq 0$	L3	1	10

Or

- b Solve the following problem by using two phase simplex method L3 1 16
- Minimize* $Z = x_1 - 2x_2 - 3x_3$
- Subject to* $-2x_1 + x_2 + 3x_3 = 2$
- $2x_1 + 3x_2 + 4x_3 = 1$
- $x_1, x_2, x_3 \geq 0$

12. a Examine an initial basic feasible solution to the following transportation problem using Vogel's approximation method and obtain the optimal solution by MODI L4 2 16

	D1	D2	D3	D4	Availability
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
Demand	16	18	31	25	

Or

- b A company has a team of 4 Salesman and the company wants to do business in 4 districts. Considering the capabilities of salesmen and nature of the district, the company has estimated the cost efficiency of each salesmen in each district as follows. Develop the best assignment schedule and analyze the total cost. L4 2 16

	Districts			
Salesmen	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

13. a i A large restaurant purchases cakes daily from a local bakery. The cake costs Rs. 10 each and sell at Rs.15 each. If he cakes are not sold on the same day, they are sold in another outlet for Rs. 8 each. The probability for the restaurant sales is given below. L4 3 8
- | | | | | | | | |
|-------------|------|------|------|------|-----|------|------|
| Daily sales | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| Probability | 0.01 | 0.09 | 0.16 | 0.25 | 0.3 | 0.11 | 0.08 |
- Suggest the optimum quantity the buyer wants to purchase to maximize his profit based on EMV approach

- ii Mr.Sam has Rs 10000 to invest in any of the three options A, B and C, The return on his investment depends on the economy of inflation, recession and no L4 3 8

change. What should he do based on pessimistic, optimistic, equally likely and regret criterion

State of Nature Strategies	Inflation	Recession	No change
A	2000	1200	1500
B	3000	800	1000
C	2500	1000	1800

Or

- b i For the following payoff matrix, (a) write the maximin and minimax strategies. (b) Evaluate the value of the game. L4 3 16

Player A	Player B					
		B1	B2	B3	B4	B5
	A1	8	10	-3	-8	-12
	A2	3	6	0	6	12
	A3	7	5	-2	-8	17
	A4	-11	12	-10	10	20
	A5	-7	0	0	6	2

14. a i A stockiest has to supply 12000 units of a product per year to his customer. Demand is fixed and known. Shortage cost is assumed to be infinite. Inventory holding cost is 20 paise per unit per month. Ordering Cost is Rs. 250 and purchase price is Rs.10 per unit. L4 4 8

- i) Estimate the EOQ
ii) Find the Frequency of orders and total inventory cost

- ii A company has a demand of 12000 units/year for an item and it can produce 2000 units per month. The cost of one setup is Rs.400 and the holding cost/unit/month is 15 paise. Select the optimum lot size and total cost per year assuming the cost of 1 unit as Rs.4. Find EBQ , the number of set ups & total cost. L4 4 8

Or

- b i There are 1000 light bulbs, all of which must be kept in working order. If a bulb fails in service it costs Rs.2 to replace it. If all the bulbs are replaced in the same operation, it costs Rs. 1.40 per bulb. The following table shows proportion of bulbs failing in successive time intervals. L4 4 8

Week	1	2	3	4	5	6
Probability of bulbs failing	0.09	0.16	0.24	0.36	0.12	0.03

Determine the best replacement policy.

- ii An electro mechanical equipment has a purchase price of Rs. 7,000. Its running cost per year and resale values are given

Year	1	2	3	4	5	6	7	8
Running Cost	2000	2100	2300	2600	3000	3500	4100	4600
Resale Value	4000	3000	2200	1600	1400	700	700	700

Analyse the due year of replacement

15. a i A road transport company has one reservation clerk on duty at a time. He handles information of bus schedules and makes reservations. Customers arrive at a rate of 8 per hour and the clerk can on average service 12 customers per hour.

(a) Estimate the average number of customers waiting for the service of the clerk?

(b) Evaluate the average time a customer has to wait before being served

- ii A tax consulting firm has four service counters in its office for receiving people who has problems and complaints about their income, wealth and sales taxes. Arrivals average 80 persons in an 8 hours service day. Each tax advisor spends an irregular amount of time, servicing the arrivals which have been found to have an exponential distribution. The average service time is 20 minutes,

(a) Calculate the average number of customers in the system and the average time a customer spends in the system.

Or

- b i Customers arrive at a service facility to get the required services. The inter arrival and service times are constant and are 1.8 minutes and 4 minutes respectively. Simulate the system for 14 minutes. Determine the average waiting time of the customer and the idle time of the service facility.

- ii Explain how do you apply Monte carlo simulation techniques for queueing problems and Networking techniques. Illustrate with examples.
