U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**

Branch: Industrial Engineering and Management **Duration: 3 hrs.**

Course Code: 22IM6PCADM **Max Marks: 100**

Course: Advanced Decision Modelling

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of statistical tables permitted.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Solve the following LPP by Two phase Simplex Method Maximize $Z = -4X_1 - 3X_2 - 9X_3$ subject to $2X_1+4X_2+6X_3 \geq 15$ $6X_1 + X_2 + 6X_3 \geq 12$ $X_1, X_2, X_3 \geq 0$	CO2	PO2	**10**
	b)	Solve the following problem using Branch and bound method of integer Programming. MaxZ=3X1+4X2 Subject to 3X1-X2≤12 3X1+11X2≤0 X1, X2 ≥0 and are integers	CO2	PO2	**10**
		OR			
2	a)	Maximize $z = -5x1 + 5x2 + 13x3$ using Sensitivity Analysis Subject to: $-x1 + x2 + 3x3 \leq 20$ $12x1 + 4x2 + 10x3 \leq 90$ $x1, x2, x3 \geq 0$. i) Solve the above LPP ii) If b_i is changed to (40 and 18), what is the new solution ? iii) If C_j is changed to (10, 10,13). Does the optimal solution change?	CO4	PO3	**10**
	b)	Find solution using integer simplex method (Gomory's cutting plane method) MAX Z = x1 + x2 subject to 3x1 + 2x2 <= 5 x2 <= 2 and x1,x2 non-negative integers	CO2	PO2	**10**

			UNIT - II			
	3	a)	What are the characteristics of queuing system Discuss M/G/1 and M/D/1queing models. Show under what conditions M/G/1 can be reduced to M/D/1 queuing model.	CO1	PO1	**08**
		b)	A commercial bank has 3 cash paying assistants. Customers are found to arrive in a poison fashion at an average rate of 6/hr for transaction. The service time is found to have exponential distribution with a mean of 18mins. The customers are processed on FCFS basis. Determine i) Average no of customers in the bank ii) Waiting time of customers in the bank iii) Average no of customers in the Queue iv) Waiting time of customers in the Queue.	CO4	PO3	**12**
			UNIT - III			
	4	a)	Define Simulation. Explain the steps involved in simulation.	CO1	PO1	**10**
		b)	Differentiate between Continuous and discrete systems.	CO1	PO1	**05**
		c)	What is system and System environment? List the component of the system with examples	CO1	PO1	**05**
			OR			
	5	a)	Define Random number. Explain statistical properties of random numbers.	CO1	PO1	**05**
		b)	Generate 4 three-digit random numbers using multiplicative congruential method with X_0=117, a=43 and m=1000.	CO2	PO2	**06**
		c)	The sequence of numbers 0.54, 0.73, 0.98 ,0.11 0.68 has been generated. Use the Kolmogrove-Smirnnov test with α =0.05 to determine if the hypothesis that the numbers are uniformly distributed on the internal [0,1] can be rejected.	CO2	PO2	**09**
			UNIT - IV			
	6	a)	Explain Inverse Transform technique of producing random variates for exponential distribution. Generate exponential variates Xi wit mean 1. Given random numbers Ri=0.1306, 0.0422, 0.6597, 0.7965, 0.7696.	CO2	PO2	**08**
		b)	What is the need for input modeling? Explain the steps involved in the development of a useful model for given set of data	CO1	PO1	**06**
		c)	Records pertaining monthly number of the job-related injuries at an underground coal mine were being studied by a federal agency. The values for the past 100 months were as follows Injuries per month: 0 | 1 | 2 | 3 | 4 | 5 | 6 Frequency of Occurrence: 35 | 40 | 13 | 6 | 4 | 1 | 1 Apply the chi-square test to these data to test the hypothesis, that, underlaying distribution is Poisson. Use a level of significance of α=0.05.	CO4	PO3	**06**
			UNIT - V			
	7	a)	Give the Classification of MCDM with Applications	CO4	PO2	**04**
		b)	Explain the reasons for choosing MCDM And Soft computing in Decision Making	CO4	PO2	**06**
		c)	Enumerate the procedure involved in analytical Hierarchy process with an example	CO4	PO2	**10**

****