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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

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

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

Course Code: 22IM6HSFPD **Max Marks: 100**

Course: Facilities Planning & Design

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	What are the factors that govern the selection of a location of a plant?	CO1	PO1	**06**
	b)	Enumerate the principles of a Plant Layout.	CO1	PO1	**06**
	c)	Enlist the advantages and disadvantages of different types of Plant Layouts.	CO1	PO1	**08**
		OR			
2	a)	List and explain the factors that influence selection of Plant Location.	CO1	PO1	**10**
	b)	Enlist and explain the principles that govern selection of a suitable Material Handling System for a production setup.	CO1	PO1	**10**
		UNIT - II			
3	a)	With an illustration explain the importance of REL Chart.	CO2	PO1, PO5	**08**
	b)	What are the factors to be considered while Space Planning for a Facility Layout?	CO2	PO1, PO5	**06**
	c)	What are the IE tools that are used for picking inputs for carrying out facilities layout design activity in the form of data and activities? Explain each of them briefly.	CO2	PO1, PO5	**06**
		OR			
4	a)	With a neat line diagram explain the procedural steps of SLP.	CO2	PO1, PO5	**10**
	b)	With an illustration explain the importance of REL Chart and the procedure to draw an REL chart for a Layout.	CO2	PO1, PO5	**10**

			UNIT - III			
	5	a)	Explain the working of ALDEP with an example.	*CO2*	*PO1, PO5*	**08**
		b)	What are the limitations of CRAFT? Explain.	*CO2*	*PO1, PO5*	**06**
		c)	What are the advantages of CORELAP in contrast with other computerised FL techniques? Explain.	*CO2*	*PO1, PO5*	**06**
			OR			
	6	a)	What are the methods of constructing a layout? Explain with an illustration.	*CO2*	*PO1, PO5*	**06**
		b)	Discuss the core concepts behind Simulated Annealing and Genetic Algorithm as applied to FL design function with an example for each.	*CO2*	*PO1, PO5*	**08**
		c)	How are the layouts evaluated? Explain.	*CO3*	*PO1, PO2, PO5*	**06**
			UNIT - IV			
	7	a)	Explain Location – Allocation model with an example.	*CO3*	*PO1, PO2, PO5*	**10**
		b)	Write a note on Storage models with relevant notations.	*CO3*	*PO1, PO2, PO5*	**10**
			OR			
	8	a)	Explain the mathematical formulation of Single Facility Minisum Location Problem indicating all the parameters in both Rectilinear and Euclidean distances.	*CO3, CO4*	*PO1, PO2, PO5*	**08**
		b)	A new machine is to be located in a maintenance department. There are five existing machines located at P_1=(1,1), P_2=(5,2), P_3=(2,8), P_4=(4,4) and P_5=(8,6). The cost per unit distance traveled is the same between the new machine and each of the existing machines. The number of trips per day between the new machine and each of the existing machines are 5, 2, 4, 6 and 8 respectively. Find the suitable location for the new machine.	*CO3, CO4*	*PO1, PO2, PO5*	**12**
			UNIT - V			
	9	a)	Explain the uses of MCDM techniques in the present day. Elucidate the working of AHP.	*CO3, CO4*	*PO1, PO2, PO5*	**10**
		b)	Explain Quadratic Assignment Problem along with its mathematical formulation with a suitable example.	*CO3, CO4*	*PO1, PO2, PO5*	**10**
			OR			
	10		Given that there are four facilities (F1, F2, F3, F4) and four locations (L1, L2, L3, L4). You have a cost matrix that represents the pairwise distances or costs between facilities.	*CO3, CO4*	*PO1, PO2, PO5*	**20**

Additionally, we have a flow matrix that represents the interaction or flow between locations. Find the assignment that minimizes the total cost based on the interactions between facilities and locations. Each facility must be assigned to exactly one location, and each location can only accommodate one facility.

Facilities cost matrix:

	L1	L2	L3	L4
F1	0	2	3	1
F2	2	0	1	4
F3	3	1	0	2
F4	1	4	2	0

Flow matrix:

	F1	F2	F3	F4
L1	0	1	2	3
L2	1	0	4	2
L3	2	4	0	1
L4	3	2	1	0

Solve the QAP.

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