U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

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

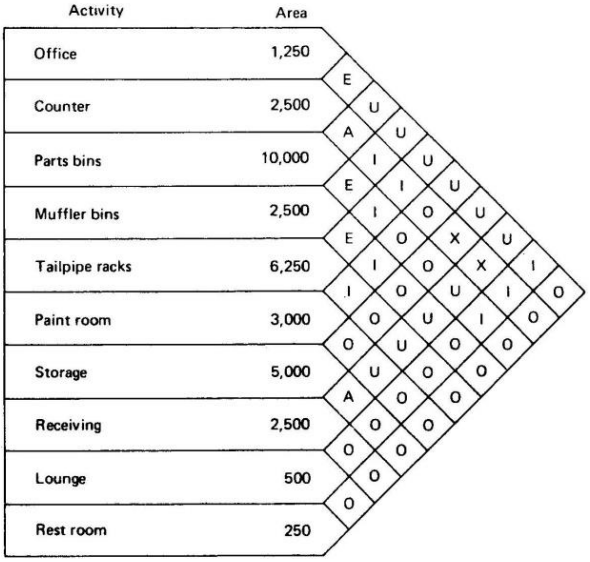
Branch: Industrial Engineering & Management **Duration: 3 hrs.**

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)		Compare any two prominent Theories of Plant Location and explain their utility in the selection of a location for a Nuclear Power Plant?	*CO1*	*PO1*	**06**
	b)		Choose any three principles of plant layout and explain the need of those principles with an illustration.	*CO1*	*PO1*	**06**
	c)		Explain Material Handling Systems' classification and its need?	*CO1*	*PO1*	**08**
			OR			
2	a)		List and explain the factors that influence the selection of a Plant location.	*CO1*	*PO1*	**12**
	b)		Explain the following: i) Unit Load ii) Break Even Analysis	*CO1*	*PO1*	**08**
			UNIT - II			
3	a)		Explain the need to study Traditional Layout procedures? Discuss any two procedures in detail with an example to establish that objective.	*CO1*	*PO1*	**08**
	b)		Develop a Block Layout for the REL chart shown below: Total available space is 35000 Sq.ft. 	*CO2*	*PO1* *PO5*	**12**

			OR			
	4	a)	What are the facilities to be covered ideally under Employee Services?	*CO1*	*PO1*	**06**
		b)	What are the factors that influence Design and Development of Receiving department?	*CO1*	*PO1*	**06**
		c)	Identify and explain the factors considered for determining space requirements for the facilities layout. Apply them to improve an existing automobile parts' manufacturing firm's layout.	*CO1, CO3*	*PO1 PO2 PO5*	**08**
			UNIT - III			
	5	a)	Compare the working of ALDEP and CORELAP with their input requirements.	*CO1*	*PO1*	**08**
		b)	For a Initial Layout shown below, flow matrix and distance matrix are given. Using Pairwise Exchange method and adopting two iterations excluding the existing arrangement. Obtain an Optimum Layout. Initial Layout is **1** | **2** | **3** | **4** The Material Flow Matrix is From Department / To Department: **1** **2** **3** **4** **1**: - 10 15 20 **2**: - 10 5 **3**: - 5 **4**: - The Distance Matrix is From Department / To Department: **1** **2** **3** **4** **1**: - 1 2 3 **2**: - 1 2 **3**: - 1 **4**: -	*CO2, CO3*	*PO1 PO2 PO5*	**12**
			OR			
	6	a)	Explain the step-by-step procedure adopted in Constructing a Layout Plan.	*CO1*	*PO1*	**08**
		b)	Explain the use of Efficiency indices in the area of Facilities Layout Design? Mention any three of them.	*CO1*	*PO1*	**06**

		c)	What are the methods of presenting the designed layouts to Management?	*CO1*	*PO1*	**06**
			UNIT - IV			
	7	a)	Make a comparative analysis of locating a single facility using MINISUM and MINIMAX location formulations.	*CO4*	*PO1* *PO2* *PO5*	**08**
		b)	Explain the significance of Storage Model while arranging Block Stacking and ASRS and also the factors that influence the decision of selecting one suitable storage model.	*CO1*	*PO1*	**06**
		c)	Cafeterias are planned to be placed in an office building. The office tenants are located at 4 locations. 'n_1' persons per day are expected to visit the first office, 'n_2' the second office, 'n_3' the third office and 'n_4' the last office. 70% of visitors are expected to drop by the cafeteria. Each unit distance which a customer has to travel costs the owner of the Cafeterias the loss of Rs.25 in revenue. The daily operating cost of n shops is Rs. 5000x. Using Location Allocation Formulation explain how can you resolve such a location problem. Also explain the key distinction of Location Allocation problem.	*CO4*	*PO1* *PO2* *PO5*	**08**
			OR			
	8	a)	Explain Location – Allocation Formulation with an example.	*CO4*	*PO1* *PO2* *PO5*	**06**
		b)	Explain with their key parameters, when the following are to be adopted: i) A Storage Model ii) Warehouse Layout Model	*CO4*	*PO1* *PO2* *PO5*	**06**
		c)	Separate electrical cables are to be run from the generator to each machine in a facilities layout. The locations of the machines are at $\mathbf{P_1}$=(0,0), $\mathbf{P_2}$=(30,90), $\mathbf{P_3}$=(60,20), $\mathbf{P_4}$=(20,80), $\mathbf{P_5}$=(70,70), $\mathbf{P_6}$=(90,40). Determine the location for the generator that will minimize total required length of the cable assuming rectilinear distance.	*CO4*	*PO1* *PO2* *PO5*	**08**
			UNIT - V			
	9	a)	Explain the formulation of Quadratic Assignment Problem. In a layout 3 machines X, Y and Z are to be assigned to 3 sites 1, 2 and 3. The Flow values and Distance Values are shown in 'F' and 'D' matrices. Solve using QAP formulation.	*CO2, CO3*	*PO1* *PO2* *PO5*	**12**

Flow Matrix (F)		To Machine		
		X	Y	Z
From Machine	X	-	5	0
	Y	3	-	3
	Z	4	0	-

Distance Matrix (D)		To Site		
		1	2	3
From Site	1	-	10	4
	2	4	-	7
	3	6	5	-

		b)	Enumerate the procedure of Analytical Hierarchy Process as an MCDM technique with an illustration.	*CO1, CO4*	*PO1 PO2 PO5*	**08**
			OR			
	10	a)	Where and how Quadratic Assignment Problem model comes in handy to solve FL problem? Explain with an example.	*CO2*	*PO1 PO2 PO5*	**05**
		b)	There is a garments' manufacturing unit needing to change its Facilities Layout. It has 4 options before it, names FL_1, FL_2, FL_3 and FL_4. There are 5 important criteria (C_1, C_2, C_3, C_4 and C_5) that govern the selection of the most suitable design of the FL. Which method would you adopt to make a selection of the most suitable FL that considers all the conflicting and complimentary factors governing the selection process and why? Elaborate the step-by-step procedure of such a decision-making mechanism with an illustration.	*CO2, CO3*	*PO1 PO2 PO5*	**15**

****