Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, May 2025

Course: M Tech (HSE**)** **Semester: II**

Program: Plant layout and material handling **Time : 03 hrs.**

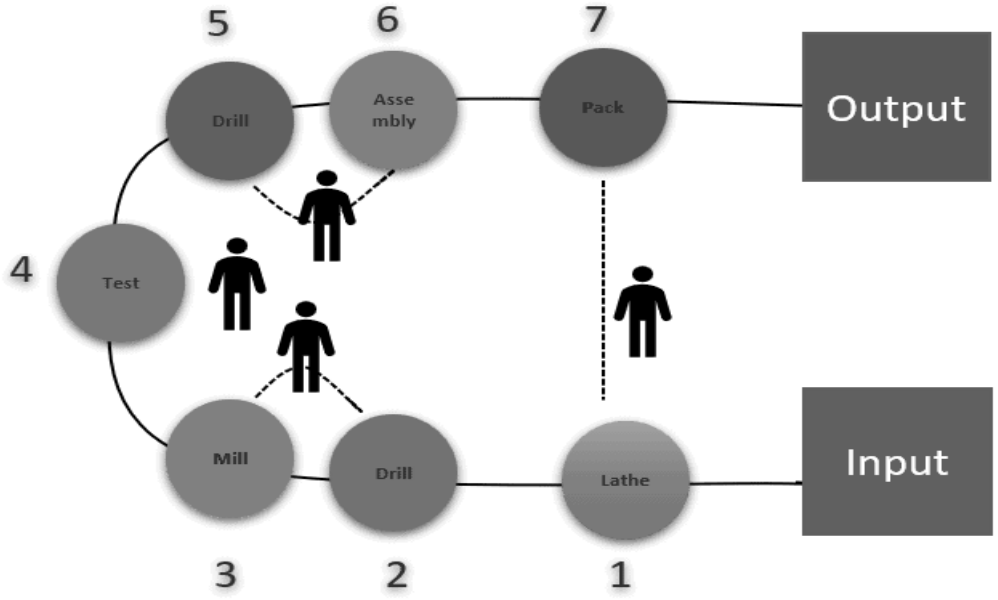
Course Code: HSFS 7031 **Max. Marks: 100**

Instructions:

- ✓ Attempt all the sections.
- ✓ Draw neat diagrams. Assume missing data if any.
- ✓ **Make sure to manage your time effectively and utilize the entire three-hour duration productively.**

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	True/False type questions: i. Product layouts are ideal for mass production of standardized items. (True/False) ii. Process layouts are arranged based on the sequence of operations. (True/False) iii. In a process layout, the same type of machinery is grouped together. (True/False) iv. A product layout can easily adapt to changes in product design. (True/False)	**4**	**CO1**
Q 2	List any four considerations when choosing a location for waste treatment and disposal units.	**4**	**CO1**
Q 3	How artificial intelligence will help in optimization of a good plant layout?	**4**	**CO1**
Q 4	State two advantages and two disadvantages of locating a chemical plant near a water body.	**4**	**CO1**
Q 5	Name the below layout and write the characteristics of the layout? 	**2+2**	**CO1**

SECTION B **(4Qx10M= 40 Marks)** **Attempt any four questions**			
Q 6	XYZ Engineering Company is contemplating to integrate the AGVS and AS/RS with their flexible manufacturing system. The company is interested in determining the number of AGVSs required for its manufacturing system. It must deliver 70 pieces per hour. The company has decided to make up for installing a wire guided path system and the unit load AGVS. Calculate the number of AGVs required. The following data has been collected as shown: o Vehicle Speed 180 ft/min o Average loaded travel distance per delivery 620ft o Average empty travel distance per delivery 400 ft o Pickup time 0.25 min o Drop-off time 0.25 min Traffic factor 0.75	**10**	**CO4**
Q 7	a. Briefly explain the key factors to consider when selecting a location for waste treatment and disposal in an industrial plant. b. Discuss the importance of environmental safety, regulatory compliance, and future expansion possibilities.	**5+5**	**CO4**
Q 8	A chemistry fume hood room measures 15 m × 6 m × 5 m (length × width × height). The ventilation system supplies 3 000 m^3/h of fresh air to this room. a. Calculate the air changes per hour (ACH) for this room. b. How many minutes does it take for one complete air change?	**5+5**	**CO3**
Q 9	A conveyor belt system is used in a distribution warehouse to transport packaged goods from the sorting area to the loading dock. The conveyor moves at 0.5 m/s, and each package is 20 kg. The conveyor length is 50 meters, and 5 packages are placed on the belt every minute. The system operates 10 hours per day. Calculate: a. Total weight of packages transported per shift. b. Time taken for a package to reach the loading dock. c. If the conveyor speed is increased to 0.75 m/s, how much time is saved per package?	**4+3+3**	**CO3**
Q 10	i. Identify the plant layout in which tools and resources move to the job and others in which the job moves from one station to another. ii. How to optimize the urban carrying capacity while designing a plant layout?	**4** **6**	**CO1**
SECTION-C **(2Qx20M=40 Marks)**			

Q 11	a. If the human body is considered the most efficient 'natural layout,' what key principles can be borrowed from it when designing sustainable and safe plant layouts? b. The body packs complex systems into compact spaces while maintaining accessibility for repair or healing. How should this be reflected in dense yet maintainable layouts in manufacturing plants?	**10** **10**	**CO4**
Q 12	Answer any four from the following: i. Procedure needs to be adopted for the safe location of chlorine and ammonia plants. ii. Suggest two measures to enhance coordination and safety among equipment and operators. iii. Factors to be considered for locating a cement industry in Tamil Nadu. iv. Industrial ventilation system. v. State two advantages and two disadvantages of locating a chemical plant near a water body. vi. Recommend safe storage practices for ammonia.	**5x4 =20**	**CO1**