A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U9774

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Open Elective

21UME974 – BASICS OF INDUSTRIAL LAYOUT DESIGN AND SAFETY

(Regulations 2021)

(Common to All Engineering branches)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Space requirement and availability analysis considers CO1- U
   (a) The lighting and ventilation needs of the facility
   (b)The size and shape of the available building area
   (c) The employee parking lot capacity
   (d)The location of nearby restaurants
2. Computer-aided facility layout (CAFL) software allows for CO1- U
   (a) Managing employee social media accounts
   (b) Testing and simulating different layout options
   (c) Generating marketing materials for the company
   (d) Scheduling employee vacation days
3. OSHA regulations in facility design are concerned with CO1- U
   (a) Color schemes and office furniture aesthetics
   (b)Worker safety and health hazards
   (c) Lighting levels for employee productivity
   (d) Company dress code policies

4. CRAFT (Computerized Relative Allocation of Facilities Technique) software is used for CO1- U

(a) Detailed equipment layout within work areas

(b) Block layout of departments and major work areas

(c) Simulating material flow and production processes

(d) Employee scheduling and task assignment

5. Which model is used for multi-row facility layout problems with departments of equal area CO1- U

(a) Quadratic Assignment Problem (b) Single-Row Facility Layout Problem

(c) CRAFT Algorithm (d) CORELAP Method

6. Which of the following is a principle of material handling CO1- U

(a)Automation Principle (b)Space Principle

(c)Cost Principle (d) Time Principle

7. What is the primary focus of the Indian Factories Act, 1948 CO1- U

(a)Increasing production

(b) Ensuring safety, health, and welfare of workers

(c) Enhancing factory infrastructure

(d) Regulating exports

8. What does the term "hazardous substance" refer to in the context of workplace safety CO2- U

(a) Any substance that causes burns

(b)Any substance that can pose a risk to health or safety

(c) Any material used for construction

(d) Non- flammable substance

9. What is a key safety feature to prevent tractor rollovers CO2- U

(a) Anti-lock braking system (b) Roll-Over Protective Structure (ROPS)

(c) Seat belts (d) Automatic steering system

10. Lockout/Tagout (LOTO) is designed to control which type of hazard CO2- U

(a) Chemical spills (b) Electrical shocks (c) Hazardous energy (d) Falling objects

PART – B (5 x 2= 10 Marks)

11.	What factors are considered during personnel requirement analysis for facility layout	CO1 U	
12.	Differentiate between construction algorithms and improvement algorithms used for facility layout design	CO1 U	
13.	Describe the Quadratic Assignment Problem (QAP) in facility layout	CO1 U	
14.	What is the significance of safety procedures and arrangements in industries	CO2 U	
15.	What safety precautions should be taken when storing compressed gas cylinders	CO2 U	

PART – C (5 x 16= 80 Marks)

16.	(a)	Discuss the different types of layout problems commonly encountered in industrial facility design. Illustrate each type with relevant examples.	CO1 U	(16)
	(b)	Describe the types of data that are critical for making informed layout decisions. Explain how this data impacts the design and operation of the facility.	CO1- U	(16)
17.	(a)	Apply systematic layout planning (SLP) to design a layout that reduces material handling costs in a manufacturing facility.	CO3- App	(16)
	(b)	Develop a facility layout considering special requirements such as office layout or compliance with ADA regulations.	CO3-App	(16)
18.	(a)	Construct a layout problem model for integrating both storage and manufacturing departments in a facility.	CO3- App	(16)
	(b)	Discuss compliance with safety standards influence the operational efficiency of storage and warehousing systems?	CO3- App	(16)
19.	(a)	Apply safety arrangements when planning a chemical plant layout to minimize occupational hazards.	CO3- App	(16)
	(b)	Apply safety developmental program principles to reduce accident-prone areas in a factory layout.	CO3- App	(16)

20. (a) Implement hazard control measures to minimize accidents during tractor operations in agricultural or industrial settings. CO4- App (16)

(b) Propose safety management arrangements for the handling and storage of flammable hydrocarbons. CO4- App (16)