


Name: Enrolment No:			
UPES End Semester Examination, May 2024			
Course: M Tech (HSE) Program: Plant layout and material handling Course Code: HSFS 7031		Semester: II Time : 03 hrs. Max. Marks: 100	
➤ Instructions: Attempt all the sections. Draw neat diagrams. Assume missing data if any. Please use the full three hours wisely.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	List out four types of material handling equipment.	4	CO1
Q 2	How to safely handle dangerous materials?	4	CO1
Q 3	What are the risk elements in manual material handling environment?	4	CO1
Q 4	AGVs do not require an operator. Why?	4	CO1
Q 5	I. AGV stands for? (a) Automatic Guided Vehicle (b) Auto Guided Vehicle (c) Automated Guide Vehicle (d) Automated Guided Vehicle II. Hand trucks are also called as (a) order picker (b) pallet trucks (c) dollies (d) stackers	2 2	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	Karan Engineering is contemplating to integrate the AGVS and AS/RS with their flexible manufacturing system. Karan Engineering is interested to determine number of AGVSs required for its manufacturing system. It has to deliver 66 pieces per hour. The company has decided in favour of	10	CO4

	<p>installing a wire guided path system and the unit load AGVS. Calculate the number of AGVs required.</p> <p>The following data has been collected as shown:</p> <ul style="list-style-type: none"> ○ Vehicle Speed 200 ft/min ○ Average loaded travel distance per delivery 600ft ○ Average empty travel distance per delivery 400 ft ○ Pickup time 0.25 min ○ Drop-off time 0.25 min ○ Traffic factor 0.75 		
Q 7	<p>i. Explain the types of plant layout with suitable examples.</p> <p>ii. Refer to the below figure and identify the type of plant layout. Also explain its merits.</p> <div style="text-align: center;"> </div>	6+4	CO2
Q 8	Explain any ten basic principles / guidelines for designing and operating an effective & efficient material-handling system.	10	CO4
Q 9	Identify and analyze criteria and sub-criteria for the selection of a plant location for a pharmaceutical industry.	10	CO3
<p>SECTION-C (2Qx20M=40 Marks)</p>			
Q 10	<p>a. For a typical Class 10,000 cleanroom space with a typical internal generation of approximately 4,850 per CFM, and supply air through 99.9 % HEPA filters, what shall be the required air-change rate?</p> <p>b. What do you understand by HVAC requirements?</p> <p>c. An automated manufacturing system for machining crankshafts in a forging industry is planning to implement AGVs in the organization. There are five CNC workstations (A, B, C, D, E) and a load-unload station (F). Approximate time of moving the crankshaft on AGVS between stations is shown in Table.</p>	<p>6</p> <p>4</p> <p>10</p>	CO4

	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <th>A</th> <td>-</td> <td>2</td> <td></td> <td></td> <td></td> <td>1</td> </tr> <tr> <th>B</th> <td>2.5</td> <td>-</td> <td>2.5</td> <td></td> <td></td> <td></td> </tr> <tr> <th>C</th> <td></td> <td>3</td> <td>-</td> <td>1.0</td> <td></td> <td></td> </tr> <tr> <th>D</th> <td></td> <td></td> <td>2</td> <td>-</td> <td>0.5</td> <td></td> </tr> <tr> <th>E</th> <td></td> <td></td> <td></td> <td>1.5</td> <td>-</td> <td>1.0</td> </tr> <tr> <th>F</th> <td>0.5</td> <td></td> <td></td> <td></td> <td>0.5</td> <td></td> </tr> </tbody> </table> <p>Two hundred crankshafts are machined in every 8-h shift and the operations on the crankshaft are performed in sequence from station A through E. Taking an assumption that every pickup and drop-off operation takes approximately 0.70 min, determine the number of AGVSs to meet the demand of moving 200 crankshafts. The load factor is assumed to be 0.78 and the traffic factor 0.96.</p>		A	B	C	D	E	F	A	-	2				1	B	2.5	-	2.5				C		3	-	1.0			D			2	-	0.5		E				1.5	-	1.0	F	0.5				0.5			
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Q 11	<p>Briefly explain:</p> <ol style="list-style-type: none"> i. Requirements for the physically challenged person in power elevator. ii. Coimbatore is familiar for textile industries. Mention the reasons. iii. Types of ventilation systems used in Industries with neat diagram. iv. Requirements of light for various works with suitable examples. 	<p style="text-align: center;">5</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p> <p style="text-align: center;">5</p>	CO1																																																	