

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM & ENERGY STUDIES
Online End Semester Examination , Dec 2021

Course: Automation In Manufacturing
Program: B.Tech Mechatronics & Mechanical
Course Code: MEPD4014

Semester: VII
Time: 03 Hrs
Max Marks: 100

Common for B.Tech ADE, Mechatronics & Mechanical

Section A

1. Each Question will carry 4 Marks

Sl.N	Question	CO's
Q1	List for the reasons for Automation.	CO1
Q2	Identify the various types of variables and parameters in process industries and discrete manufacturing industries	CO1
Q3	Define the term sensor, transducer and actuator.	CO2
Q4	Classify different types of material handling equipment.	CO2
Q5	List the different types of AGV (automated guided vehicles) i.e. being used in industrial automation.	CO2

Section B

1. Each Question will carry 10 Marks

Q1	Comment the significance of manual labor in manufacturing support system.	CO2
Q2	A planned fleet of forklift truck has an average travel distance per delivery = 500 ft loaded and an average empty travel distance = 350 ft. The fleet must make a total of 60 del/hour. Loads and unload times are each 0.5 minute and the speed of the vehicles 300ft/minutes. The traffic for the system is 0.85. Availability is expected to be 0.95 and worker efficiency is assumed to be 0.90. Determine: (a) Ideal cycle time per delivery (b) the resulting average number of deliveries per hour that a forklift truck can make and (d) how many trucks are required to accomplish the 60del/hour.	CO3
Q3	A roller conveyor moves tote pans in one direction at 150ft/min between a load station and an unload station, a distance of 200 ft. The time to load parts into a tote pan at the load station is 3sec per part. Each tote pan holds 8 parts, In addition, it takes 9sec to load a tote pans onto the conveyor. Determine: (a) spacing between tote pan centers flowing in the conveyor system and (b) flow rate of parts on the conveyor system. (c) Consider the effect of	CO4

	<p>the unit load principle. Suppose the tote pans were smaller and could hold only one part rather than eight. Determine the flow rate in this case if it takes 7 sec to load a tote pan onto the conveyor (instead of 9 sec for the larger tote pan .and it takes the same 3 sec to load the part into the tote pan.</p>	
Q4	<p>An automated storage/retrieval system installed in a warehouse has five aisles. The storage racks in each aisle are 30 ft high and 150ft long. The S/R machine for each aisle travels at a horizontal speed of 350 ft/min and a vertical speed of 60 ft/min. The pick-and-deposit time = 0.35 min. Assume that the number of single command cycles per hour is equal to the number of dual command cycles per hour and that the system operates at 75% utilization. Determine the throughput rate (loads moved per hour) of the AS/RS.</p>	CO4
Section C		
1. Each Question carries 20 Marks.		
Q1	<p>(a) Describe the different types of Automated guided vehicles systems. (b) Describe the parameters of storage system performance</p> <p style="text-align: center;">OR</p> <p>A 10-aisle automated storage/retrieval system is located in an integrated factory-warehouse facility. The storage racks in each aisle are 15 m high and 95 m long. The S/R machine for each aisle travels at a horizontal speed of 1.5 m/sec and a vertical speed of 0.5 m/sec. Pick-and-deposit time = 20 sec. Assume that the number of single command cycles per hour is one-half the number of dual command cycles per hour and that the system operates at 80% utilization. Determine the throughput rate (loads moved per hour] of the AS/RS</p>	CO3
Q2	<p>Describe the function and design of carousel storage system. A single carousel storage system has an oval rail loop that is 30ft long and 3ft wide .Sixty Cameras are equally spaced around the oval. Suspended from each carrier and five bins. Each bin has a volumetric capacity = 0.75ft³ .Carousel speed = 100ft/min. Average pick-and—deposit time for a retrieval = 20 sec. Determine: (a) volumetric capacity of the storage system and (b) hourly retrieval rate of the storage system.</p>	CO4