APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. Paper: IAR0822242-I **(Pages: 2)**

Name: .....

Reg. No: .....

SECOND SEMESTER M.TECH. DEGREE EXAMINATION JULY 2022

Branch: Mechanical Engineering **Specialization: Industrial Automation &Robotics**

08ME6342(B)ROBOTICS BASED INDUSTRIAL AUTOMATION

Time: 3 Hours **Max. Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1.a	Define automation and list types of automation.	3
	Answer b or c	
b	Explain different strategies of automation and process implementations.	6
c	Discuss low-cost automation with suitable example.	6

Q. No.	Module 2	Marks
2.a	Define partial automation and its role in the manufacturing industry.	3
	Answer b or c	
b	Explain the analysis of transfer lines with storage buffers.	6
c	A 30 station transfer line is being proposed to machine a certain component currently produced by conventional methods. The proposal received from the machine tool builder states that the line will operate at a production rate of 100 pcs/hr at 100% efficiency. From a similar transfer line, it is estimated that breakdowns of all types will occur at a frequency of F = 0.20 breakdowns per cycle & that the average downtime per line stop will be 8.0minutes. The starting blank that is machined on the line costs Rs. 5.00 per part. The line operates at a cost for 100 parts each & the average cost per tool = Rs. 20 per cutting edge. Compute the following: (i) Production rate (ii) Line efficiency (iii) Cost per unit piece produced on the line	6

Q. No.	Module 3	Marks
3.a	Define line balancing. List the methods of line balancing.	3

Answer b or c

b The following tasks must be performed on an assembly line in the sequence and times specified in the table. **6**

Task	A	B	C	D	E	F	G	H
Task time(s)	55	45	25	50	25	30	15	40
Predecessor	-	-	A	C	C	D	E	B, F,G

(i) What is the theoretical no of stations required to meet a forecast demand of 500 units per 8-hour day? (ii) Use the longest task time rule and balance the line in the minimum no of stations to produce 500 units per day. (iii) Find the efficiency.

c Explain different types of automated assembly systems. **6**

Q. No.	Module 4	Marks
4.a	List the factors influencing the selection of material handling systems.	**3**

Answer b or c

b Explain the different types of material handling systems with neat sketches. **6**

c Discuss the design of conveyer systems and AGVs **6**

Q. No.	Module 5	Marks
5.a	List and explain the types of storage systems.	**4**

Answer b or c

b Explain with neat sketches types of AS/RS systems and their applications. **8**

c Explain the design of carousel storage systems. **8**

Q. No.	Module 6	Marks
6.a	What do you mean by automated inspection? Enlist the steps involved in automation of an inspection procedure in an industry.	**4**

Answer b or c

b Describe the different parts of a coordinate measuring machine. Enlist the applications of CMMs. **8**

c Explain the role of performance modelling in automated inspection and testing. Discuss the various performance modelling tools. **8**