CBCS SCHEME

USN | | | | | | | | | | |

18RA645

Sixth Semester B.Tech. Degree Examination, June/July 2023
Automation in Manufacturing

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume missing data if any.

Module-1

1 a. With a block diagram, explain the automated system in manufacturing eco-system. **(10 Marks)**

b. With a neat sketch, explain the information processing cycle in a typical manufacturing firm. **(10 Marks)**

OR

2 a. Explain the classification of manufacturing processes with a tree diagram. **(10 Marks)**

b. A production machine operates 80hr/wk (2 shifts, 5 days) at full capacity. Its production rate is 20 unit/hr. During certain week, the machine produced 1000 parts and was idle the remaining time. i) Determine the production capacity of the machine ii) What was the utilization of the machine during the week under consideration? iii) How many hours machine was operated? **(10 Marks)**

Module-2

3 a. A small electrical appliance is to be produced on a single model assembly line. The work content of assembling the product has been reduced to the work elements listed in table below. The line is to be balanced for an annual demand of 100,000 units per year. The line will operate 50 weeks/year, 5 shifts/week and 7.5 hrs per shift. Manning level will be one work per station. Uptime efficiency is 96%. Repositioning time lost per cycle will be 0.08min. Determine: i) Total work content time ii) Required hourly production rate to achieve annual demand iii) Cycle time iv) Draw assignment of elements according to the largest candidate rule v) Draw physical sequence of work stating with assigned work elements.

Work element table

Sl. No.	Work element description	T_{ck} (min)	Must be preceded by
1)	Place frame in work holder and clamp	0.2	-
2)	Assemble plug, grommet to power cord	0.4	-
3)	Assemble bracket to frame	0.7	1
4)	Wire power cord to motor	0.1	1.2
5)	Wire power cord to switch	0.3	2
6)	Assemble mechanism plate to bracket	0.11	3
7)	Assemble blade to bracket	0.32	3
8)	Assemble motor to brackets	0.6	3, 4
9)	Align blade and attach to motor	0.27	6, 7, 8
10)	Assemble switch to motor bracket	0.38	5.8
11)	Attach cover inspect and test	0.5	9.10
12)	Place in tote pan for packing	0.12	11

(15 Marks)

b. Explain the need for line balancing. **(05 Marks)**

OR

4 a. Under what conditions, the automated assembly technology is considered. **(04 Marks)**

b. With a neat sketch explain

i) In line automated assembly system

ii) Dial type automated assembly system

iii) Carousel type automated assembly system

iv) Single station automated assembly system. **(16 Marks)**

Module-3

5 a. Write a note on computer aided process planning. **(10 Marks)**

b. Explain the three types of automated guided vehicles. **(10 Marks)**

OR

6 a. List different robot configurations. Explain any two of them. **(10 Marks)**

b. Explain the role of robots in assembly and inspection. **(10 Marks)**

Module-4

7 a. Explain the construction and operation of coordinate measuring machine. **(12 Marks)**

b. Explain machine vision. List the advantages of machine vision. **(08 Marks)**

OR

8 a. What is the role of data in a manufacturing system? Explain factory data collection system. **(10 Marks)**

b. Write a note on QR code technology. **(10 Marks)**

Module-5

9 a. Explain the basic principles of additive manufacturing. **(10 Marks)**

b. Write a note on hybrid manufacturing. **(10 Marks)**

OR

10 a. Explain the role of human workers in future automated factory. **(10 Marks)**

b. Explain the social impact due to digital manufacturing (future automated factory). **(10 Marks)**

* * * * *