R13

Set No. 1

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018
AUTOMATION IN MANUFACTURING
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Write the various automation strategies.   [3]
   b) What is the significance of buffer storage?   [4]
   c) Why assembly lines?   [3]
   d) List various conveyor systems.   [4]
   e) What is adaptive control system? Why?   [4]
   f) What do you know about Off-line Inspection Methods?   [4]

PART–B *(3x16 = 48 Marks)*

2. a) Define Automation. Discuss various levels of automation.   [8]
   b) Differentiate between fixed and flexible automation.   [8]

3. a) What is Buffer storage? Explain the reasons for the use of Buffer storage zones.   [8]
   b) What are the methods of transporting work pieces on flow lines? Explain them.   [8]

4.   The following data apply to a 10-station in-line transfer machine:
             $P = 0.01$ (all stations have an equal probability of failure)
             $T_c = 0.3$ min
             $T_d = 3.0$ min
      Using the upper-bound approach. Compute the following for the transfer
      machine:
      (i) F, the frequency of line stops. (ii) R_p, the average production rate.
      (iii) E, the line efficiency.   [16]

5. a) Describe the use of Material Handling Equipment in Machine Tools.   [8]
   b) Explain the various problems encountered in interfacing handling and storage
      systems with manufacturing units.   [8]

6. a) Explain the situations where adaptive control can be beneficially applied?   [8]
   b) What are the limitations of adaptive control?   [8]

7. a) Distinguish the contact and Non-contact inspection methods.   [8]
   b) Explain different types of CMM.   [8]

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Code No: **RT41039**

R13

Set No. 2

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AUTOMATION IN MANUFACTURING
(Mechanical Engineering)

Time: 3 hours   **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) List the hydraulic components of automated systems.   [4]
    b) What is buffer storage? Write its significance.   [4]
    c) What are the different line balancing methods?   [4]
    d) What is AS/RS?   [3]
    e) List the applications of adaptive control.   [4]
    f) Write Inspection vs. Testing.   [3]

PART–B *(3x16 = 48 Marks)*

2. a) Discuss various levels of automation.   [8]
    b) What are the important pneumatic components used in automated system? Describe briefly.   [8]

3.   Explain the following linear transfer mechanisms:
    (i)   Walking beam system.
    (ii) Powered roller conveyor system.   [16]

4.   A 30-station transfer line has an ideal cycle time $T_c=0.75$ min, an average downtime $T_d = 6.0$ min per line stop occurrence, and a station failure frequency $p = 0.01$ for all stations. A storage buffer is located between stations 15 and 16 to improve the line efficiency. Using the upper bound approach, determine
    (i) The current line efficiency and production rate.
    (ii) Maximum possible line efficiency and production rate because of storage buffer.   [16]

5. a) Describe the following automated guided vehicle system with the help of simple sketch:
        (i) Driverless automated guided train   (ii) Unit load carrier.   [8]
    b) Enumerate the differences between asynchronous conveyors and continuous motion conveyors.   [8]

6. a) Explain how various parameters such as cutting force, temperatures are controlled using adoptive control concept.   [8]
    b) Explain the process of adaptive control constraint (ACC).   [8]

7. a) What is automated inspection? Discuss its procedure.   [8]
    b) Discuss the constructional details of CMM.   [8]

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Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1   a)   List the pneumatic components of automated systems.   [3]
    b)   Identify the transfer mechanisms used in automated flow lines.   [4]
    c)   What are the different ways of improving line balancing?   [4]
    d)   What are the functions of automated material handling systems?   [4]
    e)   How adoptive control is implemented in machining operations?   [4]
    f)   What are the various inspection attributes?   [3]

PART–B *(3x16 = 48 Marks)*

2   a)   Explain any one mechanical feeding device with neat sketch.   [8]
    b)   Explain the following types of Automation:
         (i) Programmable Automation   (ii) Fixed Automation   [8]

3   a)   What is a transfer line? Explain any two work part transfer methods.   [8]
    b)   Write short note on partial automation.   [8]

4   A manual assembly line is to be designed to make a small consumer product. The
         work elements, their times and precedence constraints are given in the table below.
         The workers will operate the line for 400 min/day and must produce 300 products
         per day.
          (i) Determine the ideal minimum number of workers on the line.
         (ii) Use RPW method to balance the line.

Element	1	2	3	4	5	6	7	8	9	10
T_e(min)	0.4	0.7	0.5	0.8	1.0	0.2	0.3	0.9	0.3	0.5
Preceded by	-	1	1	2	2,3	3	4	4,9	5,6	7,8

                                                                                               [16]

5   a)   Explain the advantages of implementing various principles of material handling.   [8]
    b)   Describe the following conveyors used in material transport systems:
         (i) In-floor tow-line conveyor   (ii) Overhead trolley conveyor.   [8]

6   a)   What is meant by adaptive control? Explain.   [8]
    b)   Differentiate between adaptive control optimization and adaptive control constraint. [8]

7   a)   Write about CMM operation.   [8]
    b)   Describe the action step resulting from Automated Inspection.   [8]

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PART–A *(22 Marks)*

1. a) What are the various mechanical feeding methods?   [4]
    b) List the methods of part transport.   [3]
    c) What is the use of assembly lines?   [4]
    d) Classify the material handling systems.   [4]
    e) List adaptive control components.   [3]
    f) Write the various inspection variables.   [4]

PART–B *(3x16 = 48 Marks)*

2. a) Explain the pneumatic and hydraulic components in Automation.   [8]
    b) Write about Automation in machine Tools.   [8]

3. a) What is an automated flow line? Mention the objectives of the use of flow line
        automation.   [8]
    b) Explain the factors to be considered in designing and building an automated
        flow line.   [8]

4.   The following data apply to a 12-station in-line transfer machine:
                P = 0.01 (all stations have an equal probability of failure)
                T_c = 0.3 min
                T_d = 3.0 min
        Using the lower-bound approach, compute the following for the transfer
        machine:
        (i) F, the frequency of line stops. (ii) R_p, the average production rate.
        (iii) E, the line efficiency.
        What proportion of work parts are removed from the transfer line?   [16]

5. a) Discuss the various material characteristics factors which influence the design
        of the material handling system.   [8]
    b) Discuss the following tasks to operate Automated Guided Vehicle Systems
        efficiently:
        (i) Traffic Control   (ii) Vehicle Dispatching.   [8]

6. a) Explain the process of adaptive control optimization (ACO).   [8]
    b) What are the benefits of adaptive control machining?   [8]

7. a) Write about types of inspection methods and equipments.   [8]
    b) Describe the Machine Vision operation.   [8]

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