Code: ME8T2B

IV B.Tech - II Semester –Regular / Supplementary Examinations
July - 2021

AUTOMATION IN MANUFACTURING
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

$$11x \ 2 = 22 \ M$$

1.
   a) Discuss in brief automation principles.
   b) Mention various applications of automated flow lines.
   c) Differentiate between Geneva mechanism and cam indexing mechanism.
   d) List out various line balancing methods.
   e) What do you mean by minimum rational work element?
   f) Define mono-rail and conveyer.
   g) What is difference between hoist and crane?
   h) Identify three application areas of automated storage/retrieval systems.
   i) Define adaptive control and justify its necessity in industry.
   j) State various advantages of using CMM over manual inspection.
   k) List out various types of CMM.

PART – B

Answer any ***THREE*** questions.   All questions carry equal
marks.   3 x 16 = 48 M

2. a) Discuss various automation strategies in detail.   8 M

  b) List various mechanical feeding devices. Explain any two
    with neat sketches.   8 M

3. a) A 10-station transfer machine has an ideal cycle time of 50
    sec. The frequency of line stops is 0.08 stops per cycle.
    When a line stop occurs, the average downtime is 5.0 min.
    Determine   8 M
    (i) Average production rate in pc/hr,
    (ii) Line efficiency.
    (iii) Proportion of downtime.

  b) The following table defines the precedence relationships
    and their corresponding work element times for making
    new model toy.   8 M

  i) Construct the precedence diagram for this job.
  ii) If the ideal cycle time = 1.1min, repositioning time 0.1
    min and up time proportion is assumed to be 1.0, what is
    the theoretical minimum number of work station required
    to minimize the balance delay under the assumption that
    there will be one worker per station?
  iii) Using Largest Candidate Rule method, assign work
    elements to stations and compute balance delay.

Work content	Te (min.)	Immediate predecessors
1	0.5	-
2	0.3	1
3	0.8	1
4	0.2	2
5	0.1	2
6	0.6	3
7	0.4	4,5
8	0.5	3,5
9	0.3	7,8
10	0.6	6,9

4. a) List out various types of conveyers and explain any three of them in detail.   8 M

   b) What are the principle types of AS/RS. Explain any three of them.   8 M

5. a) Explain adaptive control with constraints system for turning process with a block diagram.   8 M

   b) Differentiate between ACO and ACC type adaptive controls.   8 M

6. a) Differentiate between contact and non-contact type of inspections.   8 M

   b) What is CMM? Explain various components of CMM in detail.   8 M