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First Semester M.Tech. Degree Examination, Dec.2014/Jan.2015
Automation and Computer Integrated Manufacturing

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain with block diagram product cycle in a computerized manufacturing environment. **(10 Marks)**
   b. Differentiate between concurrent engineering and sequential engineering. **(05 Marks)**
   c. What are the advantages of using CAM? **(05 Marks)**

2 a. Discuss with suitable block diagram typical activities performed in a production planning and control system. **(10 Marks)**
   b. Explain suitable sketch the activities performed in three phases of shop floor control system. **(10 Marks)**

3 a. Define MRP and explain structure of MRP system. **(10 Marks)**
   b. Explain briefly any three technologies available for use in automatic identification system. **(06 Marks)**
   c. Illustrate with sketch the configuration of an automated flow line. **(04 Marks)**

4 a. Discuss general terminologies used during analysis of a flow line. **(06 Marks)**
   b. A 10-station transfer machine is under consideration to produce a component used in a product. The item is currently produced by more conventional method, but the demand for the product cannot be met. The manufacturing engineering department has estimated that the ideal cycle time will be 1.0 min. From similar transfer line, it is estimated that breakdowns of all type will occur with a frequency of 0.10 breakdown / cycle and average line stop is 6.0 min. The scrap rate for the current conventional process method is 5%. The starting casting for the component cost ₹150 each and it will cost ₹6000/hr to operate the transfer line. Cutting tools are estimated to cost ₹15/work part.
   Using above data compute the following measure of line performance:
   i) Production rate   ii) Number of hours required to meet a demand of 1500 units/week.
   iii) Line efficiency   iv) Cost per unit produced.
   v) If the scrap is repaired at a cost of ₹500/unit would it be economical to do so? **(10 Marks)**
   c. Discuss upper bound approach of analysis for transfer lines without storage. **(04 Marks)**

5 a. Explain elements of part delivery system with suitable sketches. **(10 Marks)**
   b. The assembly machine is a game of chance. Comment on this statement with suitable supporting equations. **(06 Marks)**
   c. A 10-station in-line assembly machine has a 6-s ideal cycle time. The fraction defect rate at each station is 0.01 and probability that a defect will Jam is 0.5. When jam occurs, the average down time is 2 min. Determine following:
   i) The average production rate.
   ii) The yield of good assembly.
   iii) The uptime efficiency of the assembly machine. **(04 Marks)**

6 a. Explain with suitable diagram working of components of a direct digital control system.
(06 Marks)

   b. Illustrate with sketch configuration of an adaptive control and explain typical functions performed to evaluate performance.
(08 Marks)

   c. Write a brief note on document and work flow management related to networking.
(06 Marks)

7 a. Explain basic three functions performed in vehicle guidance and routing of an AGV.
(10 Marks)

   b. Discuss any six principles of material handling.
(06 Marks)

   c. Discuss two categories of interface problem while dealing with handling and storage with manufacture.
(04 Marks)

8 a. Explain with suitable sketch the basic functions performed by machine vision system.
(10 Marks)

   b. Explain following optical inspection method with sketches:
       i) Scanning laser technique.
       ii) Optical triangulation technique.
(10 Marks)

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