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10ME61

Sixth Semester B.E. Degree Examination, Dec.2013/Jan.2014

Computer Integrated Manufacturing

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Discuss the following automation strategies:
   i) Specialization of operations
   ii) Increased flexibility
   iii) On-line inspection **(06 Marks)**

   b. With sketch explain the automation migration strategy. **(06 Marks)**

   c. There are total 24 machines in the manufacturing plant and the part produced in a batch must be processed through an average of eight machines. 24 new batches are launched each week. Average operation time is 6 min, average batch size is 30 parts, average set-up time is 6 hr and average non-operation time per batch is 12 hr/machine. The plant operates an average of 80 production hours per week and assume A = 95%. Determine:
   i) Manufacturing lead time for an average part
   ii) Production rate
   iii) Plant capacity
   iv) Plant utilization
   v) WIP
   vi) WIP ratio **(08 Marks)**

2 a. Discuss the general methods of transporting work pieces on flow lines. **(08 Marks)**

   b. With sketch explain linear walking beam and Geneva wheel, work transfer mechanisms. **(08 Marks)**

   c. State the importance of Buffer storage. **(04 Marks)**

3 a. Enumerate the difference between 'upper bound approach' and 'lower bound approach'. **(06 Marks)**

   b. Explain the following terms used in the analysis of an automated flow lines:
   i) Partial automation
   ii) Lower bound approach **(06 Marks)**

   c. A transfer line has ten station with an ideal cycle time of 30 sec. The frequency of the line stop occurrence is 0.06 stop/cycle on an average. When a stop occurs, it takes an average of 5 min to make repairs. Determine:
   i) Average production time, T_p
   ii) Average production rate, R_e
   iii) Line efficiency, E
   iv) Proportion of down time. **(08 Marks)**

4 a. Discuss the following:
   i) Minimum rational work element
   ii) Cycle time
   iii) Line efficiency
   iv) Precedence constraints **(08 Marks)**

   b. Explain different methods to solve assembly line balancing problems. **(12 Marks)**

PART – B

5 a. State and briefly explain the important design principles for automated assembly system. **(06 Marks)**

b. List the parts feeding devices in delivery system and with sketch explain pick and place mechanism. **(06 Marks)**

c. An ten station assembly line has an ideal cycle time of 0.2 min. The fraction defection rate at each of the ten stations is q = 0.020 and the system operates using the instantaneous control strategy. When the breakdown occurs, it takes 1 min, an average, for the system to be put back into operation. Determine the production rate for the assembly line, the yield of good products and the proportion uptime of the system. **(08 Marks)**

6 a. Describe the three main components used in an MRP system. **(10 Marks)**

b. Define capacity planning and explain its decisions. **(05 Marks)**

c. Explain retrieval approach used for computer aided process planning systems. **(05 Marks)**

7 a. Give the classification of machining centres and explain any two machine centres. **(10 Marks)**

b. State and explain the steps involved in part programming. **(10 Marks)**

8 a. State and draw five types of joints commonly used in industrial robot construction. **(05 Marks)**

b. Draw the robot configurations for the given joint notations and briefly explain:
i) TRR ii) VRO **(10 Marks)**

c. Explain end effectors. **(05 Marks)**

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