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10ME61

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Computer Integrated Manufacturing

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define Automation. Highlight features of different automation types with examples. **(10 Marks)**

b. A certain part is routed through 6 machines in a batch production plant. The setup and operation times are given in the table below. The batch size is 100 units and the average non – operation time per machine is 12 hours.

Machines	1	2	3	4	5	6
Setup time (hrs)	4	2	8	3	3	4
Operation time (min)	5	3.5	10	1.9	4.1	2.5

Determine: i) Manufacturing Lead time ii) Production rates for operation 3 and 5. **(10 Marks)**

2 a. List and explain in detail different types of automated flow configurations. **(10 Marks)**

b. Explain with neat sketch, rack and pinion mechanism. **(05 Marks)**

c. A rotary worktable is driven by a Geneva mechanism with six slots. The driver rotates at 30 rev/min. Determine the cycle time, available process time and the lost time each cycle indexing the table. **(05 Marks)**

3 a. The ideal cycle time of an 20 station transfer line is 1.2 min. The probability of station breakdown per cycle is equal for all stations and P = 0.005 break downs/cycle. For each of the upper – bound and lower – bound approaches, determine
i) frequency of line stops per cycle ii) average actual production rate
iii) line efficiency. **(10 Marks)**

b. A fifteen station transfer line is divided into two stages of 7 and 8 stations in each stage. The ideal cycle time for each stage is 1.2 min and the constant downtime is 4 min. Determine the line efficiency of the transfer line for the following storage buffer capacities, using upper bound approach. i) $b = 0$; ii) $b = \infty$.
All of the stations in line have same probability of stopping p = 0.02. **(10 Marks)**

4 a. Briefly explain the following terminologies used in Line Balancing.
i) Minimum Rational work Element ii) Precedence diagram iii) Cycle time
iv) Balance delay. **(08 Marks)**

b. The table below shows the precedence relationships and element times for a new part. The ideal cycle time is 10 seconds. Construct the precedence diagram. Using Kilbridge and Wester's method, compute the balance delay and line efficiency. **(12 Marks)**

Element number	1	2	3	4	5	6	7	8	9	10	11	12
Predecessor element	-	1	2	1	4	3, 5	6	7	6	6	10	8, 9, 11
Time (seconds)	5	3	4	3	6	5	2	6	1	4	4	7

PART – B

5 a. List the principles used in product design for automated assembly systems. **(04 Marks)**

b. With neat sketch, explain elements of the parts delivery system for assembly operation. **(08 Marks)**

c. Explain Vehicle guidance and Routing system of an Automated guided vehicle system (AGVS). **(08 Marks)**

6 a. With block diagram, explain the steps involved in retrieval CAPP system. **(08 Marks)**

b. List the decision to be made for short term capacity planning adjustments. **(05 Marks)**

c. Requirements are to be planned for component C5 in product P1. Required deliveries for P1 are 50 and 100 units during week 8 & 10 respectively. The product structure for P1 consists of S2(2) , C5(2) and M5(2) i.e 2 units each for sub – assembly, component and material. Assembly lead time for products and sub assemblies is 1 week, manufacturing lead time for components is 2 weeks and ordering lead time for raw materials is 3 weeks. Determine the time phased requirements for S2, M5 and C5 to meet the master schedule. On – hand inventories are : 100 units for M5, 50 units for C5 and zero for S2. Scheduled receipts are zero for these items. **(07 Marks)**

7 a. With block diagram, explain the configuration of machine control unit (MCU) for CNC system. **(10 Marks)**

b. Write a CNC part program to profile mill the part shown in fig. Q7(b) using word address format. Assume suitable machining parameters. **(10 Marks)**

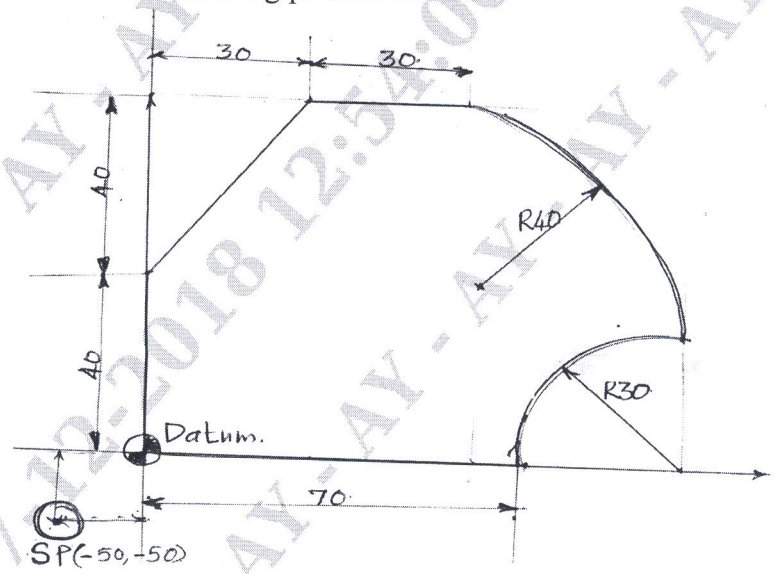

Fig.Q7(b)

8 a. Define Industrial Robotics. Briefly explain with neat sketches, physical configurations of an robot. **(12 Marks)**

b. Explain in detail sensors used in Industrial robots. **(08 Marks)**

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