USN | | | | | | | | | | |

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.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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

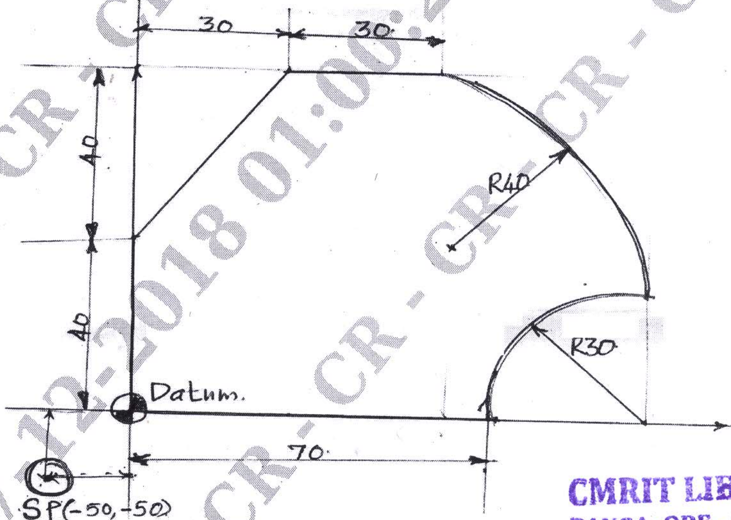
PART – B

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)



CMRIT LIBRARY
BANGALORE - 560 037

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)

*****