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10ME61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Explain any eight of the ten strategies for automation and process. **(09 Marks)**

b. Define the following with usual notations : i) Cycle time ii) Manufacturing Lead Time (MLT) iii) Production rate iv) Work in process (WIP). **(08 Marks)**

c. The hourly rate for a certain work center is to be determined based on the following data : Direct labor rate = Rs 25/hr ; Applicable factory overhead rate on labor = 35% ; Capital investment in machine = Rs 4,00,000 ; Service life of the machine = 5 years ; Rate of return = 15% ; Salvage value in 5 years = Zero and Applicable factory overhead rate on machine = 40%. The work center will be operated two 8 hour shifts , 250 days per year. Determine the appropriate hourly rate for the work center. **(03 Marks)**

2 a. What is an Automated production line? Explain the conditions under which automated production lines are appropriate. **(05 Marks)**

b. Write a note on various types of mechanized work transport systems on automated production line. **(06 Marks)**

c. With a neat sketch, explain the working beam transfer system and Geneva mechanism. **(06 Marks)**

d. A rotary workable is driven by a Geneva mechanism with five slots. The driver rotates at 60 rev/min. Determine i) the cycle time ii) available process time and iii) indexing time each cycle. **(03 Marks)**

3 a. With examples, explain upper bound and lower bound approaches to analyze automated flow line without storage buffer. **(08 Marks)**

b. A 20 station transfer line has an ideal cycle time T_c = 1.5min. The probability of station breakdown per cycle is equal to all stations and p = 0.005 breakdowns / cycle, average downtime per line stop = 8 min. For each of the upper bound and lower bound approaches, determine i) frequency of line stops per cycle ii) average actual production rate and iii) line efficiency. **(12 Marks)**

4 a. What do the terms starving and blocking means? **(02 Marks)**

b. What is the objective in line balancing? Express the same mathematically with usual notations. **(02 Marks)**

c. A manual assembly line has 17 workstations with one operator per station. Work content time to assemble the product = 28 min. Production rate of the line = 30 units per hour. The proportion uptime – 0.94 and repositioning time = 6 sec. Determine the balance delay. **(04 Marks)**

d. The table below defines the precedence relationships and element times for a new product
i) Construct the precedence diagram for this job
ii) If the ideal cycle time = 10 min , repositioning time = 1 min and uptime proportion is assumed to be 1.0. What is the theoretical minimum number of workstations required to minimize the balance delay under the assumption that there will be one worker per station?

iii) Use Ranked Positional Weights (RPW) method to assign work elements to stations.
iv) Compute the balance delay for your station.

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

Table 4(d) **(12 Marks)**

PART - B

5 a. With a neat sketch, explain the part delivery system. **(10 Marks)**
b. Write a note on Automated Guided Vehicles (AGVs). **(10 Marks)**

6 a. With the aid of a flow chart, explain the retrieval CAPP system. **(08 Marks)**
b. Write a note on structure of an MRP system. **(10 Marks)**
c. What is the difference between Rough Cut Capacity Planning (RCCP) and Capacity Requirement Planning (CRP)? **(02 Marks)**

7 a. Explain the salient features of horizontal and vertical axis machining centre and list their applications. **(06 Marks)**
b. Differentiate between Absolute and Incremental co-ordinate system. **(04 Marks)**
c. Prepare the manual part program for CNC machining of a slot and holes in a mild steel plate as shown in fig. Q7(c). Assume suitable data for machining parameters and tooling. Indicate the datum and meanings of G and M codes used in the program. **(10 Marks)**

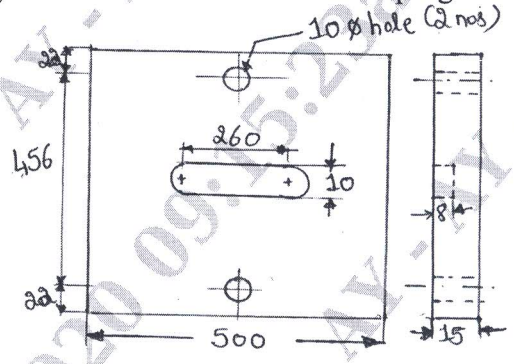

Fig.Q7(c)

All dimensions in mm.

8 a. Explain the five joint types used in robotic arms and writs with a neat sketch. **(10 Marks)**
b. Explain the following body and arm configurations of a robot :
i) Cylindrical configuration ii) Polar configuration. **(06 Marks)**
c. Write a note on the types of grippers used in industrial robot applications. **(04 Marks)**

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