Computer Integrated Manufacturing VTU CBCS Question Paper Set 2018

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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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10ME61

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
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 CIM. Explain how flexible automation is differentiated from programmable automation. **(05 Marks)**

b. Define manufacturing lead time and operation time. Represent them mathematically. **(05 Marks)**

c. An average of 10 new orders is started through a certain factory each month. An order consists of an average 75 parts to be processed through 8 machines in the factory. The operation time per machine for each part is 25 min. The non operation time averages to be 10 hrs and the required setup time is 5hrs. There were 20 workstations in the factory. The plant operates 175hrs/month. Determine i) Manufacturing lead time ii) Plant capacity iii) Utilization iv) Work in process v) TIP ratio. **(10 Marks)**

2 a. What do you understand by automated flow line? List the various symbols used to represent an automated flow line. **(06 Marks)**

b. Differentiate between In – line and Rotary configuration systems. **(06 Marks)**

c. What are Transfer mechanisms? What are its types? With a neat sketch, explain Geneva wheel transfer mechanism. **(08 Marks)**

3 a. Differentiate between Upper Bound Approach and Lower Bound Approach. **(05 Marks)**

b. Briefly explain the concept of manual assembly line, with a sketch. **(05 Marks)**

c. A transfer machine has six stations that function as follows :

Station	Operation	Process Time (min)	P_i
1	Load part	0.78	0
2	Drilling	1.25	0.02
3	Reaming	0.90	0.01
4	Tapping	0.85	0.04
5	Milling	1.32	0.01
6	Unloading	0.45	0

In addition, Transfer Time is 0.18 min. Average downtime per occurrence = 8 min. Solve the problem assuming that, when station breakdown occurs, the workparts must be removed. Determine : i) Proportion Downtime ii) Average actual production rate. **(10 Marks)**

4 a. Define the following terms : i) Minimum rational work element ii) Balance delay iii) Cycle time iv) Precedence diagram. **(08 Marks)**

b. The table below shows the element time and precedence relationships. Cycle time is 10 min. Construct the precedence diagram. Determine the number of workstations required to process all the work elements. Use ranked positional weight method. Also determine Balance delay.

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

(12 Marks)

PART - B

5 a. With neat sketches, explain Horizontal and Vertical escapement and placement devices. **(08 Marks)**

b. What are Automated Guided Vehicles? List the types of AGV's. Write a note on vehicle guidance technology adopted in AGV's. **(12 Marks)**

6 a. Define CAPP. With block diagram, explain variant type of CAPP system. **(08 Marks)**

b. Briefly explain the fundamental concepts of MRP. **(06 Marks)**

c. What is Capacity Planning? Explain how capacity planning is generally accomplished. **(06 Marks)**

7 a. What are preparatory functions? Write a note on cutter radius compensation. **(06 Marks)**

b. Differentiate between Absolute and Incremental co-ordinate systems. **(04 Marks)**

c. The desired component part is shown in fig. Q7(c). Write a manual part programme to turn the profile of the part shown. Use Rough Turning Cycle and Finish cycle. Assume suitable process parameters. **(10 Marks)**

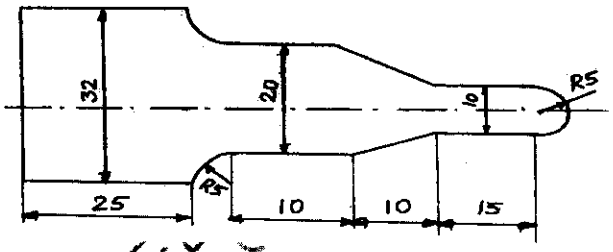

Fig.Q7(c)

8 a. With a neat sketch, explain spherical robot configuration. **(06 Marks)**

b. What are End effectors? Explain the various types of grippers available. **(08 Marks)**

c. Define the following :
i) Resolution ii) Repeatability iii) Payload **(06 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016

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. Define automation. Explain the different types of automation. List the reasons for automation. **(10 Marks)**

b. In a certain factory an average of 20 new orders is processed every month, 50 parts are to be processed on an average for every order. The processing of the order is to be carried out through 10 machines in the factory. The operation time for machining each part is 15 mins, non-operation time per order at each machines is 8 hours, setup time per order is 4 hours, number of machines in factory is 25, number of hours of plant operation per month is 160 hours, percentage of machines operational at anytime is 80%, percentage of machines under repair and maintenance at anytime is 20%. Determine: (i) MCT, (ii) Production capacity, (iii) Plant utilization, (iv) WIP ratio. **(10 Marks)**

2 a. What is workpart transfer mechanism? With neat sketches, explain the different types of rotary transfer mechanism. **(10 Marks)**

b. Briefly explain automation for machining operations. **(05 Marks)**

c. Explain the control functions in an automated flow line. **(05 Marks)**

3 a. Explain the analysis of transfer lines with storage buffer. **(08 Marks)**

b. What is partial automation? List the assumption made in analysis of partial automation. **(04 Marks)**

c. In the operation of a certain 12 station transfer line the ideal cycle time is 8 min and the average downtime is 5 min. Determine the frequency of lines stops per cycle and also the production rate if the probability of station breakdown will occur at a rate of 0.0128. **(08 Marks)**

4 a. What is line balancing? Enumerate with an example explaining the Kilbridge and Wester method. **(10 Marks)**

b. Explain the following terms in line balancing:
i) Precedence diagram
ii) Minimum rational work element **(04 Marks)**

c. Explain briefly the workstation considerations. **(06 Marks)**

PART – B

5 a. With a neat sketch, explain the elements of part delivery system. **(10 Marks)**

b. What is AGV? Explain the vehicle guidance systems in AGV. **(10 Marks)**

6 a. Define computer aided process planning. Explain retrieval type of process planning with the block representation. **(10 Marks)**

b. Define material requirement planning. Explain the inputs to MRP system with a block diagram. **(10 Marks)**

7 a. The top view of the component is shown in Fig.Q7(a). Write the complete part program with respect to absolute programming to mill the profile of the part. Part thickness is 10 mm and cutter dia is 10 mm. Assume suitable data.

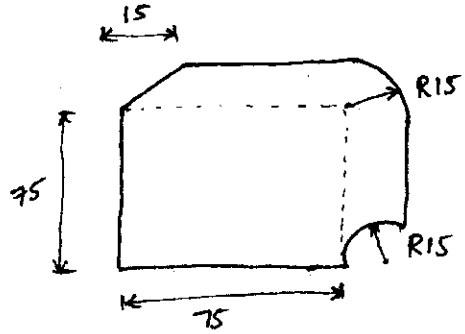

Fig.Q7(a) **(15 Marks)**

b. List the advantages and disadvantages of CNC machines. **(05 Marks)**

8 a. Define a robot. With neat sketches, explain the different geometrical configurations of a robot. **(10 Marks)**

b. Briefly explain the industrial applications of robots. **(10 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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 relationship between automation and computer integrated manufacturing. **(05 Marks)**

b. The parts produced in a batch manufacturing plant must be processed through an average of six machines. There are 20 new batches of parts launched each week. Other data are as follows:

Average operation time	: 6 minutes
Average set up time	: 5 hours
Average non-operation time	: 600 minutes
Average batch size	: 50 parts

There are 24 machines in the plant, and the plant operates 70 hours per week. Determine: i) Manufacturing lead time; ii) Plant capacity; iii) Work in progress; iv) Plant utilization. **(10 Marks)**

c. One million parts are to be manufactured in a plant which runs 6 hours per day, 5 days per week and 50 weeks per year. Calculate number of machines required to keep up the demand if the cycle time is 0.6 mins. Also calculate machine utilization. **(05 Marks)**

2 a. Discuss the reasons for implementing buffer storage. **(04 Marks)**

b. Distinguish between instantaneous control and memory control. **(04 Marks)**

c. Write a note on pallet fixture. **(04 Marks)**

d. The driver of a six slotted Geneva mechanism rotates at two RPM. Determine: i) Cycle time; ii) Available process time; iii) Indexing time and iv) Angle of rotation of drives for indexing. **(08 Marks)**

3 a. Derive a relation to compute production rate using lower-bound approach. **(05 Marks)**

b. A 10-station transfer machine has an ideal cycle time of 1 minute. Station breakdowns occur with a probability of F = 0.10 breakdowns/cycle. Average downtime is 5 minutes per line stop. Raw material for the component manufactured in this line costs Rs.150/unit and it costs Rs.100/ per min to operate the line. Cutting tools are estimated to cost Rs.15 per work part. Considering a scrap rate of 10%. Compute: i) Production rate; ii) Number of hours required to meet the demand of 1500 units/week; iii) Line efficiency and down time; iv) Cost per unit. **(15 Marks)**

4 a. The following list defines the precedence relationships and element times for a new product. Using ranked positional weight (RPW) method balance the line.

i) Construct precedence diagram.

ii) Calculate balance delay.

Assume an ideal cycle time of 10min. **(10 Marks)**

Element	1	2	3	4	5	6	7	8	9	10
Time Te (min)	5	3	8	2	2	6	4	5	3	6
Immediate predecessor	-	1	1	2	2	3	4 & 5	3 & 5	7 & 8	6 & 9

b. In a plant a product is assembled as per the follow data:

Element	1	2	3	4	5	6	7	8
Time Te(min)	10	5	8	3	11	3	5	15
Immediate predecessor	-	-	1, 2	2	3	3, 4	4	5, 6 & 7

Using largest candidate rule balance this assembly line.

i) Construct precedence diagram.

ii) Calculate balance delay if the ideal cycle time is 16 min. **(10 Marks)**

PART – B

5 a. An AGV has an average travel distance of 450m per delivery. The system must be capable of making 40 deliveries/hour. The following data specifies the performance requirement:

i) Vehicle velocity 150m/min

ii) Pick up time 45 seconds

iii) Drop-off time 45 seconds

iv) Average empty travel distance = 300m

v) Traffic factor 0.90.

Calculate number of AGVs needed to satisfy the delivery requirements and system efficiency. **(08 Marks)**

b. A 10-station in-line assembly machine has 6s ideal cycle time. The base part is automatically loaded prior to the first station and components are added at each station. The fraction defect rate at each of 10 stations is 0.01 and probability that a defect will jam is 0.5. When jam occurs average down-time is 2min. Determine average production rate, yield of good assemblies and uptime efficiency of the assembly machine. **(08 Marks)**

c. Briefly explain AGVs system management function. **(04 Marks)**

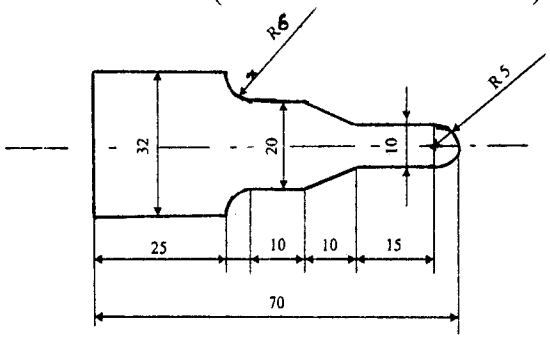
6 a. With a block diagram, explain the retrieval type computer aided process planning systems. **(10 Marks)**

b. With a block diagram explain the structure of bill of material for a product. **(06 Marks)**

c. List the MRP output reports. **(04 Marks)**

7 a. Write a part program for the component shown in Fig.Q.7(a). The program should be complete with comments for each block. (All dimensions are in mm). **(12 Marks)**

Fig.Q.7(a)



b. Briefly explain the following NC codes: i) G40, G41 and G42 ; ii) G70, G71 and G72. **(08 Marks)**

8 a. Draw a neat sketch of a TRL-TTR robot showing all six degrees of freedom and explain it briefly. **(08 Marks)**

b. Explain the terms: i) Spatial resolution, ii) Accuracy and iii) Repeatability with reference to precision of a robot. **(06 Marks)**

c. Differentiate between walk through and lead-through programming of a robot. **(06 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Computer Integrated Manufacturing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is automation? Explain different types of automation. **(08 Marks)**

b. Explain the following terms:
i) Manufacturing lead time ii) Production rate iii) Production capacity **(06 Marks)**

c. In a manufacturing plant a part is produced in a batch size of 60 units. The batch must be routed through 8 operations to complete it. Average set up time 5 hr/operation. Average operation time is 10 min. Average non-operation time is 7 hrs/operation. Determine:
i) Manufacturing lead time in number of days of the plant runs 8 hrs shift/day.
ii) Production rate of the plant. **(06 Marks)**

2 a. Explain the various methods of work part transport in an automated flow line. **(09 Marks)**

b. What are the symbols used in an automated flow line? **(05 Marks)**

c. Sketch and explain the linear walking beam mechanism. **(06 Marks)**

3 a. Explain the upper bound approach and lower bound approach in analyzing transfer lines, without storage buffer. **(08 Marks)**

b. Discuss the starving and blocking of stations with respect to an automated flow line. **(04 Marks)**

c. The ideal cycle time of an 16 station transfer line is 1.4 min. The average down time per line will be 6 min and the probability of breakdowns per cycle is equal for all cycles and is equal to 0.004. Determine production rate and line efficiency by considering both upper bound and lower bound approaches. **(08 Marks)**

4 a. Explain the following terms with respect to line balancing:
i) Cycle time ii) Precedence constraints
iii) Precedence diagram iv) Balance delay **(08 Marks)**

b. What are the objectives of line balancing? **(06 Marks)**

c. Explain with an example, the largest candidate rule method of line balancing. **(06 Marks)**

PART – B

5 a. Discuss the principles used in product design to facilitate automated assembly. **(06 Marks)**

b. With neat figures, explain the elements of part delivery system. **(06 Marks)**

c. Discuss the functions that are performed while operating AGVS. **(08 Marks)**

6 a. With the help of a block diagram, explain retrieval CAPP systems. **(08 Marks)**

b. Explain the structure of MRP system. **(08 Marks)**

c. Briefly explain the capacity planning. **(04 Marks)**

7 a. Describe salient features of CNC systems. **(10 Marks)**

b. Discuss the advantages and disadvantages of CNC systems. **(10 Marks)**

8 a. With neat sketches, discuss the common robot configurations. **(12 Marks)**

b. Explain resolution, accuracy and repeatability, as applied to robot. **(08 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, June/July 2013
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. What do you mean by automation? With suitable examples, distinguish between fixed and programmable automation. **(09 Marks)**

b. Discuss briefly the arguments in favour of automation. **(05 Marks)**

c. A production machine is operated 65 hr/week at full capacity, its production rate is 20 units/hour. During a certain week, the machine produced 1000 good parts and was idle in the remaining time.

i) Determine the production capacity of machine.

ii) What was the utilization of the machine during the week under consideration? **(06 Marks)**

2 a. Enlisting the objectives of automated flow lines, Discuss the two configurations used in practice. **(08 Marks)**

b. Explain three main functions that are utilized to control the operation of an automatic transfer system. **(07 Marks)**

c. Differentiate between intermittent verses power and free transfer methods of transport. **(05 Marks)**

3 a. A 20 station transfer line is divided into two stages of stations and each has an ideal cycle time of 1.2 mins. The probability of station breakdown per cycle is equal for all stations and P = 0.005 breakdowns/cycle downtime constant Td = 8.0 min compute the following for the buffer capacities: b = 0 and b = ∞.

i) Frequency of line stop per cycle.

ii) Average actual production rate.

iii) Line efficiency. **(08 Marks)**

b. What is the purpose of buffer storage? Mention two extreme cases of buffer effectiveness in automated flow lines. **(04 Marks)**

c. What are the two reasons for partial automation? Analyze the performance of partial automation along with suitable assumptions. **(08 Marks)**

4 a. Explain with mathematical expressions, different terms in line balancing. **(04 Marks)**

b. With suitable example explain the method of computing balance delay using KILBRIDGE and WESTER method and ranked positional weight method. **(16 Marks)**

PART – B

5 a. Explain different types of automated assembly system based on physical configuration. **(08 Marks)**

b. Explain briefly the automated guided vehicle system (AGV's). **(05 Marks)**

c. Explain briefly the recommendations and principles that can be applied in product design to facilitate automated assembly. **(07 Marks)**

6 a. With a neat sketch, explain variant CAPP system. **(07 Marks)**

b. List out the benefits of CAPP. **(05 Marks)**

c. What do you mean by MRP? What are the MRP outputs and benefits? **(08 Marks)**

7 a. Describe the salient features of CNC systems. **(10 Marks)**

b. Discuss the classification of CNC machine tools, with block diagrams. **(10 Marks)**

8 a. With a neat sketch, explain the common robot configurations. **(12 Marks)**

b. Explain four types of programming methods. **(08 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, June/July 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. Define automation. Explain different types of automation system with examples. **(10 Marks)**

b. Explain the terms: i) Utilization; ii) Manufacturing lead time **(04 Marks)**

c. The average part produced in a certain batch manufacturing plant must be processed through an average of 6 machines. There are 20 new batches parts launched each week. Data for the average problem are as follows:

Average operation time = 6 min
Average setup time = 5 hours
Average non-operation time = 10 hours
Average batch size = 25 parts

There are 18 machines in the plant. The plant operates an average of 70 hours/week. Determine: i) Manufacturing lead time, ii) Plant capacity, iii) Plant utilization. **(06 Marks)**

2 a. What are the symbols used in an automated flow line? **(05 Marks)**

b. Sketch and explain the following work part transfer mechanism:
i) Linear walking beam
ii) Geneva wheel
iii) Dial indexing machine **(15 Marks)**

3 a. In a eleven (11) station transverse line the probability of station breakdowns will occur for a given work part is equal to 0.02. This probability is same for all the 11 stations. Determine the frequency line stop/cycle on this flow line using upper bound approach and lower bound approach with an average production time = 1.6 min. Determine production rate. **(10 Marks)**

b. What is the purpose of buffer storage? State its effectiveness in automated flow line. **(06 Marks)**

c. Write a short note on partial automation. **(04 Marks)**

4 a. A project has the following tasks. Its immediate predecessor and the task times are given below. Using largest candidate rule balance the line and determine:
i) Number of work stations ii) Balance delay of line iii) Line efficiency.
Take T_c = 1 min.

Tasks	1	2	3	4	5	6	7	8	9	10	11	12
Preceded by	-	-	1	1, 2	2	3	3	3, 4	6, 7, 8	5, 8	9, 10	11
T_e (min)	0.2	0.4	0.7	0.1	0.3	0.11	0.32	0.6	0.27	0.38	0.5	0.12

(12 Marks)

b. Explain the following terms in line balancing;
i) Minimum rotational work element.
ii) Total work content time
iii) Cycle time
iv) Line efficiency. **(08 Marks)**

PART – B

5 a. Explain the design for automated assembly system. **(07 Marks)**
b. Explain with a neat sketch the elements of part feeding device. **(08 Marks)**
c. List the applications of AGVs. **(05 Marks)**

6 a. With a neat sketch explain retrieval 'CAPP' system. **(10 Marks)**
b. What is a material requirement planning? Explain various inputs and outputs to MRP system. **(10 Marks)**

7 a. Describe the advantages, disadvantages and applications of CNC machine tools. **(10 Marks)**
b. Explain the fundamental steps involved in development of part programming for milling and turning. **(10 Marks)**

8 a. Explain with sketches the common robot configuration. **(10 Marks)**
b. Explain the following:
i) Work volume
ii) Precision of movement
iii) End effectors in robots
iv) Repeatability **(10 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, June/July 2015
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 the different types of automation. **(08 Marks)**

b. Explain the following automation strategies :
i) Specialization of operator ii) Online Inspection. **(04 Marks)**

c. The parts produced in a certain batch has to be processed through an average of 6 machines. There are 20 new batches of parts launched each week. Other data as follows :
i) Average operation time = 0.1 Hr ; ii) Average setup time = 5 Hr ;
iii) Average non – operation time = 10 Hr ; iv) Average Batch size = 25 parts.
There are 18 work centers in the plant and the plant operates for an average of 70 production Hr/week. Determine i) Manufacturing lead time ii) Plant capacity iii) Production rate iv) Plant utilization. **(08 Marks)**

2 a. Explain Synchronous transfer method and Asynchronous transfer method of work transport in automation. **(08 Marks)**

b. Explain with neat sketches, the following transfer mechanisms :
i) Walking beam transfer bar system ii) Geneva mechanism. **(12 Marks)**

3 Explain the following related to analysis of an automated flow lines :
a. Partial automation.
b. Lower bound approach.
c. Upper bound approach.
d. Effect of storage. **(20 Marks)**

4 a. Explain the following terms related to line balancing : **(06 Marks)**
i) Total work context time ii) Assembly line balance iii) Line balancing.

b. The table below defines the precedence relationships and elements times for a new model :
i) Construct the precedence diagram
ii) If the Ideal time = 1 min
iii) Use Kilsridge and Westers method to assign the work station to each element and compute the balance delay and line efficiency. **(14 Marks)**

Work element	1	2	3	4	5	6	7	8	9	10	11	12
Te(min)	0.25	0.45	0.35	0.4	0.32	0.2	0.27	0.7	0.6	0.38	0.5	0.43
Preceded by	-	1	1	1	2	2,3	4	4	5	6,7	8	9,10,11

PART – B

5 a. List the principles used in product design for automated assembly. **(06 Marks)**

b. With a neat sketch, explain elements of parts delivery system. **(08 Marks)**

c. Define AGVS. List the advantages and applications of AGVS. **(06 Marks)**

6 a. With a block diagram, explain variant CADD system. **(10 Marks)**
b. What is Material requirement? Explain the structure of a MRP system. **(10 Marks)**

7 a. Discuss the advantages and disadvantages of CNC systems. **(10 Marks)**
b. Explain the fundamental steps involved in part programming for turning and milling. **(10 Marks)**

8 a. Explain the different configuration of robot, with neat sketches. **(12 Marks)**
b. Explain the following terms related to robots :
i) End effectors ii) Programming methods. **(08 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, June/July 2016
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. What are the different reasons for industrial automation? How do you classify automated manufacturing systems? List typical features of them. **(12 Marks)**

b. A part is produced in a batch size of 100 units. 5 operations are required to complete the processing of the part. Average setup time is 3 hours/operation, average operation time is 0.1 hour. Delay, inspection time & others account to 7 hours for each operation. Determine how many days are required to complete the batch, assuming the plant runs 8 hours shift per day. **(05 Marks)**

c. Define MLT, utilization and availability. **(03 Marks)**

2 a. With a neat sketch, explain the configuration of an automated flow line. What are the different symbols and notations practiced in production systems? **(08 Marks)**

b. Explain with neat diagram the working principle of walking beam system. **(08 Marks)**

c. What are the different controlling functions of an automated flow line? Explain. **(04 Marks)**

3 a. Explain the following :
i) Upper bound approach and lower bound approach
ii) Starting and Blocking of stations **(08 Marks)**

b. A line has 10 workstations, each with a probability of breakdown 0.02. The cycle time of line is 60 seconds and each time breakdown occurs, it takes 5 minutes to repair. The line is divided into two stages by a buffer storage. Each stage consists of 5 stations. Compute efficiency of the line with no buffer storage capacity and efficiency for two stage flow lines. **(10 Marks)**

c. What are the factors affecting line balancing? **(02 Marks)**

4 a. Write a short note on the following :
i) Precedence constraints & precedence diagram ii) Line efficiency iii) Balance delay. **(08 Marks)**

b. The demand of the assembly line with its elemental time and precedence is as given below. Construct the precedence diagram and find balance delay by Kilbridge and Wester's method. (Cycle time = 1.5 minute) **(12 Marks)**

Elements	Time (Minutes)	Immediate Predecessor
1	1	-
2	0.5	-
3	0.8	1, 2
4	0.3	2
5	1.2	3
6	0.2	3, 4
7	0.5	5
8	1.5	5, 6, 7

PART – B

5 a. With neat sketch, explain part feeding and delivery systems. **(10 Marks)**

b. Briefly explain different types of vehicle guiding systems used for AGVs. **(10 Marks)**

6 a. With a neat diagram, explain generative and retrieval CAPP systems. **(12 Marks)**

b. Define MRP process inputs and outputs. What do you mean by BOM? **(08 Marks)**

7 a. Give general configuration of a CNC system. List various advantages and disadvantages of CNC machining centers. **(08 Marks)**

b. Discuss various types of NC co-ordinate systems along with motion control systems. **(10 Marks)**

c. Describe the following codes:
i) G_{00} ii) G_{90} iii) G_{02} iv) G_{04} **(02 Marks)**

8 a. Define Industrial Robot. Enlist the different applications of Robot. **(06 Marks)**

b. How do you specify a robot? **(04 Marks)**

c. Explain with neat sketches different types of end-effectors, sensors used in robot. **(10 Marks)**

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10ME61

Sixth Semester B.E. Degree Examination, June/July 2017
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 and CIM with the aid of conceptual model of manufacturing. **(06 Marks)**

b. Briefly explain the various "Automation Strategies" that can be adopted to improve the productivity. **(10 Marks)**

c. Define the term plant capacity with a mathematical relation. **(04 Marks)**

2 a. The average part produced in a certain batch manufacturing plant must be processed through an average of 8 machines. 20 new batches are launched each week. Operating time is 8 min, average setup time is 8 hrs, batch size is 30 units, average non-operation time is 15 hr/machine. Number of machines available in the plant is 20. The plant operates on an average of 80 production hrs/week. Determine
(i) MLT (ii) R_P (iii) PC (iv) U (v) WIP (vi) WIP ratio (vii) TIP ratio. **(10 Marks)**

b. Illustrate the configuration of an automated flow line. **(04 Marks)**

c. With the aid of sketches, explain any two rotary transfer mechanisms. **(06 Marks)**

3 a. Analyze the flow line performance by means of three basic measures. **(06 Marks)**

b. Explain the limits of storage buffer effectiveness. **(04 Marks)**

c. A 20 station line is divided into 2 stages of 10 stations each. The ideal cycle time of each stage is 1.2 min. All the stations in the line have the same probability of stoppage equal to 0.005. When breakdown occurs, it takes an average of 8 min, using the upper bound approach, compute the flow line efficiency for the following buffer capacity
(i) b = 0, (ii) b = ∞, (iii) b = 10, (iv) b = 100. **(10 Marks)**

4 a. Write a note on: (i) Precedence diagram (ii) Minimum rational work element. **(04 Marks)**

b. Explain Kilbridge and Wester's method. **(06 Marks)**

c. The precedence relationships and element time for a new model toy are as follows:

Element	T_e min	Immediate precedence
1	0.5	-
2	0.3	1
3	0.8	1
4	0.2	2
5	0.1	2
6	0.6	3
7	0.4	4, 5
8	0.5	3, 5
9	0.3	7, 8
10	0.6	6, 9

Using largest candidate rule method, compute (i) Number of stations required (ii) Balance delay, if the ideal cycle time is 1.0 minute. **(10 Marks)**

PART – B

5 a. Indicate the classification of an automated assembly system. **(04 Marks)**

b. Illustrate the elements of part delivery system at an assembly station. **(08 Marks)**

c. List the types of AGV's and write a note on vehicle guidance technology adopted to AGV's. **(08 Marks)**

6 a. Indicate the benefits of CAPP and explain retrieval type CAPP. **(12 Marks)**

b. What are the inputs required for carrying out an efficient MRP? Explain. **(08 Marks)**

7 a. What are NC words? Explain. **(08 Marks)**

b. Differentiate between absolute and incremental coordinate system. **(04 Marks)**

c. Write a manual part program to drill 5 holes of ϕ15 mm for the shown part in Fig.Q7(c). The plate size is 100×100×20 mm. Assume suitable data. **(08 Marks)**

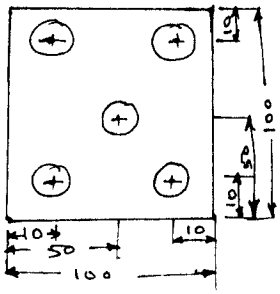

Fig.Q7(c)

8 a. With suitable sketches explain the different robot physical configurations. **(08 Marks)**

b. Explain the following :

(i) Robot anatomy

(ii) Precision of movement

(iii) Programming of robot. **(12 Marks)**

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