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06ME72

Seventh Semester B.E. Degree Examination, May/June 2010
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 do you mean by automation? Explain different types of automation. **(10 Marks)**

b. Explain the following terms:
i) Manufacturing lead time ii) Production rate iii) Production capacity. **(10 Marks)**

2 a. With suitable examples, explain the methods for work-part transport on a flow line. **(10 Marks)**

b. Sketch and explain the following transfer mechanisms:
i) Roller chain drive mechanism ii) Geneva wheel mechanism. **(10 Marks)**

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

b. Give your conclusion on the basis of cost calculations, whether the performance of 12 station transfer line having 4 manual and 8 automated stations can be improved by replacing bottleneck manual station with an automated station. Cost data for the existing line:
i) C_m – Rs.0.65/unit ii) T_c – 40 seconds iii) C_o – Rs. 0.25/min
iv) C_{as} – Rs.0.35/min ii) C_{at} – 0.30/min vi) C_t – Rs. 0.15/min
The proposed automated stations would allow the cycle time to be reduced to 32 seconds with added cost of Rs.0.40/min. Probability of breakdown for 8 stations, p = 0.01 and estimated probability for new automated station p = 0.02 with downtime of 3 minutes, which is unaffected. **(12 Marks)**

4 a. Explain the following:
i) Work station process time ii) Cycle time iii) Precedence diagram iv) Balance delay. **(08 Marks)**

b. The following table defines the precedence relationship & element times in an assembly line.

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

i) Construct the precedence diagram ii) Use the largest candidate rule to assign work elements to stations. What is the balance efficiency for the solution? **(12 Marks)**

5 a. Explain with sketches, the elements of the parts delivery system for an automated assembly line. (10 Marks)

b. Explain the approach for the quantitative analysis of AGV systems. (10 Marks)

6 a. Briefly explain:
i) Retrieval CAPP system.
ii) Generative CAPP system (10 Marks)

b. Discuss the fundamental concepts and inputs of a MRP system. (10 Marks)

7 a. Define CNC. Explain with a neat sketch, the elements of CNC. (10 Marks)

b. What are the fundamental steps involved in the development of part programming for milling? (10 Marks)

8 a. What do you understand by robotics? Explain with a neat figure, the robot configuration. (10 Marks)

b. Briefly explain the different steps of robot programming. (10 Marks)

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ME766/II

Seventh Semester B.E. Degree Examination, May / June. 08
Computer Integrated Manufacturing

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. With the help of a block diagram, explain the construction and business functions of CIM (10 Marks)

b. Define the following terms with mathematical expressions. i) Manufacturing Lead Time ii) Production Rate iii) Capacity of production iv) Work in process v) Utilization and availability. (10 Marks)

2 a. Describe the structure and various activities of generative CAPP system. (10 Marks)

b. State and explain any four benefits of CAPP systems. (10 Marks)

3 a. Name and explain the fundamental concepts of material requirement planning with the help of a flow chart. (10 Marks)

b. Explain the features of capacity planning with respect to the following : i) Short term adjustments ii) Long term adjustments iii) Technological evolutions (10 Marks)

4 a. Explain the steps involved in machine vision technique of automated inspection with a block diagram. (10 Marks)

b. With the help of a flow chart, explain three phases of shop floor control system. (10 Marks)

5 a. Sketch and explain any two types of work transfer mechanisms. (10 Marks)

b. Mention the steps involved in the following methods of line balancing and explain them. i) Largest candidate rule ii) Kilbridge and Wester's method. (10 Marks)

6 a. Explain the following terms : i) Upper bound approach ii) Lower bound approach iii) Partial automation. (10 Marks)

b. A 10 station transfer machine is to produce a component. It is estimated ideal cycle time of one minute and breakdown occurs at 0.10 breakdown/cycle. Average downtime per line stop is 6 minutes. The scrap rate for processing is 5 percent. The starting casting for the components costs 1.5 dollar each and it will cost 60 dollar per hour or 1 dollar per minute to operate the transfer line. Cutting tools are estimated to cost 0.15 per work part (dollars). Compute i) Production rate ii) Number of hours required to meet a demand of 1500 units per week. iii) Line efficiency iv) Cost per unit produced. (10 Marks)

7 a. State and explain five applications of automatically guided vehicles. (10 Marks)

b. Explain the working of automatically guided vehicles by the following methods. i) Frequency select method ii) Path switch select method. (04 Marks)

c. Define the following terms with respect to AGV . i) Acquisition distance ii) Dead reckoning iii) Unit load carriers. (06 Marks)

8 a. Explain the construction and working of various escapements and placement devices in automated assembly systems. (10 Marks)

b. The cycle time for a given assembly work head is 0.2 min. The part feeder has a feed rate of 20 components per minute. The probability that given component fed by the feeder will pass through selector is 0.3. The number of parts in the feed track corresponding to lower level sensor is 6. Feed track capacity is 18 parts. Determine

i) How long it will take for the supply of parts in the feed track to go form low level sensor to feed track capacity?

ii) How long it will take on average for the supply of parts? (10 Marks)

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ME766/IP765

Seventh Semester B.E Degree Examination, Dec. 07 / Jan. 08
Computer Integrated Manufacturing

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Define Automation. With an example, explain different types of Automation systems in use. (10 Marks)

b. Why present conventional manufacturing industry is to be automated? Explain with specific reasons. (10 Marks)

2 a. Explain the following with necessary equations : i) Manufacturing Lead Time ii) Capacity iii)Work in process. (12 Marks)

b. Explain different types of control functions used in automated flow line. (08 Marks)

3 a. Explain the upper - bound and lower – bound approach with reference to automated flow line. (10 Marks)

b. An eight station rotary indexing machine operates with an ideal cycle time of 20 seconds. The frequency of line stop occurrences is 0.06 stop/cycle on the average. When a stop occurs, it takes an average of 3 min to make repairs. Determine the following.
i) Average production time. T_p ii) Average production Rate, R_p iii) Line efficiency . E iv) Proportion of down time. (10 Marks)

4 a. The following lists, define the procedure relationships and element times for a new model toy. (12 Marks)

Element →	1	2	3	4	5	6	7	8
Te (min) →	1.0	0.5	0.8	0.3	1.2	0.2	0.5	1.5
Immediate Predecessors →	-	-	1.2	2	3	3,4	4	5,6,7

i) Construct the precedence diagram for this job.
ii) If the ideal cycle time is to be 1.5 min, what is the theoretical minimum number of stations required to minimize the balance delay?
iii) Compute the balance delay.

b. What do you mean by partial automation in a general automated flow line? Explain with necessary mathematical equations. (08 Marks)

5 a. Explain with examples, different types of automated assembly systems. (12 Marks)

b. Explain the following with reference to parts feeding devices of automated assembly systems. i) Hopper ii) Selector and orientor iii) Escapement and placement devices (08 Marks)

6 a. Explain the traffic control and safety systems used in AGV's for automated manufacturing systems. (08 Marks)

b. With a flow chart, explain Retrieval CAPP systems. (06 Marks)

c. List and explain the fundamental concepts in MRP. (06 Marks)

7 a. List the different automatic identification systems and explain any one in detail. (10 Marks)

b. What do you mean by CMM? Explain any one CMM construction with neat sketch (10 Marks)

8 Write short notes of the following:
a. Capacity planning
b. Data collection systems
c. Contact inspection methods.
d. Output reports in MRP. (20 Marks)

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ME766/IP765

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NEW SCHEME

Seventh Semester B.E. Degree Examination, May 2007
ME / IP
Computer Integrated Manufacturing

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. List various automation strategies and indicate the probable effects of each strategy on the parameters of production concepts. **(10 Marks)**

b. What do you understand by an automated flow line? Explain with the help of a neat sketch and also list the objectives of an automated flow line. **(10 Marks)**

2 a. Differentiate between upper bound approach and lower bound approach. **(06 Marks)**

b. For a 12 station in-line transfer machine p = 0.01 (all stations have an equal probability of failure), T_c = 0.5 min, T_d = 4.0 min.
Using upper bound approach, compute the following:
i) The frequency of line stops ii) Average production iii) Line efficiency. **(06 Marks)**

c. Discuss about the limits of storage buffer effectiveness. **(08 Marks)**

3 a. Explain with mathematical expressions, different terms in line balancing. **(10 Marks)**

b. The precedence relationships and element times for a new model toy are as follows:

Element	T_e min	Immediate predecessors
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 Kilbridge and Wester method, compute:
i) Number of stations required ii) Balance delay,
if ideal cycle time is 1.0 minute. **(10 Marks)**

4 a. Draw neat sketches of various escapement and placement devices used in automatic assembly systems. **(10 Marks)**

b. An eight station assembly machine has an ideal cycle time of 6 seconds. The fraction defect rate at each of the 8 stations is q = 0.015 and the system operates using instantaneous control strategy. When a jam occurs average down time is 1 minute. Determine production rate of the assembly machine, the yield of good products (Final assemblies with no defective components) and proportion uptime of the system. **(10 Marks)**

Contd.... 2

5 a. Enumerate principles of material handling. (10 Marks)
b. Explain different application categories of automated guided vehicle systems. (10 Marks)

6 a. What do you understand by process planning? Explain retrieval CAPP system with the help of a block diagram. (10 Marks)
b. Discuss about the benefits of CAPP. (10 Marks)

7 a. What is MRP? Discuss fundamental concepts in MRR. (06 Marks)
b. Describe inputs to the MRP system. (08 Marks)
c. List automatic identification systems and explain any two. (06 Marks)

8 Write short notes on any four:
a. Non Contact Inspection methods
b. CMM
c. Factory data collection system
d. Computer aided quality control
e. Argument against automation. (20 Marks)

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ME766 / IP765

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NEW SCHEME

Seventh Semester B.E. Degree Examination, Dec.06/Jan. 07
Mechanical Engineering
Computer Integrated Manufacturing

Time: 3 hrs.] [Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain computer integrated manufacture system with block diagram. (08 Marks)

b. Explain the following : i) Automation ii) Production concepts and mathematical model (12 Marks)

2 a. Define automated flow line. Explain with the objectives of the use of flow line automation. (08 Marks)

b. What is meant by methods of WORK PART TRANSPORT and Transfer Mechanism? Classify and explain each with one example. (12 Marks)

3 a. Discuss advantages and disadvantages of transfer lines, with storage and without storage with examples. (12 Marks)

b. A proposal has been made to replace one of the current manual stations with an automated work head on a 10 – station transfer line. The current system has six automated work heads and four manual stations. The current cycle time is 305. The bottle neck station is the manual station that is the candidate for replacement. The proposed automatic station would allow the cycle time to be reduced to 245. The New Station costs at Rs 25/min. Other cost data for the existing line. C_o = Rs 15/min, C_{as} = Rs 10/min , C_{at} = Rs 10/min. Break down time occurs at each of the six automatic stations with probability P = 0.01. The average down time per break down is 3 min. It is estimated that the value of P for the new automatic station would be P = 002. The average down time for the line would be unaffected. Material for the product cost Rs 50/unit. Tooling costs can be neglected (C_f = 0). It is desired to compare the challenger (the New Automated station) on the basis of cost per unit. (08 Marks)

4 a. Discuss the merits and demerits of automated assembly lines over manual assembly lines. (10 Marks)

b. Explain the types of automated assembly systems in detail. (10 Marks)

5 a. What are the basic principles to be considered in Automated Material Handling? (10 Marks)

b. What are the automated guided vehicles? Explain principle of working, write any two applications AGVS. (10 Marks)

6 a. What is meant by MRP? Explain how CAD/CAM and automation help in improving MRP. (10 Marks)

b. What is meant by capacity planning? How does a computer help in achieving a better capacity planning? Explain with an example. (10 Marks)

7 a. Classify the computer aided process planning techniques. Discuss their merits and demerits. What are their application areas? (12 Marks)

b. What are the inputs required for carrying out an efficient materials resource planning? (08 Marks)

8 a. Write in brief about data collection system and types of automated identification systems. (10 Marks)

b. How does the co-ordinate measuring machine help in carrying quality inspection? (10 Marks)

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NEW SCHEME

Seventh Semester B.E. Degree Examination, May / June 2006
Mechanical / Industrial Production Engg.
Computer Integrated Manufacturing

Time: 3 hrs.] [Max. Marks:100

Note: ***1. Answer any FIVE questions out of Eight questions.***
2. Missing Data may suitably be assumed.
3. Write neat sketches / flow charts wherever necessary.

1 a. Define clearly CAD, CAM, CIM and Automation. **(04Marks)**

b. Discuss a production system and explain in depth, as to how it can be automated with a CIM system. **(10Marks)**

c. Enumerate the different types of Automation strategies. **(06Marks)**

2 a. The average part produced in a certain Batch manufacturing plant must be processed through an average of 6 machines. 20 new batches of parts are launched each week. Average Operation time = 6 min, Average setup time = 5 Hrs. Average Batch size = 25 parts, Average Non operation time per Batch = 10 Hrs, There are 15 machines in the plant, and the plant operates an average of 70 production Hrs per week. Neglecting scrap rates determine the following.

i. The MLT for an average plant.
ii. The Plant capacity.
iii. The Plant Utilization and
iv. Explain how the non operation time to be affected by the plant utilization.

(12Marks)

b. Enlisting the objectives of Automated flow lines, discuss the two configurations used in practice. **(08Marks)**

3 a. Discuss the three basic measures used for flow line performance analysis with mathematical relations. **(08Marks)**

b. A 10 station transfer machine used for producing pump component has an ideal cycle time $T_c = 1.0$ min, with an estimated breakdowns of all types occurring with a frequency of F=0.10 Breakdown / cycle and an average down time per line stop is 6.0 min. The scrap rate for the current conventional method is 5% and is considered a good estimate for the transfer line. The starting casting for the component costs Rs 75=00 each and it will cost Rs 3000 / Hr to operate the transfer line. Cutting tools are estimated to cost Rs 7:50 / work part. Using these data compute the following measures of line performance. i. Production rate ii. Number of Hours required to meet demand of 1500 units / week. iii. Line efficiency and iv. Cost per unit produced. **(12Marks)**

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4 a. Discuss the three manual methods of line Balancing. **(12Marks)**

b. A manual assembly line is to be designed with a production rate of 100 complete assemblies per hour. The line will have eight stations and the length of each station is 1.0 m. The minimum allowable tolerance time is to be 2.0 min. If the line is figured to have an uptime efficiency of 97 % (estimated from previous similar lines) determine the following parameters for the line. i. Ideal cycle time T_c , ii. Conveyor speed V_c, iii. Feed rate f_p and iv. Part spacing S_p, along the belt. **(08Marks)**

5 a. Discuss the different types of Automated Assembly Systems. **(08Marks)**

b. Explain the parameters involved in the measures of performance of an assembly machine. **(06Marks)**

c. A 10 station in line assembly machine has a 6 – S ideal cycle time, The base part is automatically loaded prior to the first station, and components are added at each of the stations. The fraction defect rate at each of the 10 stations is q = 0.01, and the probability that a defect will jam is m = 0.5. When a jam occurs, the average down time is 2 min. Determine the average production rate, the yield of good assemblies, and the uptime efficiency of the assembly machine. **(06Marks)**

6 a. Discuss the two basic approaches in CAPP systems. **(10Marks)**

b. Explain MRP by discussing clearly the input files to the MRP processor and the Output reports to be generated by the MRP program. **(10Marks)**

7 a. Explain with suitable flow charts a typical shop floor control system highlighting the three phases involved in it. **(12Marks)**

b. Discuss the various technologies available for use in Automatic Identification systems. **(08Marks)**

8 a. Discuss any two contact inspection methods. **(10Marks)**

b. Explain the operation of a machine vision system with suitable sketches. **(10Marks)**

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NEW SCHEME

ME766/IP765

Reg. No. | | | | | | | | | | |

Seventh Semester B.E. Degree Examination, January/February 2006

ME/IP

Computer Integrated Manufacturing

Time: 3 hrs.) (Max.Marks : 100)

Note: ***Answer any FIVE full questions.***

1. (a) Define automation. Discuss the different strategies for introducing automation in a manufacturing environment. **(10 Marks)**

   (b) Discuss the different types of control of an automated buffer storage system. **(10 Marks)**

2. (a) Discuss the merits and demerits of transfer lines with storage and without storage with examples. **(12 Marks)**

   (b) Discuss the scope for introducing partial automation in a manufacturing environment. Discuss its impact on productivity aspects with examples. **(8 Marks)**

3. (a) Discuss briefly manual methods of line balancing. **(10 Marks)**

   (b) Discuss the functions of automated manufacturing planning. **(10 Marks)**

4. (a) Discuss the advantages of automated assembly lines over manual assembly lines with examples. **(10 Marks)**

   (b) Discuss the functions of assembly systems in detail. **(10 Marks)**

5. (a) Illustrate the typical automated materials handling system with a line sketch. **(10 Marks)**

   (b) Discuss the principle of working of automated guided vehicles. **(10 Marks)**

6. (a) Discuss the basic concepts of material resource planning ? How does automation help in a better MRP system. **(10 Marks)**

   (b) How does computer help in achieving a better capacity planning. Discuss with examples. **(10 Marks)**

7. (a) What are the different types of computer aided process planning techniques ? Discuss their merits and demerits. What are their applications areas? **(12 Marks)**

   (b) What are the inputs required for carrying out an efficient material resource planning? **(8 Marks)**

8. (a) Discuss the influence of automation for achieving a better shop floor control. **(10 Marks)**

   (b) Discuss the importance of coordinate measuring machine in ensuring quality in inspection **(10 Marks)**

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