Part j	Part Mix pj	Operation k	Description	Station i	Process time t_{ijk}
B	0.4	1	Load	1	3
		2	Mill	2	15
		3	Drill	3	30
		4	Unload	1	2
C	0.2	1	Load	1	3
		2	Mill	2	14
		3	Drill	3	22
		4	Unload	1	2

Or

(b) (i) How far the AGVs advantageous over other material handling systems? (5)

(ii) Discuss the AGVs pallet trucks with its application. (5)

(iii) Explain Vehicle Guidance technology. (6)

15. (a) (i) Sketch following manipulator configurations. (12)

(1) TRT: R

(2) TVR: TR

(3) RR: T

(ii) Discuss about SCARA Robot. (4)

Or

(b) (i) Explain the various robotic applications. (8)

(ii) Comment on repeatability and accuracy in robotics. (8)

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

Question Paper Code : 72171

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh/Eighth Semester

Mechanical Engineering

ME 6703 – COMPUTER INTEGRATED MANUFACTURING SYSTEMS

(Common to Mechanical and Automation Engineering, Robotics and Automation Engineering)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the factors that lead to the evolution of CIM?
2. Illustrate the components of an automated system with simple sketch.
3. Comment on the output of aggregate production planning.
4. List the basic steps in developing a process plan.
5. How the part families are identified?
6. What are the problems in implementing Group Technology?
7. List the four tests for flexibility in FMS research.
8. What are the applications of AGVS?
9. Classify the Robot control systems.
10. Differentiate between world and tool coordinate system in robotics with simple sketch.

PART B — (5 × 16 = 80 marks)

11. (a) (i) The average part produced in a certain batch manufacturing plant must be processed through an average six machine. Twenty (20) new batches of parts are launched each week. Average operation time = 6 min, average setup time =5 hr, average batch size = 25 parts and average non operation time per batch= 10 hr/machine. There are 18 machines in the plant. The plant operates an average of 70 production hours per week. Scrap rate is negligible. Determine (1) manufacturing lead time for an average part, (2) plant capacity (3) plant utilization (4) How would you expect the non operation to be affected by the plant? (4×3=12)

(ii) Name the various levels of automation. (4)

Or

(b) (i) Examine job shop production and mass production. (6)

(ii) Demonstrate the significance of JIT philosophy. (6)

(iii) Discuss about pull type KANBAN system. (4)

12. (a) Illustrate notes on the following.

(i) Phases of shop floor control. (8)

(ii) Aggregate production planning. (4)

(iii) MRP-II. (4)

Or

(b) (i) Distinguish the features of variant and generative CAPP systems. (8)

(ii) What are the criteria for Selection of CAPP systems? (3)

(iii) Define process planning. What are the activities associated with it? (5)

13. (a) (i) Analyze the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Components are identified by letters, and machines are identified numerically. (10)

Machine	Components						
	A	B	C	D	E	F	G
M1		1		1			
M2			1		1		
M3	1	1		1			1
M4	1		1			1	
M5			1	1	1	1	

(ii) Suppose that four machines, 1,2,3, and 4 have been identified as belonging in a GT machine cell. An analysis of 50 parts processed on these machines has been summarized in the From-To chart presented below. Additional information is that 50 parts enter the machine grouping at machine 3, 20 parts leave after processing at machine 1, and 30 parts leave after machine 4. Determine a logical machine arrangement using hollier method. (6)

From-To Chart

To :		1	2	3	4
From :	1	0	5	0	25
	2	30	0	0	15
	3	10	40	0	0
	4	10	0	0	0

Or

(b) Describe the followings.

(i) Opitz coding system. (12)

(ii) Composite part concept. (4)

14. (a) A flexible manufacturing cell has just been created. After considering a number of designs, the system engineer chose a layout that consists of two machining workstations plus a load/unload station. In detail, the layout consists of : The load/unload station is station 1. Station 2 performs milling operations and consists of one server (one CNC milling machine) Station 3 has one server that performs drilling (one CNC drill press). The three stations are connected by a part handling system that has one work carrier. The mean transport time in the system is 4 min. The FMC produces three parts, A, B, and C. The part mix fractions and process routings for the three parts are presented in the table below. The operation frequency $fijk$ = 1.0 for all operations. Determine (i) maximum production rate of the FMC, (ii) Corresponding production rates of each product(iii) utilization of each machine in the system, and (iv) number of busy servers at each station. (16)

Part j	Part Mix pj	Operation k	Description	Station i	Process time t_{ijk}
A	0.4	1	Load	1	3
		2	Mill	2	20
		3	Drill	3	12
		4	Unload	1	2

Reg. No. :

Question Paper Code : 41421

30/04/18 AN

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh/Eighth Semester
Mechanical Engineering
ME 6703 – COMPUTER INTEGRATED MANUFACTURING SYSTEMS
(Common to Mechanical and Automation Engineering/Robotics and Automation Engineering)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is the difference between CAD/CAM and CIM ?
2. What is concurrent engineering ?
3. What is a reorder point system in inventory control ?
4. What is Enterprise Resource Planning (ERP) ?
5. What are production conditions under which group technology and cellular manufacturing are most applicable ?
6. What is the application of the rank order clustering ?
7. What are the three capabilities that a manufacturing system must possess in order to be flexible ?
8. What are the difference between rail-guided vehicles and automated guided vehicles ?
9. What is the work volume of a robot manipulator ?
10. What is a palletizing operation ?

PART – B **(5×16=80 Marks)**

11. a) i) Briefly explain the benefits obtain by CIM. **(8)**
    ii) Explain about computerized elements of a CIM system. **(8)**

    (OR)

    b) i) Explain the five levels of automation in a production plant. **(8)**
    ii) Explain about lean production. **(8)**

12. a) Explain about Computer Aided Process Planning (CAPP). **(16)**

(OR)

b) i) How Material Requirement planning works ? **(12)**

ii) Name four of the capacity adjustment for the short term. **(4)**

13. a) i) Explain about parts classification and coding. **(8)**

ii) Describe about MICLASS coding systems. **(8)**

(OR)

b) i) What are the advantages of cellular manufacturing ? **(6)**

ii) Explain about machine cell design and layout. **(10)**

14. a) i) Sketch and explain the layout of a typical FMS. **(12)**

ii) List the applications of FMS. **(4)**

(OR)

b) i) Explain about three categories of AGV and mention its applications. **(10)**

ii) Discuss about self guided vehicles technology. **(6)**

15. a) Draw the diagram of the following robots using the notation scheme for defining manipulator configuration : (a) TRT (b) VROT (c) LVL (d) TRT:R **(16)**

(OR)

b) i) Describe about Robot programming language. **(8)**

ii) Describe about Lead through programming. **(8)**

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Reg. No. :

Question Paper Code : 50890

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh/Eighth Semester
Mechanical Engineering
ME 6703 – COMPUTER INTEGRATED MANUFACTURING SYSTEMS
(Common to : Mechanical and Automation Engineering/Robotics and Automation Engineering)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A (10×2=20 Marks)

1. What is the role of CIM in manufacturing ?
2. Define fixed automation.
3. What are the approaches the CAPP will recognize ?
4. What is meant by MRP ?
5. What is part family ?
6. How the machine cells are classified ?
7. What are the components of FMS ?
8. What are functions performed to operate AGVS ?
9. What are the various joint types in robots ?
10. What is Robot accuracy ?

PART – B (5×16=80 Marks)

11. a) i) What are the steps involved in designing and manufacturing a product ? (6)

ii) What are the components of CIM ? (10)

(OR)

b) Explain the following automation

i) Programmable (8)

ii) Flexible (8)

12. a) Write short notes on the following :

i) Aggregate production planning. (6)

ii) Master production planning. (5)

iii) Capacity planning. (5)

(OR)

b) Explain the inputs to MRP and various MRP outputs. Also list the various benefits of MRP. (16)

13. a) i) List out the methods for part family formation. (12)

ii) Enumerate the role of GT in CAD/CAM integration. (4)

(OR)

b) Discuss D CLASS and OPTIZ coding systems with suitable examples. (16)

14. a) i) What are the components of FMS ? (8)

ii) List and explain the various types of machines used in FMS. (8)

(OR)

b) Discuss the functions, application, advantage and disadvantages of a FMS. (16)

15. a) Explain in details Robot Anatomy and its related attributes. (16)

(OR)

b) i) Name some industrial Robot Applications. (6)

ii) Write short notes on Robot Programming and Lead through Programming. (10)

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

Question Paper Code : 20823

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh/Eighth Semester

Mechanical Engineering

ME 6703 — COMPUTER INTEGRATED MANUFACTURING SYSTEMS

(Common to : Mechanical and Automation Engineering/Robotics and Automation Engineering)

(Regulations 2013)

(Also common to : PTME 6703 – Computer Integrated Manufacturing Systems for B.E. (Part-Time) – Sixth Semester – Regulations – 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the major communication used in manufacturing Industry?

2. Define automation.

3. What are the prerequisites for process planning?

4. What are the applications of GT?

5. List out the methods for part family formation.

6. Name few of the CAPP system.

7. What are the Objectives of FMS?

8. List any two advantages and disadvantages of FMS implementation.

9. Why industrial robots are important?

10. What are the two types of Lead through Programming?

PART B — (5 × 13 = 65 marks)

11. (a) Explain the basic elements an automated system. (13)

Or

(b) What are all the nature and role of the elements of CIM system? (13)

12. (a) Write short notes on the following :

(i) Retrieval-type CAPP systems, (7)

(ii) Generative CAPP systems. (6)

Or

(b) What is MRP? Explain the inputs to MRP and various MRP outputs. Also list the various benefits of MRP. (13)

13. (a) (i) Enumerate Role of process planning in CAD/CAM integration. (3)

(ii) Enumerate the role of GT in CAD/CAM integration. (4)

(iii) What are all the advantage and disadvantage of varient type CAPP? (6)

Or

(b) Explain D CLASS and OPTIZ coding systems with suitable examples. (13)

14. (a) Discuss Automated guided vehicle system in detail. (13)

Or

(b) Discuss the functions, application, advantage and disadvantage of a FMS. (13)

15. (a) Explain in details Robot Anatomy and its related attributes. (13)

Or

(b) Explain in details about the types of robot part programming. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain Machine Cell design and layout with neat diagram. (15)

Or

(b) With respect to principles, tools and examples explain Lean manufacturing and Just-in-time production systems. (15)

14. a) Write an engineering brief on the following :
    i) Dedicated FMS and Random order FMS. (7)
    ii) FMS Operational issues. (6)

    (OR)

    b) In context of the AGVs describe the following :
    i) Self guided vehicle. (7)
    ii) Traffic control. (6)

15. a) Discuss the Common Robot Configurations in detail with the configuration diagram.

    (OR)

    b) Discuss the robot control systems in detail with the neat sketches.

PART – C **(1×15=15 Marks)**

16. a) Analyze the design features of the components part concept and the production steps required to design those features.

    (OR)

    b) Analyze the use of Flexible machining system for the mechanical processes with a case study.

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

Question Paper Code : 91854

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Seventh/Eighth Semester
Mechanical Engineering
ME 6703 – COMPUTER INTEGRATED MANUFACTURING SYSTEMS
(Common to Mechanical and Automation Engineering/Robotics and Automation Engineering)
(Regulations 2013)
(Also Common to PTME 6703 Computer Integrated Manufacturing Systems for B.E. (Part-Time) – Seventh Semester – Mechanical Engineering Regulations 2014)

Time : Three Hours Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Name the two components of Production systems.
2. How can plant capacity be increased or decreased in the short term ?
3. Name some of the benefits derived from computer aided process planning.
4. Give the differences between the aggregate production plan and the master production Schedule.
5. Define the key machine concept in cellular manufacturing.
6. What are the typical objectives when implementing cellular manufacturing ?
7. What do you understand by the term volume flexibility ?
8. Distinguish the features of laser-guided vehicles from conventional AGVs.
9. What is meant by work volume in robotics ?
10. What are the general characteristics of industrial work situations that tend to promote the substitution of robots for human workers ?

PART – B (5×13=65 Marks)

11. a) There are ten machines in the automatic lathe section of a certain machine shop. The setup time on an automatic lathe averages 5 hours. Average batch size for parts processed through the section is 100. Average operation time = 9.0 minutes. Under shop rules, an operator can be assigned to run one or two machines. Accordingly, there are five operators in the section for the ten lathes. In addition to the lathe operators, there are two setup workers who perform only machine setups. These setup workers are busy the full shift. The section runs one 8-hour shift per day, 5 days per week. Scrap losses are negligible and availability = 100%. The production control manager claims that the capacity of the section should be 2000 parts per week. However, the actual output averages only 1600 units per week. What is the problem and recommend a solution ?

(OR)

b) Justify the seven forms of waste in manufacturing with examples.

12. a) Using the master schedule of Figure 1 and the product structures for P_1 and P_2 in figures 2 and 3. Determine the time-phased requirements for component C6 and raw material M6. The assembly lead time is 1 week for P_1, P_2, S_2 and S_3. For S_3 inventory on hand is 2 units and quantity on order is zero. For C6, inventory on hand is 5 units and quantity on order is 10 for delivery in week 2 and for M6, inventory on hand is 10 units and quantity on order is 50 for delivery in week 2.

	WEEK									
Product Line Model	1	2	3	4	5	6	7	8	9	10
Model P_1								50		100
Model P_2							70	80	25	

Figure : 1. Master Production Schedule

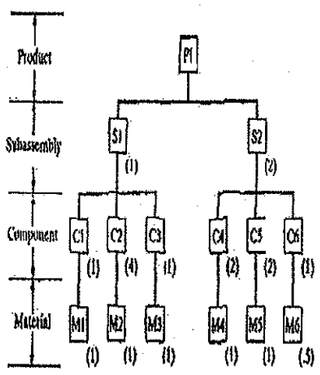

Figure : 2. Product Structure P1

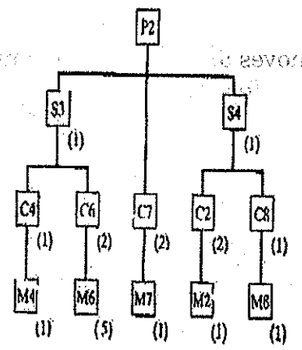

Figure : 3. Product Structure P2

(OR)

b) Discuss the following phases with respect to shop floor control.
   i) Order release. (5)
   ii) Order Scheduling. (8)

13. a) The following Table 1 lists the weekly quantities and routings of ten parts that are being considered for cellular manufacturing in a machine shop. Parts are identified by letters and machines are identified numerically. For the data given, (a) develop the part-machine incidence matrix and (b) apply the rank order clustering technique to the part-machine incidence matrix to identify logical part families and machine groups. (3+10)

Table : 1

Part	Weekly Quantity	Machine Routing
A	50	3 → 2 → 7
B	20	6 → 1
C	75	6 → 5
D	10	6 → 5 → 1
E	12	3 → 2 → 7 → 4
F	60	5 → 1
G	5	3 → 2 → 4
H	100	3 → 2 → 4 → 7
I	40	2 → 4 → 7
J	15	5 → 6 → 1

(OR)

b) Five machines used to produce a family of parts are to be arranged into a GT cell. The from-to data for the parts processed by the machines are shown in the table below. (a) Determine the most logical sequence of machines for this data (b) Construct the network diagram for the data, showing where and how many parts enter and exit the system. (c) Compute the percentages of in-sequence moves, bypassing moves and backtracking moves in the solution. (d) Develop a feasible layout plan for the cell. (4+3+3+3)

Table : 2

	To				
From	1	2	3	4	5
1	0	10	80	0	0
2	0	0	0	85	0
3	0	0	0	0	0
4	70	0	20	0	0
5	0	75	0	20	0