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