B.E./B.TECH. Degree Examination, December 2020

Seventh Semester

ME16703 - COMPUTER INTEGRATED MANUFACTURING SYSTEMS

Regulation 2016

Time: Three hours Maximum: 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Concurrent Engineering reduces the elapsed time required to bring a new product to market.
   (a) True b) False
2. Which of the following is not a phase of Shop Floor Control?
   (a) Order release (b) Order scheduling (c) Order progress (d) Order dispatch
3. Which of the following is not a Design Attribute?
   (a) Tolerance (b) Basic Internal Shape (c) Operation Sequence (d) Surface Finish
4. A company producing high product variety and low production quantity falls under which type of automation
   (a) Programmable automation (b) Flexible automation (c) Fixed automation (d) None
5. In manufacturing a component, the actual processing time is 92 seconds. Part handling time is 36 seconds, and the tool handling time is 25 seconds. Calculate the cycle time.
6. What are the various Computer Aided Process Planning (CAPP) methods?
7. List the benefits of a well-designed coding system.
8. Differentiate between single machine cell and flexible manufacturing cell.

PART B - (4 X16 = 64 marks)

09. (a) (i) Explain the importance of CIM. Also write the reasons for implementing CIM. **(8)**

(ii) A production m/c operates 80hr/wk (2shifts, 5 days) at full capacity. Its production rate is 30 unit/hr. During a certain week, the m/c produced 2000 parts and was idle the remaining time. **(4)**

(i) determine production Capacity

(ii) calculate the utilization of the m/c during the week

(iii) A certain part is produced in a batch size of 100. The batch must be routed through 5 operations. Average setup time is 4hr/operation. Avg. operation time is 9min. Average nonoperation time 6 hours for each operation. Plant runs one 8-hour shift. Calculate how many days are needed for the batch. **(4)**

(OR)

(b) (i) Explain different levels of automation. **(8)**

(ii) Explain the basic elements of automated system with simple sketch. **(8)**

10. (a) (i) Explain retrieval and generative computer aided process planning approaches in detail. **(8)**

(ii) Explain aggregate production planning and master production schedule. **(8)**

(OR)

(b) (i) The annual demand for a certain item made-to-stock is 20000pc/yr. One unit of the item costs Rs.30 and the holding cost rate = 15%/yr. Setup time to produce a batch = 6 hr. The cost of equipment downtime plus labour = Rs.200/hr. Determine the economic order quantity and the total inventory cost for this case. Also find the total annual cost. **(8)**

(ii) Describe the features of MRP-I and MRP-II systems. **(8)**

11. (a) (i) Explain the benefits and limitations of group technology. **(8)**

(ii) Apply rank order clustering technique to the part-machine incidence matrix given the table to arrange parts and machines into groups. **(8)**

		Part Number				
Machine ID		P1	P2	P3	P4	P5
	M1			1		1
	M2		1	1		
	M3	1			1	
	M4		1	1		1
	M5	1			1	

(OR)

(b) (i) Explain the composite part concept with an example. **(8)**

(ii) Five machines constitute a GT cell. The From/To data for the machines are shown in table. **(8)**

(i) Determine the most logical sequence of machines for this cell

(ii) Construct the network diagram for the data, showing where and how many parts enter and exit the system.

From	To				
	1	2	3	4	5
1	0	15	80	0	0
2	0	0	0	90	0
3	0	0	0	0	0
4	80	0	25	0	0
5	0	80	0	15	0

12. (a) (i) Illustrate different FMS layout configurations. **(8)**

(ii) Explain the various types of AGVs. **(8)**

(OR)

(b) A flexible machining system consists of two machining workstations and a load/unload station. Station 1 is the load/unload station. Station 2 performs milling operations and consists of two servers (two identical CNC milling machines). Station 3 has one server that performs drilling (one CNC drill press). The stations are connected by a part handling system that has four work carriers. The mean transport time is 3.0 min. The FMS produces two parts A and B. The part mix fractions and process routings for the two parts are presented in the table below. The operation frequency f_{ijk}=1.0 for all operations. Determine: **(16)**

(a) Maximum production rate of the FMS

(b) Corresponding production rates of each product

(c) Utilization of each station

(d) Number of busy servers at each station

Part j	Part Mix p_j	Operation k	Description	Station i	Process Time t_{ijk} (min)
A	0.3	1	Load	1	5
		2	Mill	2	40
		3	Drill	3	15
		4	Unload	1	3
B	0.7	1	Load	1	5
		2	Mill	2	50
		3	Drill	3	20
		4	Unload	1	3