Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2720815 **Date: 27/05/2016**

Subject Name: Computer Integrated Manufacturing

Time:10:30 am to 01:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the ten strategies for automation and process improvements. **07**

(b) With a neat sketch explain the work part transfer mechanisms. **07**

Q.2 **(a)** The table below defines the precedence relationships and element times for a new model toy. (1) Construct the precedence diagram for this job. (2) If the ideal cycle time – 1.1 min, repositioning time – 0.1 min and uptime efficiency is assumed to be 1.0, what is the theoretical minimum number of workstations required to minimize the balance delay under manning level 1.0? (3) Use ranked positional weights method to assign work elements to work stations. (4) Compute the balance delay. **07**

Work 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

(b) Explain the work transport systems for manual assembly line. **07**

OR

(b) Write a note on line pacing for manual assembly line. **07**

Q.3 **(a)** Explain the parts delivery systems for the automated assembly systems. **07**

(b) Differentiate between the AS/RS and a carousel storage system. **07**

OR

Q.3 **(a)** Explain the different industrial trucks used in material handling system. **07**

(b) A single station assembly machine performs five work elements to assemble four components to a base part. The elements are listed in the table below, together the fraction defect rate (q) and probability of a station jam (m) for each of the components added (NA: not applicable). **07**

Element	Operation	Time (sec)	q	m	p
1	Add gear	4	0.02	1.0	
2	Add spacer	3	0.01	0.6	
3	Add gear	4	0.015	0.8	
4	Add gear and mesh	7	0.02	1.0	
5	Fasten	5	0	NA	0.012

Time to load the base part is 3 sec, and time to unload the completed assembly is 4 sec, giving a total load/unload time is 7 sec. When a job occurs, it takes an average of 1.5 min to clear the jam and restart the machine. Determine: (a) production rate of all product, (b) yield, (c) Production rate of good product and (d) uptime efficiency of the assembly machine.

Q.4 **(a)** Explain the principal components of AIDC and categories the AIDC technologies. **07**

(b) Explain the computerized elements of a CIM system. **07**

OR

Q.4 **(a)** Explain the basic components of CIM. **07**

(b) Describe the magnetic stripes, Optical character recognition and machine vision technology of automated inspection system. **07**

Q.5 **(a)** Explain the Retrieval CAPP system and describe the importance of GT in the retrieval CAPP. **07**

(b) Explain the types of flexibility in manufacturing. **07**

OR

Q.5 **(a)** Explain the powder based RP processes. **07**

(b) A FMS consist 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. Station 3 has one server that performs drilling. 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: (a) maximum production rate of the FMS, (b) corresponding production rates of each product, (c) utilization of each station, and (d) number of busy servers at each station. **07**

Part j	Part mix P_j	Operation k	Description	Station i	Process time t_{ijk}(min)
A	0.4	1	Load	1	4
		2	Mill	2	30
		3	Drill	3	10
		4	Unload	1	2
B	0.6	1	Load	1	4
		2	Mill	2	40
		3	Drill	3	15
		4	Unload	1	2

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