Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 172506 Date: 28/12/2012

Subject Name: Flexible Manufacturing Systems

Time: 10.30 am - 01.00 pm Total Marks: 70

Instructions:

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

Q.1 **(a)** (i)What types of flexibilities are offered by flexible manufacturing systems? Explain in brief the way in which any of these flexibilities can be achieved. **04**

(ii) Enlist the various functions of automated material handling and storage systems. **03**

(b) (i) Differentiate: Engineered FMS with Modular FMS **04**

(ii) Enlist the factors that govern the FMS layouts. **03**

Q.2 **(a)** (i) "Flexible Manufacturing System is far more versatile than Flexible Manufacturing Cell." – Justify. **04**

(ii) Differentiate: Traditional stand alone NC machine tool with Integrated multi machine cell. **03**

(b) (i) Mention the reasons due to which group technology layout turns out to be more advantageous than process type layout. **04**

(ii) "A normal industrial practice is to adopt hybrid coding combining mono code and ploy code in grouping the parts in Group Technology." – Justify. **03**

OR

(b) (i) Define pack and zoning with reference to group technology. How manufacturing engineering, quality control and purchase department get the functional benefit due to implementation of group technology? **04**

(ii) Enlist the major obstacles in the implementation of group technology. **03**

Q.3 **(a)** Four machines will constitute the group technology machine cell. The from-to data for machine is as follows. Determine the most logical sequence of machines for these data according to/from ratios. **07**

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

(b) (i) "Vertical machining centre permits usage of heavy tools, absorbs thrust and are economic." – Justify. **04**

(ii) " Horizontal machining centre due to its table indexing capability reduce setting and clamping time." – Justify. **03**

OR

Q.3 **(a)** (i) Explain the benefit of torque controlled machining. **04**

(ii) State the functions of machining centre probe. **03**

(b) Four machines belong to the group technology machine cell. Analyses of 50 parts which are processed on these machines provide the following from-to data for machine (the machines are identified as number). 50 parts enter the machine grouping at machine 3, 20 parts leave after processing machine at 1, and 30 parts leave after machine at 4. Determine from-to ratios and suggest a **07**

logical sequence of machines.

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

Q.4 **(a)** (i) Explain the working principle of electro-chemical deburring, its positive features and process limitations. **04**

(ii) "The balls used in ball bearings are subjected to vibratory deburring." – Evaluate. **03**

(b) (i) Explain in brief four phases of typical installation of FMS. **04**

(ii) Why is it important to know when to change out a tool on an automatic machine? **03**

OR

Q.4 **(a)** (i) "Automated tool delivery systems add considerably to machining centre overall up-time and performance." – Justify. **04**

(ii) State the factors that govern the selection of either batch or in-line type wash stations. **03**

Q.4 **(b)** (i) Enlist the task that should be entirely completed or must have previously occurred to make sure that acceptance testing occurs on schedule. **04**

(ii) State the conditions under which tool sharing and tool migration is preferred. **03**

Q.5 **(a)** What geometrical features can be evaluated with coordinate measuring machine (CMM)? Draw the schematic sketch of CMM and explain its working principle. **07**

(b) Following is the data for automated guided vehicle system: **07**

Vehicle velocity: 45 m/min, Pick up time: 45 s
Average distance travelled/delivery: 135 m
Drop off time: 45 s, Traffic factor: 0.9
Average distance traveling empty: 90 m
Determine the number of vehicles required to satisfy the delivery demand of 40 deliveries per hour. Also determine handling system efficiency.

OR

Q.5 **(a)** Enlist six types of mechanical configuration of CMM that fits the varied industrial needs. Explain any one type in detail mentioning its merits, demerits and applications. **07**

(b) In order to determine the number of vehicles required to meet the demand of particular automated guided vehicle system, the system must be capable of making 40 deliveries per hour. The following are the data of performance characteristics of the system. **07**

Vehicle velocity: 150 m/min, Pick up time: 0.75 min
Average distance travelled/delivery: 450 m
Drop off time: 0.75 min, Traffic factor: 0.9
Average distance traveling empty: 300 m

Determine the number of vehicles required to satisfy the delivery demand. Also determine handling system efficiency.

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