GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3722812
Semester – II
Subject Name: Flexible Manufacturing System

Type of course: Elective IV

Prerequisite: Nil

Rationale:
The course Flexible manufacturing system (FMS) is the most automated and technologically sophisticated of the machine cell types used to implement advance manufacturing. It covers multiple automated stations and is capable of variable routings among stations, while its flexibility allows it to operate as a mixed model system. The FMS knowledge integrates many of the advanced technologies of manufacturing like automation, CNC machines, distributed computer control, and automated material handling and storage.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
03	0	02	04	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Group Technology: Introduction, objectives, part families, algorithms and models for G.T. - Rank order clustering, Bond energy, mathematical model for machine – component cell formation. Design and manufacturing attributes. Parts classification and coding, concept of composite job machine group, cell group tooling, design rationalization.	08
2	Computer Aided Process Planning: Generative and variant types, backward and forward approach, feature based and CAD based CAPP.	05
3	Introduction to FMS: Concepts, advantages, components of FMS and their integration in the data processing systems, FMS scheduling, examples of FMS installations. Quantitative analysis of FMS	10
4	Distributed data processing in FMS: DBMS and their applications in CAD/CAM and FMS, Distributed systems in FMS, Integration of CAD and CAM, Part programming in FMS, tool data base, Clamping devices and fixtures data base.	10
5	Material Handling systems: Conveyors, AGVs, Industrial robots in material handling, AS/RS.	06
6	Interfacing of computers - machine tool controllers and handling systems: communications standards - programmable Logic Controllers (PLC's), Interfacing, Computer aided Project	06

	planning, dynamic part scheduling.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**20**	**20**	**20**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Paul Ranky., "The design and operation of FMS", IFS publication, 1983.
2. Mikell P Groover, "Automation Production systems, Computer Integrated Manufacturing", Prentice Hall, 1987.
3. David J. Parrish, "Flexible Manufacturing" Butterworth-Heinemann, 1990.
4. Computer Aided Manufacture by Chien Chang and Richard A Wysk, Prentice HALL
5. CAD / CAM / CIM by P. Radhakrishnan, S. Subramanyan, New Age International.
6. Global Manufacturing, YORAM KORAM

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Acquire the knowledge Group Technology and computer aided process planning	30
CO-2	Can be able to solve FMS problems and apply quantitative techniques	40
Co-3	Able to write FMS part program and PLC program	30

Term Work:

The term work shall be based on the topics mentioned above.

List of Experiments:

As per above syllabus content

Major Equipment:

FMS setup , CNC machine, PLC kit

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List of Open Source Software/learning website: