GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3171509
Semester – VII
Subject Name: Computer-integrated manufacturing

Type of course: Professional Elective

Prerequisite: Nil

Rationale:
Today computer integrated manufacturing systems are widely used in industries. This course develops capability in students to demonstrate and use of CIM in industry.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Introduction:** Fundamentals of Manufacturing and Automation: Production operations and Automation in Production Systems, types of automation, Automation Principles & Strategies, Advance mfg. techniques like Digital manufacturing, RPT etc CIM Automation Computer applications in Design and manufacture- Fundamentals of CAD, CAE, CAM. Introduction to CIM, Evolution, objectives, benefits, limitations, relationship between auto and CIM, reasons for automating, arguments for and against automation	**08**
2	GROUP TECHNOLOGY AND CELLULAR MANUFACTURING : Part families, Parts classification and coding, Production flow analysis, Cellular manufacturing , Application of group technology	**10**
3	**Flexible Manufacturing Systems:** Types of flexibility, types of FMS, FMS components, FMS Components-Workstations, Material Handling and Storage Systems, Computer Control System, Human Recourses, FMS Applications and Benefits., Quantitative analysis of FMS, Sizing the FMS, System performance measure. Automated Material Handling & Storage: Functions, Types, Analysis of material handling equipment, Design of Conveyor & AGV systems. Problems. Development for total material handling system.	**12**
4	**Computer Aided Process Planning:** Retrieval CAPP Systems, Generative CAPP Systems, Graph Based Approach, Attribute Adjacency Graph, Benefits of CAPP.	**04**

5	**Automated Assembly Systems:**System Configurations, Parts Delivery at Workstations, Applications, Quantitative Analysis of Assembly Systems- Parts Delivery System at Workstations, Multi-station Assembly machines, Single Station Assembly Machines, Partial Automation.	**04**
6	**Automated Inspection systems:** Overview of Automated inspection principles and methods, sensor technologies for automated inspection – contact and non- contact types, computer aided testing Identification Methods, Bar Code Technology, Radio Frequency Identification, Other AIDC Technologies-Mangnetic Stripes, Optical Character Recognition, and Machine Vision.	**07**
	Total Hours	**45**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**15**	**40**	**25**	**5**	**5**

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. Groover, M.P: "Automation, Production System and CIM"- Prentice-Hall of India.
2. Vajpayee,"Principles of CIM" - Prentice-Hall of India.
3. Ranky, Paul G: "Computer Integrated Manufacturing"- Prentice-Hall of India.
4. David Bedworth: "Computer Integrated Design and Manufacturing" -TMH, New Delhi.
5. Robert Levine et al;" A Comprehensive guide to AI and Expert Systems"- McGraw Hill Inc, 1986.
6. Mohsen Shahinpoor – Harper & Row publishers, New York. "A Robot Engineering Textbook
7. "Robotics, control vision and intelligence," Fu, Lee and Gonzalez. McGraw Hill International.
8. Geoffrey Boothroyd, "Assembly Automation and Product Design", (Manufacturing Engineering and Materials Processing)
9. Radhakrishnan.P, Subramanyan. S, 'CAD/CAM/CIM', New Age International Publishers

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Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Overall understanding of automated systems integration using CIM	20
CO-2	Apply program programmable controllers, robots and CNC machines in an integrated system	15
CO-3	Develop interfaces necessary to integrate machines with a conveyor system and a host control system for a flexible manufacturing system	15
CO-4	Apply automated assembly and inspection system in industry	25
CO-5	Application of group technology and CAPP	15

List of Experiments:

Experiments based on above contents and should include below mentioned topics.

1. Demonstrate scope of CIM in fabrication/manufacturing industry.
2. Demonstrate different CIM hardware and software
3. Perform an activity to define part family of an object and classify with opitz coding system.
4. Demonstrate flexible manufacturing system in any industries.
5. Demonstration of automated guided vehicles and their application in manufacturing industries.
6. Demonstration of automated inspection system for an object.
7. Demonstrate computer aided process planning

List of Open Source Software/learning website:

1. www.nptel.ac.in