

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Production (25) & Manufacturing Engineering (34)

SUBJECT NAME: Flexible Manufacturing Systems

SUBJECT CODE: 2172506

B.E. 7th SEMESTER

Type of course: Under Graduate

Prerequisite: NIL

Rationale: The course aims to impart basic knowledge of FMS system & its parameters.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits C | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|--------------|-------------------|--------|-----|-----------------|---|-----------|----------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | |
| | | | | PA | ALA | ESE | OEP | | | |
| 3 | 2 | 0 | 5 | 70 | 20 | 10 | 30 | 0 | 20 | 150 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

| Sr. No. | Content | Total Hrs | % Weightage |
|----------|--|-----------|-------------|
| 1 | FMS Introduction and Description limitations with conventional manufacturing, Need for FMS Introduction, Definition, Basic Component of FMS, Significance of FMS, General layout and configuration of FMS, Principle Objectives of FMS, Benefits and limitations of FMS, Area of Application of a FMS in Industry, Various Hardware and Software required for an FMS, CIM Technology, Hierarchy of CIM, FMS Justification. | 8 | 18 |
| 2 | Manufacturing Cell Introduction, Description and Classifications of Cell, Unattended Machining, Cellular versus Flexible Manufacturing. | 3 | 6 |
| 3 | Group Technology Introduction, Definition, Reasons for Adopting Group Technology, Benefits of Group Technology Affecting Many Areas of a Company, Obstacles to Application of GT | 5 | 12 |
| 4 | Turning and Machining Centres Introduction, Types ,Construction and Operation Performed on Turning enter, Automated Features and Capabilities of Turning Centres, General Advantages and Disadvantages of Vertical and Horizontal Machining Centres, Pallet and Part Loading and Programming Options in Machining Centres, Automated features and capabilities of a Machining Centres | 6 | 17 |
| 5 | Cleaning and Deburring Equipment Introduction, Wash Station and Operation Description, Deburring Station and Operation Description, Importance of Cleaning and | 4 | 8 |

| | | | |
|-----------|--|-----------|------|
| | Deburring in Automated Manufacturing. | | |
| 6 | Coordinate Measuring Machines Introduction, Types, Construction and General Functions of CMM, Operational Cycle Description, CMM Applications, Importance to Flexible Cells and Systems. | 4 | 8 |
| 7 | Automated Material Movement and Storage System Introduction, Types of AGV and Their principle of working, Advantages, Limitation and General AGV Guide path, Robots, Benefits of using Industrial Robots, Basic components and benefits of Automated Storage and Retrieval Systems, Conveyors and Pallet Flotation System, Queuing Carrousel and Automatic Work Changers, Coolant and Chip Disposal and Recovery system. | 6 | 15 |
| 8 | Cutting Tools and Tool Management Introduction, Control of Cutting Tools, Tool Management, Tool Strategies, Tool Preset, Identification and Data Transfer, Tool Monitoring and Fault Detection | 4 | 8 |
| 9. | FMS Installation and Implementation FMS Installation, FMS implementation. | 4 | 8 |
| | Total | 43 | 100% |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | | |
|-------------------------------------|----------------|----------------|----------------|----------------|----------------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 7 | 14 | 21 | 14 | 7 | 7 |

Legends: R: Remembrance; U = Understanding; A = Application 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. Flexible Manufacturing System by H. K. Shivanand, M. M. Benal, V. Koti, New Age Pub.
2. Automation, Production Systems and Computer Integrated Manufacturing Groover
3. M.P, Prentice Hall of India
4. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall of India.
5. Approach to Computer Integrated Design and Manufacturing Nanua Singh, John Wiley and Sons, 1998.
6. Principles of CIM , Vajpayee, PHI
7. Flexible Manufacturing Cells and Systems by Luggen

Course Outcome:

After learning the course the students should be able to:

1. Understand FMS & its applications.
2. Implement GT.
3. Differentiate Turning & Machining Centres.
4. Understand CMM.
5. Understand various types of AGVS

6. Understand basics of Tool Management System.

List of Experiments:

Assign tutorials based on Syllabus

Design based Problems (DP)/Open Ended Problem:

NA

Major Equipment:

NIL

List of Open Source Software/learning website:

1. <http://nptel.ac.in/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.