GUJARAT TECHNOLOGICAL UNIVERSITY

MANUFACTURING ENGINEERING(34)
MECHATRONICS
SUBJECT CODE: 2153406
B.E. 5th SEMESTER

Type of course: Theoretical + Practical (Regular)

Prerequisite: To understand the principles, techniques & components of Mechatronics system and robotics.

Rationale: It gives a framework of knowledge that allows engineers and technicians to develop an interdisciplinary understanding and integrated approach to engineering

Teaching and Examination Scheme:

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| 1       | Introduction:
Electronic systems: Conductors, Insulators and Semiconductors – Passive Components used in Electronics.
Mechanical systems: Basic concepts – Materials – Heat treatment – Electroplating – Standards. | 4 | 10 |
| 2       | Mechatronics, Sensors and Transducers
| 3       | Actuation Systems
Distribution of Theory Marks

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System Models And Controllers

Programming Logic Controllers & Design of Mechatronics

Robot Kinematics & Dynamics

Suggested Specification table with Marks (Theory):

Reference Books:


Course Outcome:

After learning the course the students should be able to:

List of Experiments:

1. Design a simple pneumatic direct control circuit to open and close the Gate of a factory. By operating a push button valve, gate should open or close
2. Design of pneumatic circuit using a double acting cylinder and 5/2 Air Spring Valve to open the main gate of a factory which can be controlled by a security personnel from the security room.
3. Design of Hydraulic circuit using a double acting cylinder and 4/2 hand operated valve to raise or lower the pallet truck.
4. To study about the programming of the PLC using Ladder diagram to switch ON the 230V AC Lamp using start button and switch OFF the Lamp using stop button (Latching circuit).
5. Using PLC, Write and simulate a program to move the forward stroke of a pneumatic double acting cylinder in 15seconds and to return after 10seconds.
6. Real Time Temperature controller
7. Servo motor using closed and open loops
8. Multipurpose station current to pressure transmitter and flow transmitter.
9. Study and applications of 8051 Micro controller
10. Study of Pick and Place Robot.

Evaluation of Open ended / design based small project

1. Operating the stepper motor at different speed and different directions.
2. PLC applications for various assignments
3. Programming codes for robots for different types of work required.

Major Equipment:

1. PLC
2. Microcontroller
3. Temperature Controller
4. Pneumatic and Hydraulic actuators and cylinders

List of Open Source Software/learning website:

http://nptel.ac.in/courses/112106138

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.