MECHATRONICS

B.E, VII Semester, Mechanical Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code	17ME754	CIE Marks	40
Number of Lecture Hours/Week	03	SEE Marks	60
Total Number of Lecture Hours	40(8 Hours per Module)	Exam Hours	03

Credits –03

Course Objective:

- Understand the evolution and development of Mechatronics as a discipline.
- Substantiate the need for interdisciplinary study in technology education.
- Understand the applications of microprocessors in various systems and to know the functions of each element
- Demonstrate the integration philosophy in view of Mechatronics technology

Module - 1

Introduction: Definition, Multidisciplinary Scenario, Evolution of Mechatronics, Design of Mechatronics system, Objectives, advantages and disadvantages ofMechatronics.

Transducers and sensors: Definition and classification of transducers, Differencebetween transducer and sensor, Definition and classification of sensors, Principleof working and applications of light sensors, proximity switches and Hall Effectsensors.

Module - 2

Microprocessor &Microcontrollers: Introduction, Microprocessor systems, Basic elements of control systems, Microcontrollers, Difference betweenMicroprocessor and Microcontrollers.

Microprocessor Architecture: Microprocessor architecture and terminology-CPU, memory and address, I/O and Peripheral devices, ALU, Instruction andProgram, Assembler, Data, Registers, Program Counter, Flags, Fetch cycle, writecycle, state, bus interrupts. Intel's 8085A Microprocessor.

Module - 3

Programmable logic controller: Introduction to PLC's, basic structure, Principleof operation, Programming and concept of ladder diagram, concept of latching &selection of a PLC.

Integration: Introduction & background, Advanced actuators, Pneumaticactuators, Industrial Robot, different parts of a Robot-Controller, Drive, Arm, EndEffectors, Sensor & Functional requirements of robot.

Module - 4

Mechanical actuation systems: Mechanical systems, types of motion, Cams, Gear trains, Ratchet & Pawl, belt and chain drives, mechanical aspects of motorselection.

Electrical actuation systems: Electrical systems, Mechanical switches, Solenoids, Relays, DC/AC Motors, Principle of Stepper Motors & servomotors.

Module - 5

Pneumatic and hydraulic actuation systems: Actuating systems, Pneumatic andhydraulic systems, Classifications of Valves, Pressure relief valves, Pressureregulating/reducing valves, Cylinders and rotary actuators.

DCV & FCV: Principle & construction details, types of sliding spool valve, solenoid operated, Symbols of hydraulic elements, components of hydraulicsystem, functions of various units of hydraulic system. Design of simple hydrauliccircuits for various applications.

Course outcomes:

On completion of this subject, students will be able to:

1. Illustrate various components of Mechatronics systems.
2. Assess various control systems used in automation.
3. Develop mechanical, hydraulic, pneumatic and electrical control systems.

TEXT BOOKS:

1. NitaigourPremchandMahalik , Mechatronics-Principles, Concepts and Applications, Tata McGraw Hill, 1ˢᵗEdition, 2003 ISBN.No. 0071239243, 9780071239240.
2. W.Bolton-Pearson Education, Mechatronics – Electronic Control Systems in Mechanicaland Electrical Engineering, 1ˢᵗEdition, 2005 ISBNNo. 81-7758-284-4.

REFERENCE BOOKS

1. Mechatronics by HMT Ltd. – Tata McGrawHill, 1ˢᵗ Edition, 2000. ISBN:9780074636435.
2. Anthony Esposito, Fluid Power , Pearson Education, 6th Edition, 2011, ISBN No.9789332518544.

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