

## **ELECTIVE I -ME- 5005 (4) MECHATRONICS**

**UNIT - 1 INTRODUCTION:** Definition of Mechatronics, Multi-disciplinary scenario, origins. Evaluation of Mechatronics, An over view of mechatronics, Design of mechatronics system. Measurements system and function of main elements of measurement systems. Need for mechatronics in industries. Objectives, advantages and disadvantages of mechatronics. Microprocessor based controllers. Principle of working of engine management system, automatic washing machine.

**UNIT - 2 REVIEW OF TRANSDUCERS AND SENSORS:** Definition and classification of transducers. Definition and classification of sensors. Principle of working and applications of light sensors, proximity sensors and Hall effect sensors. **MICROPROCESSOR:** Introduction, Microprocessor based digital control. Digital number system, binary and hexadecimal number system, Logic functions, Data word representation basic Elements of control systems.

**UNIT 3 : MICROPROCESSOR ARCHITECTURE:** 8085A processor architecture Terminology- such as, CPU, memory and address, ALU, assembler, data, registers, Fetch cycle, write cycle, state, bus interrupts. Micro controllers - difference between microprocessor and micro controllers. Requirements for control and their implementation in micro controllers. Classification of micro controllers.

### **Unit 4**

**ELECTRICAL ACTUATORS:** Actuator and actuator system. Classifications of actuator system with examples. Mechanical switches. Concept of bouncing Methods of Preventing bouncing of mechanical switches. Solenoids, Relays. Solid state switches - Diodes, Thyristors, Triacs, Transistors, Darlington pair. Electrical actuator. Principle, construction and working of AC, DC motors, stepper motors, permanent motors, servomotors, Servo systems and control

**HYDRAULIC ACTUATORS:** Valves - Classifications, Pressure Control Valves - Pressure relief valves, Pressure regulating/reducing valves, Pressure sequence valve. Flow control valves - Principle, needle valve, globe valve. Direction control valve -sliding spool valve, solenoid operated.

**Unit 5 : SINGLE CONDITIONING:** Concept, necessity, op-amps, protection, filtering, wheat stone bridge - Digital Signals - Multiplexer. Data acquisition - Introduction to digital signal processing - Concepts and different methods.

### **REFERENCE BOOKS:**

1. Mechatronics - Principles, Concepts and applications - Nitaigour and Premchand, Mahalik - Tata McGraw Hill -2003
2. Mechatronics - W. Bolton, Pearson Education Asia -2<sup>nd</sup> Edition, 2001.
3. Introduction to mechatronics and measurement systems -David G. Alciatore & Michel BiHstand - Tata McGraw Hill -2000
4. Mechatronics - H.D. Ramachandra - Sudha Publication -2003
5. Mechatronics by HMT Ltd. - Tata McGrawHill -2000.
6. Mechatronics System design by Devadas Shetty and Richard A. Kark - Thomas Learning -1997.
7. Mechatronics an Introduction by Robert H Bishop - CRC
8. Mechatronics systems Fundamentals by Rolf Isermann - Springer