Course title: **Elective-III: Robotics and Automation**

**UNIT I CLASSIFICATION OF ROBOTIC SYSTEMS**

Basic structure of a robot - Classification of robots: Cartesian, Cylindrical, Spherical, Articulated, SCARA. Accuracy, resolution and repeatability of robots. Robot application in manufacturing: Material transfers - Machine loading and unloading - Processing operations - Assembly and inspection.

**DRIVES AND CONTROL SYSTEMS:** Hydraulic and Pneumatic systems: cylinders, control valves, hydro motor. Types of mechanical power drive, rotary to linear motion conversion mechanisms. Robot end effectors. Servomotors – operation, stepper motors - control loops using current and voltage amplifier. Robot controllers - configuration of robot controller.

**UNIT II SENSORS AND VISION SYSTEMS**

Types of sensors, tactile sensors, proximity sensors and speed sensors – Encoder, resolvers. Vision systems: Image processing and analysis, Segmentation, Feature extraction, Object Recognition.

**UNIT III ROBOT PROGRAMMING & AUTOMATION**

Lead through programming - Textual programming, programming examples - Social and Economical Aspects of Robots - Typical layouts of robots in Industries. **AUTOMATION:** Advantages of automation, building blocks of automation. Automatic feeding lines, material-handling devices, ASRS, transfer lines, automatic inspection, intelligent automation.

**UNIT IV PROGRAMMABLE LOGIC CONTROLLERS ( PLC)**

Basics of PLC, Architecture of PLC, Advantages, Types of PLC, Types of Programming - Simple process control program's using Relay Ladder Logic. Introduction to PLC networking. Introduction to HMI, DCS and SCADA systems.

**UNIT V COMPUTER NUMERICAL CONTROL (CNC)**

Block diagram of a CNC control system, Advantages, Power supply, CPU. CNC and PLC interfacing, Control loops. Feedback devices in CNC machine, analog and digital CNC systems. Introduction to FMS.

**TEXT BOOK**

1. Michel P. Grover, “Automation Production systems and Computer Integrated manufacturing”, Prentice-Hall India, New Delhi, 1987. / Pearson Education, New Delhi.

**REFERENCES**

1. W. Bolton, “Mechatronics”, Pearson Education Asia, 2002.

2. K.S. Fu, R.C. Gonzalez and C S G Lee, “Robotics: Control, Sensing, Vision and Intelligence”, McGraw Hill, New Delhi, 1987.

3. Michel P. Grover, “Industrial Robotics - Technology, Programming and Applications”, McGraw Hill, New Delhi, 1986.