

**I Year I Semester**

**L P C**

**Code: 17CC101**

**4 0 3**

## **INDUSTRIAL ROBOTICS**

### **UNIT - I**

**INTRODUCTION:** Automation and Robotics, Robot anatomy, robot configuration, motions joint notation scheme, work volume, robot drive systems, control systems and dynamic performance, precision of movement.

**CONTROL SYSTEM AND COMPONENTS:** basic concepts and motion controllers, control system analysis, robot actuation and feedback components, Position sensors, velocity sensors, actuators, power transmission systems, robot joint control design.

### **UNIT - II**

**MOTION ANALYSIS AND CONTROL:** Manipulator kinematics, position representation, forward and inverse transformations, homogeneous transformations, manipulator path control, robot arm dynamics, configuration of a robot controller.

### **UNIT - III**

**END EFFECTORS:** Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. **SENSORS:** Desirable features, tactile, proximity and range sensors, uses sensors in robotics.

**MACHINE VISION:** Functions, Sensing and Digitizing-imaging devices, Lighting techniques, Analog to digital single conversion, image storage: Image processing and Analysis-image data reduction, Segmentation, feature extraction, Object recognition. Training the vision system, Robotic application.

### **UNIT - IV**

**ROBOT PROGRAMMING:** Lead through programming, Robot program as a path in space, Motion interpolation, WAIT, SIGNAL AND DELAY commands, Branching, capabilities and Limitations of lead through methods.

**ROBOT LANGUAGES:** Textual robot Languages, Generations of robot programming languages, Robot language structures, Elements and function.

### **UNIT - V**

**ROBOT CELL DESIGN AND CONTROL:** Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detection, Work cell controller.

**ROBOT APPLICATION:** Material transfer, Machine loading/unloading, Processing operation, Assembly and Inspection, Future Application.

### **TEXT BOOKS:**

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd edition.

## **REFERENCES BOOKS:**

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
4. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley
5. Introduction to Robotics by SK Saha, The McGrah Hill Company, 6<sup>th</sup>, 2012
6. Robotics and Control / Mittal R K & Nagrath I J / TMH