EIEVAC03-Basics of Robotics

Unit I Automation

Mechanization and Automation - History of Automation - Reasons for automation - Merits and limitations - Automation systems - Types of Automation: Fixed, Flexible and Programmable Automation - Intelligent Industrial Automation - Automation and Robotics.

Unit II Fundamentals of Robots

Definition - Historical background - Various generations of robots - RobotAnatomy - Robot configuration: Polar, Cylindrical, Cartesian coordinate, Joint-armconfiguration - Degree of freedom - Work volume and Dead zone - Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance.

Robot Drive System: Hydraulic, Electric and Pneumatic.

Unit III Introduction to Robot End Effectors, Sensors and Control System

End Effectors: Characteristic features - Types: Mechanical grippers, Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops - Tools as end effectors - Robot / End-effectors interface - Consideration in Gripper selection and Design

Sensors: Transducers and Sensors - Sensors in Robotics: Tactile, Proximity and Range Sensors, Miscellaneous sensors and sensor based systems - Robot Vision System.

Control System: Lead-through Programming, Walk-through Programming, Use of Teach pendants - Capabilities and limitations.

Unit–IV Robot Programming and Applications

Robot Programming: Textural Programming: requirements of robot programming language, problems pertaining to robot programming languages, Common languages/Software used- - Robot program as a path in space .

Applications: Factors influencing the selection of Robots - Robots for Materials handling, Assembly, Agriculture and Chemical Plants - Advanced applications.

Intelligent Robots - Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots - Control and Safety Issues

Unit V Lab work

Experiments on various sensors and drive system in connection with Robotic system.

Text Books:

Groover, M.P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice-Hall of India Private Limited, New Delhi, 2007

Groover, M.P., Weiss, M., Nagel, R.N., Odrey, N.G., Industrial Robots: Technology, Programming and Applications, McGraw-Hill Book Company, 2012

Reference Books:

Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill, 1994

Saeed B. Niku, An Introduction to Robotics- Analysis, Systems, Applications, Second Edition, John Wiley & Sons Inc., 2010

Wesley, E. Sryda, "Industrial Robots: Computer interfacing and Control" PHI, 1985.

Yoran Koren, Robotics for Engineers, McGraw Hill, 1980