ELECTIVE – V - 3. ROBOTICS

Unit I

Fundamentals of robot Technology : Robot anatomy. Work volume. Drive systems. Control - Systems and dynamic performance - Accuracy and repeatability - Sensors in robotics – Robot reference frames and coordinates and robot kinematics.

Unit II

Robot kinematics : Matrix representation - Homogeneous transformations - Forward and inverse kinematics - Robot dynamics - Differential motions of a frame - Jacobian static force analysis.

Unit III

Configuration of a robot controller : End effectors - Mechanical and other types of grippers - Tools as end effectors - Robot and effector interface - Gripper selection and design - Introduction to robot languages.

Unit IV

Applications for manufacturing - Flexible automation - Robot cell layouts – Machine interference - Other considerations in work cell design - Work cell control – Interlocks – Robot cycle time analysis.

Unit V

Simulation of robotic work cells - Typical applications of robots in material transfer, machine loading/unloading; processing operations; assembly and inspection.

Text Book:

1. "Introduction to Robotics analysis, Systems & Applications" - Saeed B. Niku - Pearson Education Singapore P. Ltd., 2002.
2. "Robotic Technology and Flexible Automation" - S.R. Deb, Tata McGraw Hill Publishing Co. Ltd., 2003.
3. "Robotics & Control"- R.K. Mittal,I.J. Nagrath - Tata McGraw & Hill, 2005.

References Book:

1."Fundamentals of Robotics, analysis & Control" Robert J. Schilling, Prentice Hall of India P.Ltd., 2002.