DEPARTMENT OF MECHANICAL ENGINEERING
SYLLABUS FOR B.E IV Semester
Introduction to Robotics (Open Elective III)

Instruction: 2 Hours / week	SEE Marks : 60	Course Code : OE440ME
Credits: 2	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	On completion of the course the student will be able to: 1. list and explain the basic elements of industrial robots 2. analyse robot kinematics and its control methods. 3. classifythe various sensors used in robots for better performance. 4. summarize various industrial and non-industrial applications of robots.

UNIT-I
ROBOT BASICS
Robot-Basic concepts, Need, Law, History, Anatomy, specifications.
Robot configurations-cartesian, cylinder, polar and articulate.
Robot wrist mechanism, Precision and accuracy of robot.

ROBOT ELEMENTS
End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system
Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

UNIT II –
ROBOT KINEMATICS AND CONTROL
Robot kinematics – Basics of direct and inverse kinematics, Robot trajectories, 2D and 3D
Transformation-Scaling, Rotation, Translation Homogeneous transformation.
Control of robot manipulators – Point to point, Continuous Path Control, Robot programming

UNIT III –
ROBOT SENSORS
Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors. Force sensor-Light
sensors, Pressure sensors, Introduction to Machine Vision and Artificial Intelligence.

UNIT IV –
ROBOT APPLICATIONS
Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defense,
Disaster management. Applications, Micro and Nanorobots, Future Applications.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel, Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata –McGraw Hill Pub. Co., 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata McGraw Hill Publishing Company Limited, 2010.
3. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering: An Integrated Approach'", Prentice Hall of India Pvt. Ltd., 1994.
4. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", Tata- McGraw Hill Pub. Co., 2008
5. Yu. "Industrial Robotics", MIR Publishers Moscow, 1985.