IV B.Tech – II Semester (17ME842) ROBOTICS (Open Elective-II)

Int. Marks Ext. Marks Total Marks

40 60 100

L T P C 3 1 - 3

Pre-Requisites: None

Course Objectives:

- To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
- The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectoryplanning.
- Mathematical approach to explain how the robotic arm motion can bedescribed. The students will understand the functioning of sensors and actuators.

UNIT-I: INTRODUCTION:

Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT-II: COMPONENTS OF THE INDUSTRIAL ROBOTICS:

Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom –Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III: MOTION ANALYSIS:

Homogeneous transformations as applicable to rotation and translation –problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H rotation joint coordinates and world coordinates Forward and inverse kinematics –problems.

UNIT-IV:

Differential transformation and manipulators, Jacobians – problems Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT-V:

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

UNIT-VI: ROBOT ACTUATORS AND FEED BACK COMPONENTS:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors. Feedback components: position sensors – potentiometers, resolvers, encoders– Velocity sensors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer -Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Course Outcomes:

After successful completion of the course, the students can be able to:

S. No	Course Outcome	BTL
1.		L2
2.		L2
3.		L3
4.		L3
5.		L3
6.		L2

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1														
CO 2														
CO 3														
CO 4														
CO 5														
CO 6														

Text Books:

- 1. Industrial Robotics / Groover M P /Pearson Edu.
- 2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

Reference Books:

- 1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- 2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
- 3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
- 4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.