

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5E5	L	T	P	L	T	P	Total
Robotics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

**Prerequisite:** Students should have knowledge of fundamentals of microcontroller, Electrical, mechanical drives and software programming.

**Rationale:** This course introduces students to engineering and technology with a focus on robotics and automation through programming. Students will work hands on with their classmates to understand how things operate in real world situations. They will have the opportunity to build, test, and modify robots to meet the requirements for the task assigned to them.

#### Unit 1:

Introduction: Definition, Classification of Robots, Geometric classification and control classification.

#### Unit 2:

Robot Elements: Drive systems, Control systems, sensors, End effectors, Gripper actuators and gripper design.

#### Unit 3:

Drive systems, Control systems, sensors, End effectors, Gripper actuators and gripper design. Robot Coordinate Systems and Manipulator Kinematics: Robot co-ordinate system representation, Transformation, Homogeneous transforms and its inverse, Relating the robot to its world.

#### Unit 4 :

Robot Control: Fundamental principles, Classification, Position, path and speed control systems, adaptive control.

#### Unit 5 :

Robot Programming: Level of robot programming, Language based programming, task level programming, Robot programming synthesis, robot programming for foundry, press work and heat treatment, welding, machine tools, material handling, warehousing assembly, etc., automatic storage and retrieval system, Robot economics and safety, Robot integration with CAD/CAM/CIM, Collision free motion planning.

#### Reference Books:

1. Phillippe Collet , Robotic Technology (Vol. I-V), Prentice Hall
2. YKoren , Robotics for Engineers, McGraw Hill
3. K.S. Fu, R.C. Gonzalez & CSG Lee, Robotics, McGraw Hill
4. J.J. Craig, Robotics, Addison-Wesley
5. Groover, Mitchell Weiss, Nagel Octrey Industrial Robots, McGraw Hill

**Course Outcome:**

After learning the course the students should be able to:

1. Apply the concept of robotics in various systems.
2. Design robot to meet demand in various real time systems.