

IAF - 220

Robotics

(02 credits – 50 marks)

Course Outcomes:

On completion of the course, students should be able to-

1	Classify Robots in different categories.
2	Explain robot kinematics and dynamics.
3	Analyze forward and reverse kinematics
4	Summarize path planning by a Robot.
5	Describe robot manipulator.
6	Program Robot for various applications

Course Contents:

Module- I: Introduction

(06 Hrs)

Specifications of Robots, Classifications of robots, Laws of Robotics, Flexible automation versus Robotic technology, Applications of Robots

Module- II: Robot Kinematics And Dynamics

(06 Hrs)

Positions, Orientations and frames, Mappings: Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations, Transformation Arithmetic, D-H Representation, Forward and inverse Kinematics, Robot Arm dynamics

Module- III: Manipulators

(06 Hrs)

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators, Classification of End effectors (Tools as end effectors), Drive system for grippers(Mechanical, adhesive, vacuum, magnetic, grippers), Hooks & scoops, Gripper force analysis and gripper design, Active and passive grippers.

Module- IV: Path Planning & Programming

(06 Hrs)

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion, straight line motion, Robot Programming

Module-V:

Presentations, case studies, Assignments, Tutorials based on Module I to IV.

Ref. Books:

1. S. R. Deb and S. Deb, 'Robotics Technology and Flexible Automation', Tata McGraw Hill Education Pvt. Ltd, 2010.
2. John J.Craig , "Introduction to Robotics", Pearson, 2009.
3. Mikell P. Groover et. al., "Industrial Robots - Technology, Programming and Applications", McGraw Hill, New York, 2008.
4. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India P Ltd., 2006.
5. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics : Control, Sensing, Vision and Intelligence", McGraw Hill, 1987