Robotics in Medicine

B.E. Sem. VIII [BIOM] (Elective)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral	–	–
Oral Exam	2 Hrs.	25
Term Work	–	25

SYLLABUS

1. **Introduction**
   Automation and Robots, Classification, Application, Specification, Notations.

2. **Direct Kinematics**
   Dot and cross products, Coordinate frames, Rotations, Homogeneous coordinates Link coordination arm equation, (Five-axis robot, Four-axis robot, Six-axis robot).

3. **Inverse Kinematics**
   General properties of solutions tool configuration Five axis robots, Three-Four axis, Six axis robot(Inverse Kinematics).
   Workspace analysis and trajectory planning work envelope and examples, workspace fixtures, Pick and place operations, Continuous path motion, Interpolated motion, Straight-line motion.

4. **Robot Vision**
   Image representation, Template matching, Polyhedral objects, Shane analysis, Segmentation (Thresholding, region labeling, Shrink operators, Swell operators, Euler numbers, Perspective transformation, Structured illumination, Camera calibration).

5. **Task Planning**
   Task level programming, Uncertainty, Configuration, Space, Gross motion, Planning, Grasp Planning, Fine-motion planning, Simulation of planar motion, Source and Goal scenes, Task Planner simulation.

6. **Applications in Biomedical Engineering**
   Application in rehabilitation, Clinical and Surgery

References Books :

1. Fundamentals of Robotics-Analysis and control (*Robert Schilling*) Prentice Hall of India.
2. Robotics (*Fu,Gonzales and Lee*) McGraw Hill
3. Introduction to Robotics (*J.J,Craig*) Pearson Education
4. Robotics and AI (*Staughard*) Prentice Hall Of India.
5. Industrial Robotics (*Grover, Wiess, Nagel, Oderey*) McGraw Hill.
6. Robotics and Mechatronics (*Walfram Stdder*)
7. Introduction to Robotics (*Niku*) Pearson Education.
8. Robot Engineering (*Klafter, Chmielewski, Negin*) Prentice Hall of India.
9. Robotics and Control (*Mittal, Nagrath*) Tata McGraw Hill publications.

❑ ❑ ❑ ❑ ❑ ❑