APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M. TECH DEGREE EXAMINATION
Electronics & Communication Engineering
(Robotics and Automation)
04EC6903- Robotics System Configuration

Max. Marks: 60   Duration: 3 Hours

PART A
Answer All Questions
Each question carries 3 marks

1. Explain the concept of Cartesian coordinate robot.
2. List the challenges and advantages in the inverse kinematics analysis of robot manipulator.
3. Classify the methods of trajectory planning.
4. Examine how joint torque is represented in terms of kinetic energy and potential energy.
5. Evaluate the limitations of integral controller in robot control applications.
6. List the factors affecting the torque of a robotic arm.
7. Differentiate thresholding and preprocessing.
8. List the external sensors used in robotics.

PART B
Each question carries 6 marks

9. "Each robot joints are considered as the origin of a coordinate frame". Evaluate the statement in the contest of kinematic analysis of a robot manipulator.

OR

10. Design a robotic arm to paint the exterior of cars produced in an automobile factory. Analyze the nature of joints, kinematics and dynamics of the robots.

11. Classify the workspaces for robot with the help of neat diagram. Examine the workspace of a 3 DOF manipulator.

OR

12. List the DH parameters for forward kinematics with the help of 3 DOF articulated arm.

13. Differentiate Joint space trajectory planning and Cartesian space trajectory planning.

OR

14. "A pure linear trajectory is not used in robot manipulator". Justify the statement with the methods to compensate the errors in linear trajectory.

15. Illustrate the expression for moment of inertia in a robot joint with suitable equations. Examine its role in the dynamic analysis of a robotic arm.

OR

16. Differentiate the concept of inverse kinematics and inverse dynamics.

17. Develop the linear second order model of a manipulator joint.

OR

18. Illustrate the situations where a linear controller gives an offset error. Explain with neat block diagram.

19. An image is digitalized with 512 samples per line and 256 line scan. Determine the size of image in KB to represent the image in (a) Binary scale (b) Gray level with 8 bits for coding gray levels.

OR

20. A robotic vision system is used to aid the robot to pick parts from a conveyor belt. Parts are only of one type and placed randomly on the conveyer. What information must the vision system acquire from the image to make the robot working intelligently?