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Paper ID [PE520]

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M.Tech.

ROBOTICS AND INDUSTRIAL AUTOMATION (PE - 520/PRE - 218)

Time : 03 Hours **Maximum Marks : 100**

Instruction to Candidates:

1) Attempt any **Five** Questions.
2) **All** questions carry equal marks.

Q1) (a) Differentiate between force control and position control of robotic manipulators. Give suitable examples.

(b) Derive expressions for homogeneous transformation matrices both for rotated as well as translated frame

Q2) (a) Name the basic robotic configurations.

(b) Explain any two robotic configurations with the help of neat sketches

(c) Differentiate between servo and non-servo manipulators

Q3) (a) What are the basic characteristics of a robot-level language? Discuss with the help of an example.

(b) What the different types of pressure control and speed control valves? Discuss with the help of neat sketches.

Q4) Compute the position and orientation of tool tip with respect to the base frame for a two link planar manipulator. Assume the two joints as rotary joints.

Q5) (a) What is a Jacobian? Discuss.

(b) What is the physical explanation of singularities in robotic manipulators?

(c) Differentiate between hydraulic and pneumatic actuators.

Q6) Discuss the Newton-Euler dynamic algorithm for computation of joint torques.

Q7) (a) What are the different principles that can be applied in product design to facilitate automated assembly.

(b) What are the different elements of parts feeding devices? Discuss.

Q8) Write Short note on the following:

(a) Tactile sensors.

(b) Automated guided vehicles.