

Code: R7421002

**R7****B.Tech IV Year II Semester (R07) Advanced Supplementary Examinations June 2012****ROBOTICS AND AUTOMATION****(Electronics & Instrumentation Engineering)**

Time: 3 hours

Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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- 1 (a) Explain the concept of dynamic stabilization of robotics.  
(b) Explain the classification of robots by co-ordinate system.
- 2 (a) Explain about electrical drives.  
(b) Explain about tactile sensors.
- 3 (a) Explain about electronic manipulator.  
(b) Write the various advantages and disadvantages of pneumatic manipulator.
- 4 (a) Explain the construction and operation of hydraulic actuators.  
(b) With a neat diagram explain vacuum cups.
- 5 (a) Derive the expression for potential energy of a robot manipulator by using language Euler formulation.  
(b) Write the forward and backward recursive Newton-Euler equations of motion.
- 6 (a) Explain the position representation of a two dimensional 2-degree of freedom manipulator.  
(b) Determine the time required for each joint of a 3-axis RRR manipulator to travel the following distances using slew motion: joint 1,  $30^\circ$ ; joint 2,  $60^\circ$ ; and joint 3,  $90^\circ$ .  
All joints travel at a rotational velocity of  $30^\circ/\text{S}$ , neglecting effects of acceleration and deceleration.
- 7 (a) What are the constraints for planning joint interpolated trajectory?  
(b) With a neat block diagram explain robot language structure.
- 8 (a) Write short note on robot cell design and selection of a robot.  
(b) Explain the applications of robots in manufacturing side.

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