BME-029

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BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination
June, 2011

BME-029 : ROBOTICS

Time : 3 hours   *Maximum Marks : 70*

*Note :   Assume suitable missing data if any.   Attempt **any five** questions.   Scientific calculator is **allowed**.*

1.   (a)   What are the ways of classifying a robot ?   7
             Name few robot manufacturers and their
             robot programming languages.

      (b)   When are hydraulic actuators preferred in   7
             robots ? What are the differences between
             stepper motor and DC servo motor ?

2.   (a)   What are the different types of Internal   7
             Sensors ? Explain their functional details.

      (b)   Explain selection methodology of actuators   7
             and sensors for a robotic system.

3. (a) Explain direct Cosine representation. 7

(b) Let $[Q_A]_F$ be the rotation of the fixed frame 7
to a new frame A with respect to frame F,
and $[Q_B]_A$ be the rotation of frame A to
another new frame B with respect to
frame A. What is the resultant matrix
representation of frame B with respect to
their original reference frame F, i - e, $[Q]_F$?

4. Explain Algebraic solution of a three link planar 14
manipulator for inverse kinematics problem.

5. Explain and find out Jacobian matrix for a two 14
link planar manipulator.

6. Explain Euler - Lagrange formulation based on 14
kinetic energy.

7. (a) Explain point to point and continuous path 7
planning.
(b) Explain the purpose and importance of feed 7
back control.

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