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**SUBJECT CODE NO:- H-231**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (ECT/E&C) (Sem-II)**  
**Elective-II: Robotics**  
**[Revised]**

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

N.B.:

- i) Q. No.1 & Q.No.6 are compulsory.
- ii) Solve any two questions from the remaining questions in both sections.

## Section A

- Q.1 Solve the following 10
- a) State classification of robot arm.
  - b) Define hard & soft automation.
  - c) What do you understand by homogenous coordinate.
  - d) What is dynamic constraints.
  - e) What are different joints.
- Q.2 07
- a) Discuss in detail the architecture of robot system.
  - b) Explain the implementation of DH motation for a links coordinate system and joint parameters. 08
- Q.3 08
- a) What is homogenous transformation matrix? Explain four sub matrices.
  - b) Explain Newtons&Eulers equation. 07
- Q.4 08
- a) What do you understand by present & future trends in robotics.
  - b) What are vector operations & matrix operations. 07
- Q.5 08
- a) Determine the tool configuration vector of a SCARA robot. When the vector of joint variable is given by 08
- $$q = \left\{0,0,100, \frac{\pi}{2}\right\}^T$$
- b) Write the inverse Kinematic algorithm for the five axis spherical co-ordinate robot. 07

## Section B

- Q.6 Solve the following 10
- a) What are different grippers.
  - b) State different proximity sensors.
  - c) What is image processing.
  - d) What are different electrical actuators.

e) What is object recognition.

- Q.7 a) What are different applications of machine vision system. 07  
b) What image description, Sensing & digitization. 08
- Q.8 a) Explain obstacle avoidance system in robotics. 07  
b) Explain Jacobian in terms D.H matrix. 08
- Q.9 a) What are different force sensors. Explain any one. 07  
b) What are different touch & slip sensors. Explain functions of touch & slip sensors. 08
- Q.10 a) Explain adhesive grippers. 07  
b) Explain magnetic end effectors. 08