

**SUBJECT CODE NO:- E-423**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**B.E.(Mech) Examination Nov/Dec 2017**  
**Robotics and Industrial Automation [Elective-II]**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Attempt any three questions from each section.
  2. Figures to the right indicate full marks.

**Section A**

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|-----|--|----|
| Q.1 | a. What are diff components of Robot? Explain with neat sketch.  | 05 |
|     | b. What are the functions of robot programming language?   | 05 |
|     | c. Compare Hydraulic and Pneumatic drives for Robotic.   | 04 |
| Q.2 | a. What is necessity of coordinate Transformation? What are the different components of Transformation?  | 07 |
|     | b. List out robot programming methods and explain any two of them.   | 06 |
| Q.3 | a. List down types of Proximity sensors & explain in brief Eddy Current proximity sensor.  | 05 |
|     | b. Discuss the general considerations in path description and generation of robot motion.  | 05 |
|     | c. The Co-ordinate of point Q w.r.t base reference frame is given by $(4, 2\sqrt{3}, 5)^T$ which is rotated about OX axis by an angle $60^\circ$ . Determine the Co-ordinate of point Q w.r.t mobile rotated frame of robot. | 03 |
| Q.4 | a. Derive the rotation matrix for transformation about Y axis.   | 05 |
|     | b. Note on Robot Applications- Assembly & Inspection   | 04 |
|     | c. Write short note on   | 04 |
|     | i. Photo-sensors   |    |
|     | ii. Limit switches   |    |
|     | iii. Range sensors   |    |
|     | iv. Proximity sensors  |    |
| Q.5 | a. Define end-effectors & explain the Mechanical Grippers in detail with neat sketch.  | 06 |
|     | b. What is the Potential filed approach for Path Planning in configuration space for kinematics of robots  | 07 |

## Section B

- Q.6 a. Compare the Fixed and Flexible Automation w.r.t function, limits and applications. 06
- b. Explain the Benefits and Limitations of automation. 04
- c. Define the terms w.r.t automation. 04
- i. Sensors
  - ii. Analyzers
  - iii. Actuators
  - iv. Drives
- Q.7 a. Explain Conventional PLC Architecture with the help of block diagram. 06
- b. What is Computer Process Control? Explain its various forms. 07
- Q.8 a. Write note on: 06
- i. Carousel Storage Systems
  - ii. Automated Storage/ Retrieval Systems.
- b. What are the basic Building blocks of Automation? Give their interrelation with each other with help of neat sketch. 07
- Q.9 a. Discuss the Ethical Labor's Attitude towards the usage of Automation in Industries. 07
- b. Explain the following PLC Timers with one example 06
- i. Timer on delay
  - ii. Timer on off delay
  - iii. Retentive timer
- Q.10 a. Give classification of material handling system and explain Screw conveyor & Belt Conveyor system. 07
- b. Write short note on Industrial Control Applications of Thermal Power Plant. 06