

**III B. Tech II Semester Supplementary Examinations, November -2018****ROBOTICS**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

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**PART -A**

- 1 a) Discuss the role of robots in engineering. [3M]
- b) Define degree of freedom. [3M]
- c) Explain briefly about Euler angles. [4M]
- d) What are the challenges of end effectors? [4M]
- e) Explain why path planning is required for a robotic system. [4M]
- f) Discuss the working principle of Acoustic sensors. [4M]

**PART -B**

- 2 a) Describe the functions of the robot. [8M]
- b) With the help of line diagram explain basic components of a Robot system. [8M]
- 3 a) What are the requirements and challenges of end effectors? [8M]
- b) What is meant by Joint gripper? Explain. [8M]
- 4 a) Explain the following [8M]
  - i) Euler angles ii) RPY representation
- b) Derive the Inverse kinematics of the 3-DOF manipulator by considering an example. [8M]
- 5 a) Derive the Denavit and Hartenberg 4×4 transformation matrix. [8M]
- b) Define and explain a geometric Jacobian. [8M]
- 6 a) Explain the various capabilities and limitations of the robot languages. [8M]
- b) Discuss the following categories of program instructions in VAL robot programming: [8M]
  - i) Robot configuration control ii) Motion control
- 7 a) Explain the operation of optical encoder used in robot as a feedback device. [8M]
- b) What are essential characteristics of a spot welding manipulator? [8M]

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