

**B.Tech. – VIEP – MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2017

00424

BIMEE-016 : ROBOTICS

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **five** questions. All questions carry equal marks.

1. (a) What is a robot ? Explain the performance and characteristics of a robot. 7
- (b) What are the advantages, disadvantages and various industrial applications of robots ? 7
2. (a) Explain the working of hydraulic control systems in a robot with a neat sketch. 7
- (b) Describe the mechanical design considerations associated with an industrial robot. 7
3. (a) Explain briefly the architecture of a computer-based intelligent robotic manipulator. 7

- (b) What is a homogeneous transformation matrix? With the help of a sketch, find out the expression in terms of a rotation matrix and a position vector. 7
4. (a) State the desirable features for sensors and transducers employed in robotics. 7
- (b) What are the control techniques applied in robots? Explain. 7
5. (a) What are the potential safety hazards associated with robots in the welding industry? Describe in brief. 7
- (b) Explain how robotic programming is done using high level language. 7
6. (a) What is forward kinematics? How can the equations for forward kinematics be used to find out the workspace of a 2-link planar robot arm with 2 revolute joints? 7
- (b) Describe the various Artificial Intelligence (AI) systems used in robotics. 7

7. Write short notes on any **four** of the following :

$$4 \times 3 \frac{1}{2} = 14$$

- (a) Machine Vision
 - (b) Robot Language Features
 - (c) Safety Guidelines
 - (d) Pneumatic Drives
 - (e) Work Envelope
 - (f) End Effectors
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