

B.E./B.TECH. Degree Examination, December 2020

Seventh Semester

**ME16011- ROBOTICS**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

**PART A - (8 X 2 = 16 marks)**

1. Which of the following "laws" is Asimov's first and most important law of robotics?
  - (a) robot actions must never result in damage to the robot
  - (b) robots must never take actions harmful to humans
  - (c) robots must follow the directions given by humans
  - (d) robots must make business a greater profit
  - (e) robots should be used to eliminate jobs of human workers
2. According to Denavit-Hartenberg's notation the axes selection follows a particular order
  - (a) At first Z, then Y and X axis
  - (b) At first Y, then Z and X axis
  - (c) At first Z, then X and Y axis
  - (d) At first X, then Y and Z axis
3. Robot simulator is a
  - (a) Simulation software used for manual teaching.
  - (b) Robot kinematically equivalent to the main robot to be taught using manual teaching.
  - (c) Simulation software used for lead-through teaching.
  - (d) Robot kinematically equivalent to the main robot to be taught using lead-through teaching.
4. What does a sensor take as its input?
  - (a) An electrical property
  - (b) A physical property
  - (c) A mechanical property
  - (d) A program property
5. List the terminologies involved in gripper force analysis and explain how to calculate it
6. What type of vision is applicable for omnidirectional camera?
7. The term "Interlocks" refers to?
8. Speech recognition falls under which task classifications in AI?

**PART B - (4 X16 = 64 marks)**

09. (a) Classify the robots according to the coordinates of motion. With a sketch (16) and example, explain the features of each type

**(OR)**

(b) Compare between the three drive systems for industrial application to operate the robotic arms, with neat diagrams. **(16)**

10. (a) In an assembly unit for fixing a wind shield, what type of gripper to be used and for door panels what type of gripper to be used. Explain both of them in detail with neat diagram. **(16)**

**(OR)**

(b) Derive Geometrical equation for a robotic arm with two links with an end gripper and for another robotic arm with three links with an end gripper in two dimensional space. **(16)**

11. (a) Determine the type of ability which is required by a machine to identify and fix the position of three dimensional objects? Elaborate the functions of it with block diagram. **(16)**

**(OR)**

(b) With an Industrial application explain the following with its working principle and diagram? **(16)**

1. Optical encoders
2. Laser range meters
3. Capacitive type touch sensors
4. Ultrasonic proximity sensors

12. (a) A Manufacturing Industry decides to implement automation, what are the necessary steps and actions to be followed for successful deployment of automation. **(16)**

**(OR)**

(b) Elaborate in detail with real time application about autonomous cell layout with diagrams. **(16)**