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Question Paper Code: 59509

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Elective

Electronics and Instrumentation Engineering

15UEI909 - ROBOTICS AND AUTOMATION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 1 = 10 Marks)

1. What is the name for information sent from robot sensors to robot controllers? CO1- R
(a) temperature (b) pressure
(c) feedback (d) signal
2. Spherical coordinates can uniquely define the position of a point in up to _____ CO1- R
(a) One dimension (b) Two dimensions (c) Three dimensions (d) Four dimensions
3. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have? CO2 -R
(a) three (b) six (c) four (d) eight
4. Frame grabber is used to CO2- R
(a) archive the image (b) segment the image
(c) process the image (d) capture and store the image
5. In a rule-based system, procedural domain knowledge is in the form of CO3- R
(a) production rules (b) rule interpreters (c) meta-rules (d) control rules

6. End effectors can be classified into two categories which are _____ CO3 -R
 (a) Elbows and wrists (b) Grippers and end of arm tooling
 (c) Grippers and wrists (d) End of arm tooling and elbows
7. Many words have more than one meaning; we have to select the meaning which makes the most sense in context. This can be resolved by CO4- R
 (a) Fuzzy Logic (b) Word Sense Disambiguation
 (c) Shallow Semantic Analysis (d) All of the mentioned
8. Identify which of the following statements is *not* true in the case of inverse kinematics problem, it is much more complex because CO4- R

 (a) The equation to be solved are in general nonlinear in joint variables
 (b) Multiple solutions may exist
 (c) There might be no admissible solutions
 (d) Unique solution may exist
9. A KES knowledge base contains information in the form of CO5- R
 (a) associations (b) actions
 (c) free text (d) all of the mentioned
10. Special programs that assist programmers are called CO5- R
 (a) heuristic processors (b) symbolic programmers
 (c) intelligent programming tools (d) program recognizers

PART – B (5 x 2= 10Marks)

11. Write are the Benefits of industrial automation? CO1- R
12. State the advantages and limitation of a hydraulic drive? CO2- R
13. What is meant by gripper? Mention its classifications. CO3- R
14. What is forward kinematics and where it can be applied? CO4- R
15. List the considerations for the implementation of robot to perform a task in industry. CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Explain a robot structure with a sketch. What are the various types of joints used in robots? CO1- App (16)

Or

- (b) Differentiate between the various generations of robots. CO1 -App (16)
17. (a) With a neat block diagram, describe the different stages of machine vision system. CO2 -App (16)
- Or
- (b) Discuss in detail about the various types of sensors used in robotics. Distinguish between tactile and nontactile sensors. Sketch and explain the working of an acoustic sensor CO2- Ana (16)
18. (a) Explain the different types of speed control methods using electronic components and circuits to control the robot motions? CO3 -Ana (16)
- Or
- (b) What are the design considerations in selection of a gripper? Explain the different types of speed control methods using pneumatic circuits to control the robot motions CO3 -Ana (16)
19. (a) Static characteristics of work which promote application of robots. Discuss robot application for assembly and inspection CO4- U (16)
- Or
- (b) Determine the manipulator Jacobian for the 3-DOF articulated arm. CO4 -U (16)
20. (a) Discuss the different inputs to an inverse kinematics algorithm. Explain the solution of a simple inverse kinematic algorithm CO5- U (16)
- Or
- (b) Explain the any two robot work cell configurations in robot applications. CO5- U (16)

