EIGHTH SEMESTER B.TECH DEGREE EXAMINATION

ELECTIVE V- 13.805.5 ARTIFICIAL INTELLIGENCE AND ROBOTICS (T)

Time: 3 Hours **Max. Marks : 100**

PART – A

(Answer all questions. Each question carries 2 marks.)

1. What is the use of heuristic functions?
2. What is the constraint satisfaction problem?
3. What are the functionalities of an agent function?
4. Give the full specification of a Bayesian network.
5. Differentiate between the terms, accuracy and repeatability of a robotic manipulator ?
6. List out classification of robots.
7. What are robot end effector? How do you classify them.
8. What are the functions of machine vision system?
9. What do you mean by inverse kinematics of manipulators?
10. What are the steps to be followed in the implementation of D-H method?

PART – B

(Answer any one question from each Module.)

Module – I

11.

a) Explain in detail on the characteristics and applications of learning agents. (10 Marks)

b) Explain the following uniformed search strategies
(i) Depth First Search
(ii) Iterative deepening depth –first search
(iii) Bidirectional search (10 Marks)

12.

a) Explain the approach of formulation for constraint satisfaction problems with examples
(10 Marks)

b) Explain the unification algorithm used for reasoning under predicate logic.

(10 Marks)

Module – II

13.

a) Explain the concept of planning with state space search using example.
(10 Marks)

b) List out four common robot configuration and explain its applications.
(10Marks)

14.

a) Describe the basic structure of a robotic system with neat sketch.
(10 Marks)

b) Describe a method for constructing Bayesian networks. (10 Marks)

Module – III

15.

a) Describe the various types of gripper mechanism with neat sketch.

(10Marks)

b) Differentiate between various types of drives used for robot operation.

(10 Marks)

16.

a) Describe the various types of sensors used in robotic system. (10 Marks)

b) Give application of machine vision for robotic guidance. (10 Marks)

Module – IV

17.

a) Using D-H algorithm, obtain the kinematic parameters of a three axis planar articulated robot. Determine the arm matrix using homogeneous transformations. (10Marks)

b) $p_{xyz} = (7,6,5)^T$ and $q_{xyz} = (8,4,6)^T$ are the coordinates with respect to the reference coordinate system, determine the corresponding points p_{uvw}, q_{uvw} with respect to the rotated OUVW coordinate system, if it has rotated 60^0 about the OZ axis.(10Marks)

18.

a)Derive the general form of a Jacobian manipulator. Give an example of the Jacobian matrix of a two link planar revolute manipulator?(10 Marks)

b) Frame (2) is rotated with respect to frame (1) about the X-axis by an angle of 60^o. Also frame (2) is translated such that the position of the origin of frame (2) as seen from frame (1) is (9, 7, 5). Obtain the homogenous transformation matrix which describes frame (2) relative to frame (1). Also find the description of a point P in frame (1) if it is represented in frame(2) as (4,6,8).
(10 Marks).

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