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B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Seventh Semester

Branch : Applied Electronics and Instrumentation Engineering

AI 010 706 L01—ROBOTICS (Elective II)

(New Scheme—2010 Admission onwards)

[Regular/Supplementary]

Time : Three Hours   Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. What do you mean by degree of Freedom of a robotic arm ?

2. What are tactile sensors ?

3. Compare the pneumatic and hydraulic actuators.

4. What are the different components of a robotic manipulator ?

5. What is smoothing ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Define a robot. Define the major components of a robot.

7. Discuss about any one of the types of gripper mechanism.

8. Explain Adaptive control.

9. What are the advantages of teach pendant programming ?

10. What are the major components in robotic vision system ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Explain the anatomy of a robot.

Or

(b) Describe the classification of robots according to their control system.

Turn over

12. Explain the various features of membership functions used in fuzzy logic and also compare their characteristics.

Module 2

13. Final algebraic sum, bounded sum, intersection and product of the two given fuzzy sets A and B respectively :

$$A = \left\{ \frac{1}{2} + \frac{0.6}{4} + \frac{0.5}{6} + \frac{0.3}{8} + \frac{0.2}{9} + \frac{0}{10} \right\}$$

$$B = \left\{ \frac{0}{2} + \frac{0.3}{4} + \frac{0.4}{6} + \frac{0.2}{8} + \frac{0.5}{9} + \frac{1}{10} \right\}$$

Or

14. Explain extension principle with an application.

Module 3

15. Explain the reflexivity, symmetry and transitivity properties of fuzzy relation.

Or

16. Given two fuzzy relations $A(x, y)$ and $B(y, z)$ Compute A o B using Max-Min and Max product composition.

$$A = \begin{bmatrix} 0.2 & 0.3 \\ 0.5 & 0.7 \end{bmatrix}$$

$$B = \begin{bmatrix} 0.3 & 0.6 & 0.7 \\ 0.1 & 0.8 & 0.6 \end{bmatrix}$$

Module 4

17. Describe an application of fuzzy logic in pattern recognition.

Or

18. Discuss the fuzzy C-means algorithm.

Module 5

19. With a block diagram explain a fuzzy logic controller.

Or

20. (a) Illustrate negation, Conjunction, disjunction and implication operation on fuzzy sets with examples.

    (b) Compare sugeno and mamdani fuzzy inference systems.

$$(5 \times 12 = 60 \text{ marks})$$