

GANPAT UNIVERSITY

M.Tech. [ME (AMT)] SEM – II MECHANICAL ENGINEERING

REGULAR EXAMINATION - JULY 2013

SUBJECT: 3ME205 ROBOTICS & ARTIFICIAL INTELLIGENCE

TIME: 03 HOURS

TOTAL MARKS: 70

INSTRUCTIONS:

1. Both the sections must be attempted in a separate answer-book.
2. Assume suitable data if required and mention it clearly.
3. Figures to the right indicate full marks.

SECTION – I

1. Answer the following questions 12
 - A. By giving an appropriate example explain Breadth First Search procedure.
 - B. Using Constraint satisfaction find out the numeric values for given letters. Each letter should be assigned unique digit from 0 to 9.

$$\begin{array}{rcccccc} & & C & R & O & S & S \\ + & & R & O & A & D & S \\ \hline = & D & A & N & G & E & R \end{array}$$

OR

1. Answer the following questions 12
 - A. Explain A* algorithm with an example.
 - B. Classify following problems according to whether decomposable / ignorable / recoverable / irrecoverable.
(i) Water-Jug (ii) Tower of Hanoi (iii) 8 Puzzle
2. Answer the following questions 11
 - A. Explain following terms.
(i) Chronological Backtracking (ii) Combinatorial Explosion (iii) Heuristic.
 - B. Explain the terms in reference to the artificial intelligence:
(i) Machine Intelligence (ii) Knowledge (iii) Backtracking

OR

2. Answer the following questions 11
- A. Discuss Steepest Ascent Hill Climbing with suitable example.
 - B. Explain application of ANN in performance predication in hard turning with minimal quantities of cooling lubricants.
3. Answer the following questions 12
- A. Explain working of Artificial Neural Network works? Explain Robertson Perception Model of Artificial Neural Network.
 - B. Write a note on Expert system & Decision support system.

SECTION – II

4. Answer the following questions 12
- A. How an industrial robot is specified?
 - B. What is joint space and task space? What do you understand by redundant robot?

OR

4. Answer the following questions 12
- A. Explain the terms
 - (i) Static analysis of robot
 - (ii) Dynamic analysis of robot
 - B. Enlist different kinds of sensors used in robots. Discuss the parameters to be considered for selecting them for robot.
5. Answer the following questions 11
- A. Explain singularity in reference of robotics?
 - B. What is degree of freedom in robotics?

OR

5. Answer the following questions 11
- A. Enlist the limitations of the serial type robots. Suggest any alternative to come out from these problems.
 - B. In robotics why we need to study forward kinematics and inverse kinematics individually?
6. Answer the following questions 12
- A. Explain following terminologies:
 - (i) Repeatability (ii) Accuracy, error
 - (iii) Trajectory planning (iv) work volume
 - B. Derive DH-parameters for a link attached to a fixed link with revolute joint.

END OF PAPER