Ex. Seat No._____

GANPAT UNIVERSITY

M.Tech Sem. II[nd] Mechanical(CAD-CAM)

External Examination June 2012

3ME214 Robotics & Intelligence Manufacturing

Time: 3 Hrs **Marks: 70**

Instructions:

(i) All questions are compulsory.
(ii) Answers to two sections must be written in separate answer sheets.
(iii) Assume suitable data wherever necessary.
(iv) Figure to right indicates marks.

SECTION – I

Q1	Answer the following Questions :	**12**
(a)	Discuss Steepest Ascent Hill Climbing with suitable example.	
(b)	Classify following problems according to whether Decomposable, ignorable/recoverable/irrecoverable. (ii) Water-Jug (ii) Tower of Hanoi (iii) 8 Puzzle	
(c)	Explain turing test?	
	OR	
Q1(a)	Discuss merits & demerits of BFS and DFS.	**12**
(b)	Explain various fields of AI in brief.	
(c)	Differentiate between fuzzy set and crisp set.	
Q2(a)	How real world problem is presented in state space? Explain with example.	**12**
(b)	Explain briefly the terms cell body, axon, synapse, dentries, and neuron with references to a biological neural network.	
(c)	Explain knowledge triangle in detail.	
	OR	
Q2(a)	Discuss the major problems faced by an expert system.	**12**
(b)	What is meant by topology of ANN? Give few basic topological structure of ANN?	
(c)	What is AI and discuss current trends of AI used in robotics in brief.	
Q3	Answer any **Three** form the following Questions:	**11**
(a)	Explain different tanning algorithms of ANN with its terminology.	
(b)	Design methodology of fuzzy controller and explain rules for controlling an optimization of robot trajectory.	
(c)	Explain Intuition and rank order fuzzyfication methods with examples.	
(d)	How ANN works? Explain Robertson perception Model of ANN.	

SECTION – II

Q4	Answer the following Questions :	**12**
(a)	Compare a robot manipulator with human hand for their capabilities.	
(b)	List component of a Robot with any configuration (A base fixed or movable,) and explain function of each in detail.	
(c)	State guide lines to obtain close form solutions for an inverse kinematics problem.	

OR

Q4 Answer the following Questions : **12**

(a) Explain inverse and forward kinematics. Give name of parameters are input in inverse and forward kinematics.

(b) Classify basic robot manipulator configuration with their specific characteristic, merits & demerits.

(c) List and explain in brief with sketch different schemes of wrist orientation having 1DOF, 2DOF & 3 DOF.

Q5(a) Explain with sketch Denavit-Hartenberg notation for kinematics parameters, define each parameter. **12**

(b) Prove that here rotation performed about fixed axes give the same final orientation as obtained by the same three rotations performance in the opposite order about the moving axes. i.e. Rxyz ($\varphi 3$, $\varphi 2$, $\varphi 1$)= Rwvu ($\varphi 1$, $\varphi 2$, $\varphi 3$)

OR

Q5(a) Explain the effect of order of rotation, of an object sketch and why same is importance for matrix multiplication? **12**

(b) For a 3 DOF articulated arm, you analyzed in your practical, the home position is defined keeping first two links vertical & last link along with end effecter horizontal, obtain tool transformation matrix Also determine the tool position for $g=[0,-90,90]^T$ and show that it is the same as original home position.

Q6 Answer any **Three** form the following Questions: **11**

(a) Give design consideration for Mechanical Gripper. Explain importance of duel gripper over single gripper in machine loading /unloading application.

(b) What are the characteristics that an end effecter most satisfies?

(c) Explain the terms

(i) Solvability of an inverse kinematic model
(ii) Multiple solutions
(iii) Redundant manipulator
(iv) Solution techniques for inverse kinematics

(d) Analysis carefully the process using a robot to pick eggs. discuss the design consideration for a robotic system to pick eggs.
