Max. Marks: 50   **Duration: 1 Hr. 45 Min.**

Class: TY B.Tech   Semester: VI

Name of the Course: Artificial Intelligence   Branch: Computer Engg.

Course Code: 2UCC603

Instructions:
1. **All questions are compulsory**
2. **Draw neat diagrams**
3. **Assume suitable data if necessary**

Question No.		Max Marks

Q1 (A)	Solve the following multiple choice questions.
	
	1. Which one of the following statements is true?
	    a. BFS runs out of memory before it runs out of time.
	    b. BFS runs out of time before it runs out of memory.
	    c. Typically, BFS needs less memory than DFS for the execution
	    d. BFS is good choice when the branching factor is large
	
	2. For a given problem, there could be ____ partial order plan(s), while there could be ____ total order plan(s).
	    a. One, many
	    b. Many, many
	    c. Many, one
	    d. One, one
	
	3. Choose the correct FOL representation for the given statement. <u>No mortal can live for more than 150 years.</u>
	    a. $\forall$ m,t1,t2: mortal(m) $\cap$ born(m,t1) $\cap$ greater_than(t2-t1,150) $\rightarrow$ dead(m,t2)
	    b. $\forall$ m,t1,t2: mortal(m) $\cap$ born(m,t1) $\cap$ greater_than(t2-t1,150) $\rightarrow$ ~alive(m,t2)
	    c. ~$\exists$ m,t1,t2: mortal(m) $\cap$ born(m,t1) $\cap$ greater_than(t2-t1,150) $\cap$ dead(m,t2)
	    d. ~$\exists$ m,t1,t2: mortal(m) $\cap$ born(m,t1) $\cap$ greater_than(t2-t1,150) $\cap$ ~alive(m,t2)
	
	4. Consider two chromosomes, X1: ABCDEFG and Y1: ZYXVUTS. If one chooses two point crossover as 3:3:1 then the new chromosomes after the crossover would be:
	    a. X1' :AYCVDETG Y1': ZBXDUFS
	    b. X1' : ZYXDEFS Y1': ABCVUTG
	    c. X1' :ABCVUTG Y1': ZYXDEFS
	    d. X1' :AYXVEFG Y1': ZBCDUTS
	
	5. A problem may have _____heuristic(s).
	    a. Only one
	    b. Many
	    c. Maximum two
	    d. Maximum 5
		10

	6. Which one of the following statements is true?
	   a. Every rule based reasoning system is also a case based reasoning system, but the reverse isn't always true.
	   b. Case based reasoning system and rule based reasoning system are totally different; they don't have subset-superset relationship between them.
	   c. Every case based reasoning system and rule based reasoning system are mutually exclusive.
	   d. Every case based reasoning system is also a rule based reasoning system, but the reverse isn't always true.
	
	7. Properties of knowledge are:
	   a. Hard to characterize, voluminous, constantly changing.
	   b. Unpredictable, hard to measure, constantly changing.
	   c. Laziness of collecting knowledge, practical and conceptual ignorance
	   d. Hard to represent, hard to collect, hard to maintain
	
	8. Human mind uses_____ for reasoning process.
	   a. Forward chaining
	   b. Backward chaining
	   c. Resolution
	   d. Proof by refutation
	
	9. The snakes and ladders belong to _____category of games.
	   a. Deterministic, static, strict alternate, multiplayer
	   b. Non-Deterministic, static, no-strict alternate, multiplayer
	   c. Non-Deterministic, dynamic, no-strict alternate, multiplayer
	   d. Deterministic, dynamic, no-strict alternate, multiplayer
	
	10. The most appropriate agent architecture for a psychological counseling agent would be:
	   a. Learning with goal based architecture as performance element
	   b. Learning with utility based architecture as performance element
	   c. Learning with reflex based architecture as performance element
	   d. Learning agent architecture	

Q1 (B)	Attempt any FIVE questions out of the following (any 5 out of 7) 1. Explain the concept of alpha and beta values in adversarial search with a suitable example. 2. Discuss the "Thinking rationally approach". State its limitations. 3. Discuss the sequence in which variable-constraint assignments are considered by CSP algorithms to improve the backtracking efficiency? 4. List various algorithm families those could be used by an expert system's inference engine. 5. State which one of the problem characteristics are applicable to Tower of Hanoi problem. 6. State and discuss the things those AI cannot do even in today's technically developed era. 7. Discuss applications of natural language processing.	10

Q. 2	Consider following set of statements. 1. Lucy is a professor 2. All professors are people. 3. John is the dean. 3. Deans are professors. 4. All professors consider the dean a friend or don't know him. 5. Everyone is a friend of someone. 6. People only criticize people that are not their friends. 7. Lucy criticized John. Represent the statements in FOL. Prove: Lucy and John aren't friends using forward chaining **OR** backward chaining.	10

Q. 3	A. Consider a plan of getting COVID 19 vaccine at the vaccination center at in the nearby hospital. Right from scheduling appointment to actually getting the vaccine,
	    a. List down uncertainties in the plan.
	    b. Give at least two plans considering the above mentioned uncertainties.
	B. Consider a Life expectancy Problem-It is known that whether or not a person has cancer, is directly influenced by whether (s)he is exposed to second-hand smoke and whether (s)he smokes. Both of these things are affected by whether her parents smoke. Cancer reduces a person's life expectancy.
	    a. Draw Bayesian network for the abovestated problem
	    b. Assign probabilities to each node in the network.
	    c. Compute probability of reduction in life expectancy if the person's parents are nonsmoker, but the person is a smoker and is suffering from lung cancer.
		4 + 6

Q. 4	A. Give ADL description for wearing socks and shoes problem. B. Differentiate between STRIPS and ADL. C. Comment on strengths and weaknesses of decision trees.	4+3+3