

DEPARTMENT OF COMPUTING TECHNOLOGIES

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year 2022-2023 (EVEN)

Test: CLAT-1

Course Code & Title: 18CSC305 & AI

Year & Sem: : III & VI

Date: 22.02.2023

Duration: 50 mins

Max. Marks: 25

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	H	-	-	-	M	L	-	H
CO2	M	H	H	H	H	-	-	-	M	L	-	H
CO3	M	H	H	M	H	-	-	-	M	L	-	H
CO4	M	H	M	H	H	-	-	-	M	L	-	H
CO5	M	H	H	H	H	-	-	-	M	L	-	H
CO6	L	H	M	M	H	-	-	-	H	L	-	H

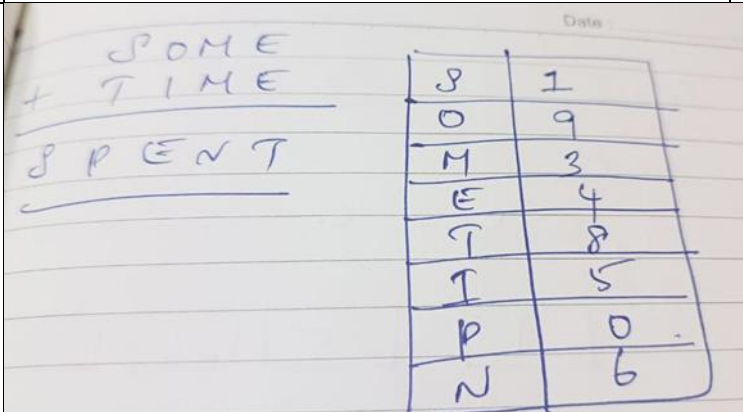
Part - A
(10 x 1 = 10 Marks)

Instructions: Answer all

Q. No	Answer with choice variable	Marks	BL	CO	PO	PI Code
1	c. III-Structured	1	1	1	2	2.1.1
2	d. Heuristic	1	1	1	1	1.2.1
3	b. Partially Observable	1	1	1	2	2.1.1
4	d. 1, 2, 3 and 4	1	1	1	1	1.2.1
5	b. Reaction	1	1	1	1	1.2.1
6	d. Utility based agent	1	1	1	1	1.2.1
7	c. Single-state problem	1	1	1	2	2.1.1
8	a. Learning agent	1	1	1	1	1.2.1
9	d.16	1	1	1	2	2.1.1
10	b. Utility based agent	1	1	1	2	2.1.1

Part - B
(3 x 5 = 15 Marks)

11	<p>Types of Agents are,</p> <ul style="list-style-type: none"> a. Table-driven agents b. Simple Reflex Agents c. Model-based reflex Agents d. Goal-based Agents e. Utility-based Agents <p>Table-driven Agents (Any Two)</p> <ul style="list-style-type: none"> • Agents are based on simple table which entries determine the action (Percept to Percept Sequence) <p>Drawbacks:</p> <ul style="list-style-type: none"> • Size of the Table • Time to build the table • No Autonomy • Time required for learning <p>Simple Reflex Agents</p> <ul style="list-style-type: none"> • Agents accountable only to the current percept • Action is decided based on rules (Condition) • Agents are limited with intelligence 	5	1	1	2	2.1.1
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	<ul style="list-style-type: none"> Can not handle the complex scenario Simple Reflex Agents may stuck in infinite loops incase of unavailability of some sensors Use of randomise simple reflex agents can solve problem (to some extent) Randomization may impact rational behaviour <p>Model-based Reflex Agents</p> <ul style="list-style-type: none"> Percept history is maintained (Using internal states) Agents reflect some of the unobserved aspects of the current state Incorporating things in determining the unobserved aspects is called model Model keeps track the past sequence of percept to determine the unseen part and impact of actions on environment. <p>Goal-based Agents</p> <ul style="list-style-type: none"> Goal of Decision-Making is considered Goal based action is very complicated and need a sequence of actions Decision-Making checks the impact of actions with reference to the goal Less efficient but more flexible <p>Utility-Based Agents</p> <ul style="list-style-type: none"> Selection is described by the utility function Utility Function is most often a real number that maps to degree of happiness Complete specification of utility function helps in rational decision-making 					
12		5	1	1	2	2.2.3
13	<p>Problem solving-process of generating solutions for the given situation</p> <ul style="list-style-type: none"> Problem is defined, <ol style="list-style-type: none"> in a context has well defined objective solution has set of activities uses previous knowledge and domain knowledge Primary objective-problem identification Problem solving technique involves <ol style="list-style-type: none"> problem definition problem analysis and representation planning execution evaluating solution consolidating gains A search algorithm takes a problem as input and returns a solution in the form of an action sequence. execution phase-Once a solution is found, the actions it recommends can be carried out. <p>Formulating problems</p> <ul style="list-style-type: none"> Problem formulation is the process of deciding what actions and states to consider, and follows goal formulation. Goal formulation-the agent may wish to decide on some other 	5	1	1	2	2.1.1

	<p>factors that affect the desirability of different ways of achieving the goal.</p> <ul style="list-style-type: none"> Knowledge and problem types <p>single-state problem-Agent knows exactly what each of its actions does and it can calculate exactly which state it will be in after any sequence of actions.</p> <p>multiple-state problem-when the world is not fully accessible, the agent must reason about sets of states that it might get to, rather than single states.</p> <p>contingency problem-the agent may be in need to now calculate a whole tree of actions, rather than a single action sequence in which each branch of the tree deals with a possible contingency that might arise.</p> <p>exploration problem-the agent learns a "map" of the environment, which it can then use to solve subsequent problems.</p> <ul style="list-style-type: none"> Well-defined problems and solutions <p>A problem is really a collection of information that the agent will use to decide what to do.</p> <p>Elements of a problem:</p> <ol style="list-style-type: none"> The initial state that the agent knows itself to be in. The set of possible actions available to the agent. <p>operator is used to denote the description of an action to reach a state.</p> <p>state space-the set of all states reachable from the initial state by any sequence of actions.</p> <p>A path in the state space is simply any sequence of actions leading from one state to another.</p> <ol style="list-style-type: none"> The goal test, which the agent can apply to a single state description to determine if it is a goal state. A path cost function is a function that assigns a cost to a path. The output of a search algorithm is a solution, that is, a path from the initial state to a state that satisfies the goal test. <ul style="list-style-type: none"> Measuring problem-solving performance <p>Solution is obtained or not</p> <p>Obtained solution is good solution or not(with a low path cost)</p> <p>Search cost-associated with the time and memory required to find a solution.</p> <p>total cost of the search is the sum of the path cost and the search cost</p> <ul style="list-style-type: none"> Choosing states and actions <p>To decide a better solution, determine the measurement of path cost function The process of removing detail from a representation is called abstraction</p>					
14	<p>AI Models</p> <p>Semiotic models- Based on sign process, signification or communication</p> <p>Statistical models- representation and formalization of relationships through statistical techniques.</p> <ul style="list-style-type: none"> History of data for decision making uses probabilistic approaches <p>Data Acquisition and Learning Aspects in AI</p> <ul style="list-style-type: none"> Knowledge Discovery- data mining and machine learning: <ul style="list-style-type: none"> data-recorded facts information-pattern underlying the data data mining or knowledge discovery-extraction of meaning information. machine learning-algorithms that improve performance with experience Computational Learning Theory(COLT)- formal mathematical models defined <ul style="list-style-type: none"> complexity-computation, prediction and feasibility analyze patterns-Probably Approximately Correct(PAC)-hypothesis mistake bound-target function Neural and evolutionary computation- speed up mining of data <ul style="list-style-type: none"> evolutionary computing- biological properties decision making and optimization Neural computing-neural behavior of human being pattern recognition and classification 	5	1	1	2	2.1.1

	<p>Data Acquisition and Learning Aspects in AI</p> <ul style="list-style-type: none">• Intelligent agents and multi agent systems- decision making in complex scenarios Intelligent agents –based on knowledge, available resources and perspectives <p>multi agent systems- combination of more than one percept of intelligent agents</p> <ul style="list-style-type: none">• Multi-perspective integrated intelligence-utilizing and exploiting knowledge from different perspective					
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Academic Year: 2022-2023 EVEN

Test: CLAT-1

Course Code & Title: 18CSC305J - Artificial Intelligence

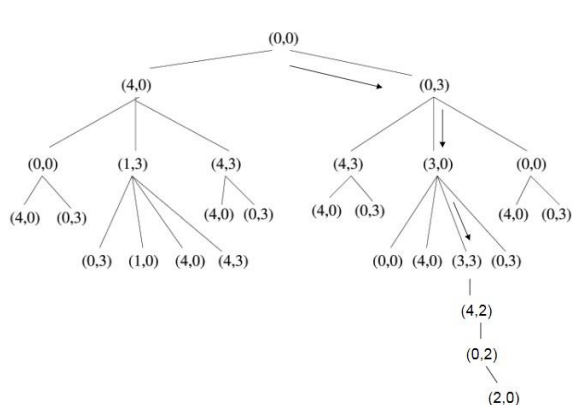
Year & Sem: III/VI

Course Articulation Matrix: (to be placed)

Date: 22.02.2023

Duration: 50 mins

Max. Marks: 25 marks

Part - A (10 x 1 = 10 Marks)						
Instructions: Answer all						
Q. No	Answer with choice variable	Marks	BL	CO	PO	PI Code
1	b. Perceiving, thinking, and acting	1	1	1	2	2.1.1
2	c. Linear problems	1	1	1	2	2.1.1
3	a. Target based agents	1	1	1	1	1.2.1
4	b. Reaction	1	1	1	1	1.2.1
5	b. Data directed problems	1	1	1	2	2.1.1
6	a. Representing your problem with variable and parameter	1	1	1	2	2.1.2
7	a. Architecture and Program	1	1	1	2	2.1.1
8	c. Successor function	1	1	1	1	1.2.1
9	d. iterative	1	1	1	1	1.1.1
10	a. Sensors and Actuators	1	1	1	1	1.1.2
Part – B (3 x 5 = 15 Marks)						
11	Explain the categories of problems in AI with suitable illustrations. Ans: Structured problems–goal state defined Unstructured problems–goal state not known Linear problems–based on dependent variable Nonlinear problems–no dependency between variables	5	1	1	2	2.1.1
12	Generate state space tree for the following water jug problem. Given: Jug 1 – 4 liters of water Jug 2 – 3 liters of water Goal state: Jug 1/Jug 2 – 2 liters of water Ans: <div style="display: flex; align-items: center;"> <div style="background-color: blue; color: white; padding: 5px; margin-right: 10px; writing-mode: vertical-rl; transform: rotate(180deg);"> Depth first Breadth first </div>  </div>	5	1	1	2	2.4.1
13	Discuss all the 7 problem characteristics with suitable example. Ans: Problem Characteristics:	5	1	1	2	2.1.1

	<p>To choose an appropriate method for a particular Problem:</p> <ul style="list-style-type: none"> • Is the problem decomposable? • Can solution steps be ignored or undone? • Is the universe predictable? • Is a good solution absolute or relative? • Is the solution a state or a path? • What is the role of knowledge? • Does the task require human- interaction? 					
14	<p>Solve the following crypt arithmetic problem. FORTY+TEN+TEN=SIXTY Ans: Solution: <pre> 29786 + 850 + 850 ----- 31486 </pre> Column 1: N is either 0 or 5. If N=5, then the carry to Col2 is 1 and there is no possible value for E, so N=0. Column 2: E is either 0 or 5, but N=0, so E=5, and the carry to Col3 is 1. Column 4: I is either 0 or 1, but N=0, so I=1, O=9, carry from Col3 is 2, and the carry to Col5 is 1. Column 3: For $1+R+T+T \geq 20$, R and T must be in {6,7,8}. Column 5: $F+1=S$, so {F,S} is either {2,3} or {3,4}, so X is not 3. Column 3: $1+R+T+T = 22$ or 24, so R is odd and must be 7, $2T=14$ or 16, T is 7 or 8, but $R=7$, so $T=8$, $X=4$. Column 5: $F=2$, $S=3$. Column 1: $Y=6$.</p>	5	1	1	2	2.2.3