GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2020-2021

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

IT504B

TIME ALLOTTED: 3 Hours **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	(i)	Traditional AI techniques still used today include all of the following EXCEPT: a) Robotic b) Medical diagnosis c) Pattern recognition d) Net surfing	1	CO1
	(ii)	How do you represent "all dogs have tails"? a) ∀x : dog(x) => has tail (x) b) ∀x : dog(x) => has tail (y) c) ∀x : dog(y) => has tail (x) d) ∀x: dog(x) => has - tail (x).	1	CO1
	(iii)	A* algorithm is based on a) Breadth-First-Search b) Depth-First –Search c) Best-First-Search d) Hill climbing	1	CO1
	(iv)	Which is the commonly used programming language for AI? a) PROLOG b) Python c) LISP d) All of the mention	1	CO4
	(v)	Fuzzy logic is a form of a) Binary set logic b) Crisp set logic c) Multi-valued logic d) All of the mention	1	CO4
	(vi)	Which search uses the problem specific knowledge beyond the definition of the problem? a) Informed search b) Depth-first search c) Breadth-first search d) Uninformed search	1	CO1

(vii) A) Knowledge base (KB) is consists of set of statements. 1 CO2
B) Inference is deriving a new sentence from the KB. Choose the correct option.
a) A is true, B is true
b) A is false, B is false
c) A is true, B is false
d) A is false, B is true

(viii) Which is created by using single propositional symbol? 1 CO2
a) Complex sentences
b) Atomic sentences
c) Composition sentences
d) None of the mentioned

(ix) In Baye's theorem, what is the meant by P(Hi|E)? 1 CO3
a) The probability that hypotheses Hi is true given evidence E
b) The probability that hypotheses Hi is false given evidence E
c) The probability that hypotheses Hi is true given false evidence E
d) The probability that hypotheses Hi is false given false evidence E

(x) What is the heuristic function of greedy best-first search? 1 CO1
a) f(n) != h(n)
b) f(n) < h(n)
c) f(n) = h(n)
d) f(n) > h(n)

(xi) Which search is complete and optimal when h(n) is consistent? 1 CO4
a) Best-first search
b) Depth-first search
c) Both a & b
d) A* search

(xii) "All employees of the AI-Software Company are programmers" is written in FOPL as 1 CO3
a) (AI-Software-co-employees X) → Programmers (X))
b) (∃X) (AI-Software-co-employees (X) → Programmers (X))
c) (∀X) (AI-Software-co -employees (X) ∧ Programmers (X))
d) (∀X) (AI-Software-co-employees (X) → Programmers (X)).

GROUP – B
(Short Answer Type Questions)

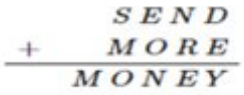
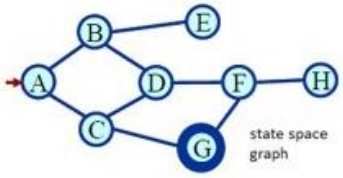
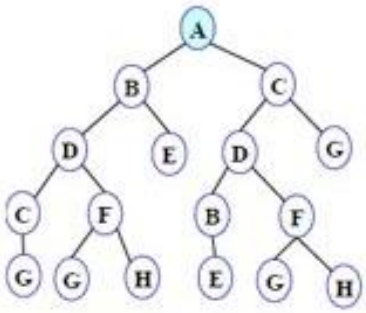
Answer any ***three*** from the following: **3×5=15**

			Marks	CO No
2.	(a)	What are the tasks of an agent? How do measure the performance of an agent?	3	CO1
	(b)	What are the constituent intelligent behaviors?	2	CO1
3.	(a)	You have given an 8-gallon jug and another 3-gallon jug. Neither has measuring marker on it. You have to fill the jugs with water. How can you get exactly 2 gallons of water in to 3 gallons jug?	4	CO1
	(b)	Explain different types of AI.	1	CO1
4.		Given the following predicate Logic statements: i) ∀X ((Bird (X) ∨ Bat (X)) → Fly (X)) ii) ∀ X (Has-feather (X) ∧ Belongs-to-Avis-class (X) → Bird (X)) iii) Has-feather (parrot) iv) Belongs-to Avis-class (parrot) Prove be resolution the Fly (parrot) follows from the statements (i) through (iv)	5	CO1

			Marks	CO No
5.	(a)	Differentiate fully observable and partially observable environment.	2	CO1
	(b)	Explain the architecture of reflex agent.	3	CO1
6.	(b)	Using the Crypt arithmetic Algorithm solve the following problem: CROSS + ROADS = DANGER	5	CO3

GROUP – C
(Long Answer Type Questions)

Answer any ***three*** from the following: **3×15=45**

			Marks	CO No
7.	(a)	State and explain Turing test? What do you conclude from this test?	4	CO1
	(b)	What is N-queens problem? Solve 4-queens problem.	5	CO1
	(c)	If SEND+MORE=MONEY then replace each letter by distinct digit so that the resulting sum is correct 	6	CO4
8.	(a)	What is blind search? State various blind search algorithms.	5	CO2
	(b)	State and explain the evaluating factors of searching algorithm.	5	CO2
	(c)	In the following graph, G represents the goal node. Draw the search tree from this graph. 	5	CO2
9.	(a)	What is BFS? Explain the properties of BFS.	5	CO3
	(b)	Apply BFS on the search tree to reach the goal (G) and find the expansion order. 	5	CO3
	(c)	State and explain depth first iterative deepening search. What are the advantages of this search?	5	CO3
10.	(a)	What is Heuristic function? Explain with example.	5	CO3
	(b)	Differentiate best first search and greedy best first search.	3	CO3
	(c)	Apply A* Search on the following 8-puzzle problem. 	7	CO3

11.		Write short notes on any *three* of the following:	3x5	
	(a)	Hill Climbing Search	5	CO4
	(b)	Mini-max vs Alpha-Beta cut algorithm	5	CO4
	(c)	Expert System	5	CO4
	(d)	Learning Decision Tree	5	CO2
	(e)	Reinforcement Learning	5	CO1