GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
ARTIFICIAL INTELLIGENCE
EI603C

TIME ALLOTTED: 3HR **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)	Artificial Intelligence is about_____. a. Playing a game on Computer b. Making a machine Intelligent c. Programming on Machine with your Own Intelligence d. Putting your intelligence in Machine	1	CO1
	(ii)	Select the most appropriate situation for which a blind search can be used. a. Real life situation b. Small Search Space c. Complex game d. All of the above	1	CO2
	(iii)	If a robot is able to change its own trajectory as per the external conditions, then the robot is considered as the__ a. Mobile b. Non-Servo c. Open Loop d. Intelligent	1	CO1
	(iv)	A technique that was developed to determine whether a machine could or could not demonstrate artificial intelligence is known as a. Boolean Algebra b. Turing Test c. Logarithm d. Algorithm	1	CO1
	(v)	Let P and Q be proposition symbols. Which of the followings are the models of $\neg P \vee Q \rightarrow \neg P \wedge Q$ a. P = False, Q = False b. P = False, Q = True c. P = True, Q = False d. P = True, Q = True	1	CO3

(vi) Which of the following is a declarative knowledge? 1 CO3
a. A set of production rules
b. Using LISP code to define a value
c. Describing the objects using a set of attributes and associated values
d. A knowledge about the order in which to pursue the sub goals

(vii) Which agent deals with the happy and unhappy state? 1 CO2
a. Utility-based agent
b. Model-based agent
c. Goal-based Agent
d. Learning Agent

(viii) A* algorithm is based on _____ 1 CO2
a. Breadth-First-Search
b. Depth-First-Search
c. Uniform Cost Search
d. Best-First-Search

(ix) Which of the following is tautology (i.e. all outcomes are True in truth table)? 1 CO3
a. $p \rightarrow (p \rightarrow q)$
b. $(pvq) \rightarrow q$
c. $pv(p \rightarrow q)$
d. $pv(q \rightarrow q$

(x) Which of the following is a non-AI problem? 1 CO4
a. 8-Queen problem
b. Water Jug problem
c. Factorial calculation problem
d. Graph coloring problem

(xi) Uninformed search is also known as 1 CO2
a. Heuristic Search
b. Intelligent Search
c. Best First search
d. Blind Search

(xii) Which agent deals with happy and unhappy states? 1 CO1
a. Utility-based agent
b. Model-based agent
c. Goal-based Agent
d. Learning Agent

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following) **3 x 5 = 15**

			Marks	CO No.
2.		State and prove Bayesian probabilistic theorem with a suitable example.	5	CO4
3.	a)	What do you mean by AI?	1	CO1
	b)	Explain Turing Test in brief	4	CO1

4.		Convert the following sentences into predictive logic: i. If a = b and b = c then a = c. ii. Neither it is hot nor cold today. iii. He goes to play a match if and only if it does not rain iv. It is false that he is poor but not honest v. Neither the red nor the green is available in size 5	5	CO3
5.		Consider the following two statements- S1: Ticket is sufficient to enter movie theater. S2: Ticket is necessary to enter movie theater. Which of the statement is/ are logically correct (use predicate calculus)?	5	CO4
6.		You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring mark on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug. Solve the problem by state space analysis and draw the state apace tree.	5	CO2

GROUP – C
(Long Answer Type Questions)

(Answer any *three* of the following) **3 x 15 = 45**

			Marks	CO No.
7.	a)	What do you mean by Agent Architecture in AI? What are the different types of Agent Architecture?	2	CO1
	b)	Mention the demerits of Table based Agent Architecture.	2	CO1
	c)	i. What do you mean by Episodic and sequential environments in AI?	4	CO1
		ii. What is agent program?	1	CO1
	d)	Explain the Goal - based Architecture and Utility- based Architecture with suitable diagram.	6	
8.	a)	Consider the following arrangement – 8 puzzle problem and solve the problem using Heuristic search. Mention all the Rules and define the state space. Write and explain all the operations.	7	CO3

Initial State

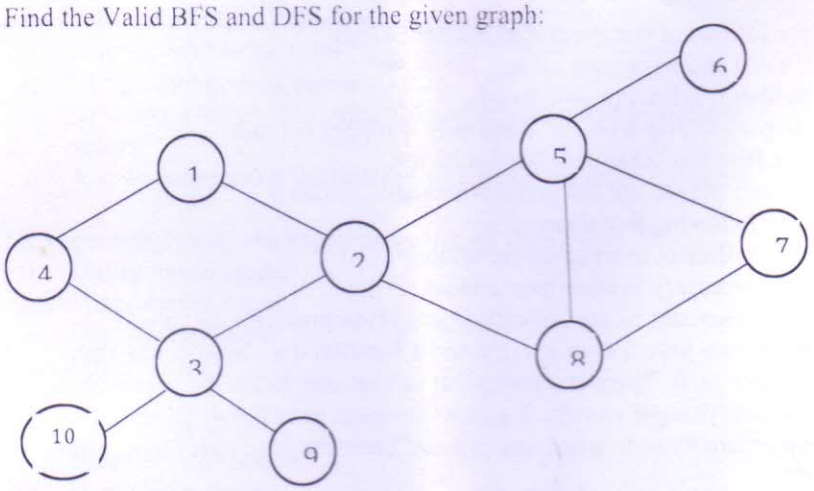
2	8	3
1	6	4
	7	5

Goal State

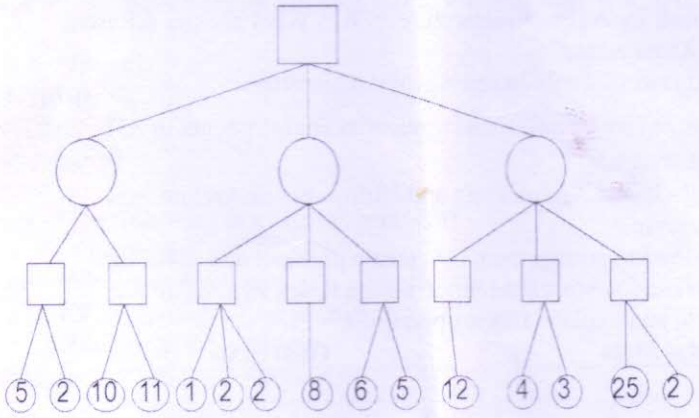
1	2	3
8		4
7	6	5

	b)	Three Missionaries and three Cannibals wish to cross the river. They have a small boat that will carry up to two people. Everyone can navigate the boat. If at any time the Cannibals outnumber the missionaries on either bank of the river, they will eat the missionaries. Find the smallest number of crossings that will allow everyone to cross the river safely.	5	CO2
	c)	Formulate the problem of playing Tic-Toe and solve it to reach the Goal states by AI approach. Assume the goal states as per your choice.	3	CO1
9.	a)	"If SRK plays hero's part, then the movie will be hit, if the plot is not too melodramatic. If SRK plays the hero's part, the plot will not be too melodramatic. Therefore, if SRK plays hero's part, the movie will be a hit." Is it a valid argument?	5	CO3

	b)	Find the Valid BFS and DFS for the given graph:	6	CO2



	c)	Write the algorithm of Depth- First Search (DFS)	3	CO2
	d)	What are the disadvantages of Breadth First Search?	1	CO2
10.	a)	Consider the following game tree:	6	CO4



Using MIN- MAX procedure determine what move should be chosen by the maximizer in his first turn

	b)	Execute alpha beta pruning on the above game tree. How many terminal nodes are examined? For each cut off specify whether it is ALPHA cut off or BETA cut off.	6	CO4
	c)	Justify the following statements (a) BFS is a special case of uniform cost search (b) Uniform cost search is a special case of A* search.	3	CO2
11.		Write short notes from the following (any three)	3x5= 15	
	a)	Different types of Knowledge in AI	5	CO1
	b)	Syntactic and Semantic Analysis in NLP	5	CO4
	c)	Best- First Search	5	CO2
	d)	Quantifiers in AI	5	CO3
	e)	Rule based architecture of an expert system	5	CO4