Course Code:	CST356	

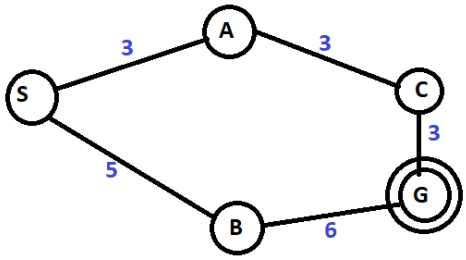
VI Semester B.E. (Computer Science & Engineering) Examination

Artificial Intelligence

Time: 2 Hours]	[Max. Marks: 40

Instructions to Candidates:

1. All questions are compulsory.
2. All questions carry marks as indicated
3. Explain your answer with neat sketches, wherever applicable.

Question		Description of Question	Marks	CO
1.	**a**	 Apply Uniform Cost Search (Graph version) on above graph, with starting node S and goal node G. Clearly show the frontier and explored list at each step. How many nodes are explored (excluding initial node), in this search? Is this solution optimal?	04	CO1
	b	Three married couples want to cross a river in a boat that is capable of holding only two people at a time, with the constraint that no woman can be in the presence of another man unless her (jealous) husband is also present. How should they cross the river with the least amount of rowing? How you will represent state of the above problem?	03	CO1
2.		The sliding-tile puzzle consists of three black tiles, three white tiles, and an empty space in the configuration shown below:	07	CO2

B	B	B		W	W	W

The puzzle has two legal moves with associate costs:

1. A tile may move into an adjacent empty location. This has a cost of 1.
2. A tile may hop over one or two other tiles into the empty position. This has a cost equal to the number of tiles jumped over.

The goal is to move all the white tiles to the left of all the black tiles. The position of the blank is not important.

The heuristic function h(n)

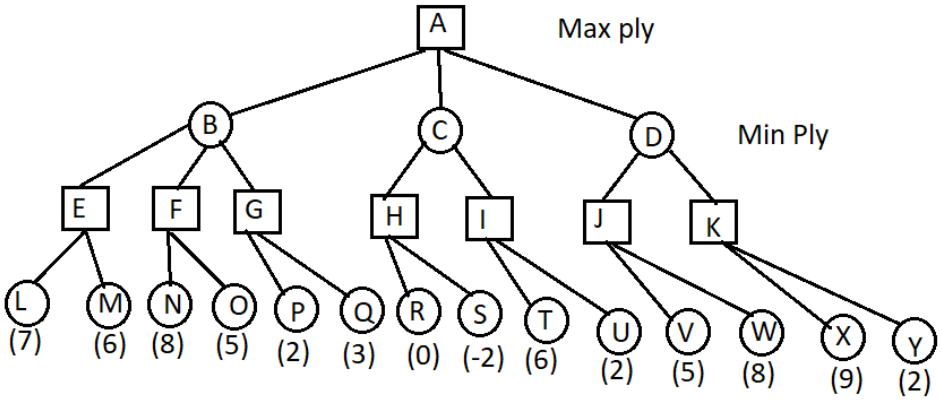
h(n) = # of white tiles on the wrong side of each black tile.

The h(B_WBBWW)=3+2+2=7

Draw the first two levels of the state space of the sliding-tile puzzle. When you generate the children of a node, make sure you add only those children nodes that have not been included to the state space graph. Label each arc with the cost of the move.

Apply A* search algorithm (Graph version) until 4 nodes are explored. Clearly show the frontier and explored list at each step.

3. **a** 03 CO3



Consider the above game tree in which static scores are assigned to min nodes. Apply minmax algorithm to assign values to non-leaf nodes. What move Max should choose at A?

b In the game tree shown in 3(a), what nodes would not need to be examined using the alpha-beta pruning procedure? 03 CO3

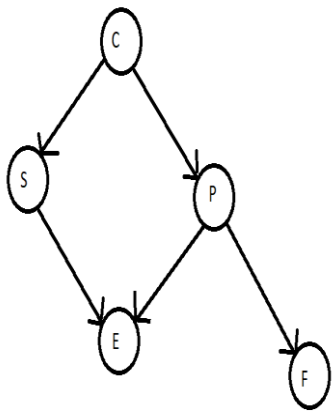
4. **a** Convert the following sentences in to first order predicate logic. 03 CO4

1. Anything anyone eats and isn't killed by is food.
2. Bill eats peanuts and is still alive.
3. Sue eats everything Bill eats.

b Convert the following wff first to normal form and then to skolem normal form. Also convert it into clause form. 04 CO4

$(\forall x) (A(x) \rightarrow B(x)) \rightarrow (\exists y) (A(y) \wedge B(y))$

5. Consider the following Bayesian network. This network shows us at a glance that if you go to college (C), this will affect the likelihood that you will study (S) and the likelihood that you will party (P). Studying and partying affect your chances of exam success (E), and partying affects your chances of having fun (F). 07 CO5



To complete the Bayesian belief network, we need to include the conditional probability tables.

P(C)
0.2

C	P(S)
true	0.8
false	0.2

C	P(P)
true	0.6
false	0.5

S	P	P(E)
true	true	0.6
true	false	0.9
false	true	0.1
false	false	0.2

P	P(F)
true	0.9
false	0.7

Find

a) P (S|E, P, F)
b) P (E|~S,F,P)

6. **a** Find root node of Decision tree by using ID3 algorithm for the following training data. 06 CO6

#	X_1	X_2	X_3	X_4	Y
1	1	Yes	1	1	No
2	2	Yes	2	1	No
3	1	No	2	1	Yes
4	3	No	3	2	Yes
5	1	No	3	3	Yes
6	2	No	1	2	No
7	2	No	3	2	No
8	1	Yes	2	3	No