CSE4107
Class Test 3, Fall-2021

Marks: 10 Time: 25 min.

1. What role does utility theory play in acting under uncertainty? (2)
2. Consider the 'Escape the monster' environment given below.

OK 1,2 S	OK 2,2 S	
OK 1,1	OK 2,1	OK 3,1 S

Assume that OK indicates absence of a monster(M) at the cell, the status of the cells of the 4 x 4 grid other than those shown are unknown, and that the agent can smell(S) a monster at a cell vertically or horizontally adjacent to it.
Find $P(M_{2,3})$ taking 0.1 as the independent probability of a monster at any of the unknown cells. (3)

3. What are the major components of a Decision Network? (2)
4. Say, we have a Bayesian network containing 4 random variables A, B, C and D with two distinct values each. The conditional probability tables assigned to the random variables are given below. Draw the network and compute $P(D \mid a \wedge \neg b \wedge c)$ using the network. (3)

A	B	P(c)
a	b	0.7
a	¬b	0.5
¬a	b	0.2
¬a	¬b	0.02

A	C	P(d)
a	c	0.8
a	¬c	0.4
¬a	c	0.3
¬a	¬c	0.01

B	P(a)
b	0.6
¬b	0.05

P(b)
0.09

---

1. What are the major tools for acting under uncertainty? (2)
2. Joint-probability distribution of two random variables, having three different values each is shown in the table below.

		X_2		
		v_{21}	v_{22}	v_{23}
X_1	v_{11}	0.06	0.07	0.13
	v_{12}	0.21	0.14	0.12
	v_{13}	0.08	0.15	0.04

Compute the probabilities of the compound propositions, $v_{11} \vee v_{22}$ and $v_{21} | v_{13}$ using the distribution. (3)

3. Write a short note on 'Future state in Decision Networks'. (2)
4. Consider the 'Escape the monster' environment given below.

OK 1,2 S		
OK 1,2	OK 2,2 S	
OK 1,1	OK 2,1	OK 3,1 S

Assume that OK indicates absence of a monster(M) at the cell, the status of the cells of the 4 x 4 grid other than those shown are unknown, and that the agent can smell(S) a monster at a cell vertically or horizontally adjacent to it.
Find $P(M_{2,3})$ taking 0.3 as the independent probability of a monster at any of the unknown cells. (3)

-