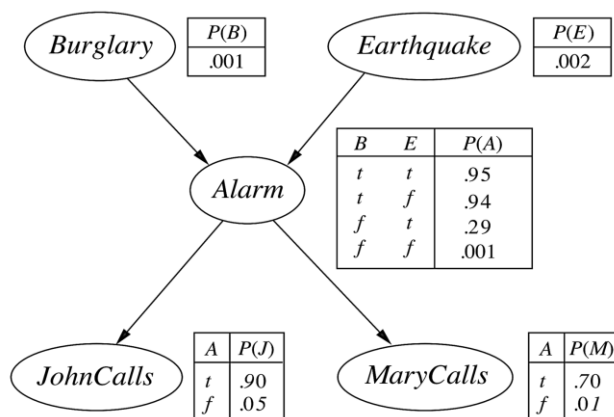


**Ganpat University**  
**U V Patel College of Engineering**  
**B Tech Semester VI Computer Engineering/ Information Technology /Computer**  
**Engineering with Artificial Intelligence**  
**2CEIT602: Artificial Intelligence**  
**Assignment -2**

**Instruction -**

The right-most text indicates the Course Outcomes (CO) Numbers, followed by Bloom's taxonomy level of the question, R: Remembering, U: Understanding, A: Applying, N: Analyzing, E: Evaluating, C: Creating.

- Q-1 You have a new burglar alarm installed at home. It is fairly reliable at detecting burglary, but also sometimes responds to minor earthquakes. You have two neighbors, John and Merry, who promised to call you at work when they hear the alarm. John always calls when he hears the alarm, but sometimes confuses the telephone ringing with the alarm and calls too. Merry likes loud music and sometimes misses the alarm. Given the evidence of who has or has not called, we would like to estimate the probability of a burglary. Find  $P(M)$  and  $P(B|M)$ . 4-E

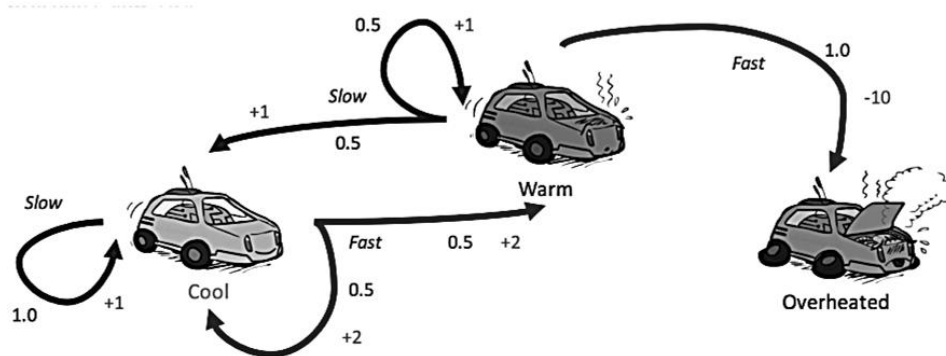


- Q-2 List out the fuzzy set operation. Create your example to apply the fuzzy set operations. 3-E
- Q-3 What is Fuzzy logic? Explain Membership functions of Fuzzy logic with applications. Prove Fuzzy De Morgan's Law. 3-A
- Q-4 What is a Markov Decision Process (MDP)? Explain the components of MDP and how they interact to make decisions in a stochastic environment. 3-U
- Q-5 Explain a Multi-Layered Neural Network with all possible parameters. What is an activation function and loss function in a neural network and why is it necessary? Write down at least three Activation Functions and loss Functions according to classification and regression problems. 3-U
- Q-6 Using the racing car problem depicted in the figure below, Answer the following questions: 3-A
- Demonstrate how the Value Iteration algorithm can be applied and calculate the value of  $V_2$  for all states with assuming no discount factor.
  - Demonstrate how the Value Iteration algorithm can be applied and calculate the value of  $V_2$  for all states with discount factor 0.5.
  - Demonstrate how the policy Iteration algorithm can be applied and find out optimal policy.

Transition Model $T(s,a,s')$						
Source $\rightarrow$	Cool		Warm		Overheated	
Destination $\downarrow$	slow	fast	slow	fast	slow	Fast
Cool	1.0	0.5	0.5	-	-	-

Warm	-	0.5	0.5	-	-	-
Overheated	-	-	-	1.0	-	-

Reward Value $R(s,a,s')$						
Source →	Cool		Warm		Overheated	
Destination ↓	slow	fast	slow	fast	slow	Fast
Cool	+1	+2	+1	-	-	-
Warm	-	+2	+1	-	-	-
Overheated	-	-	-	-10	-	-



- Q. 7 Given the below knowledge base, show all steps of resolution to determine the answer to this query “What course would Meera like?”. 3-A
1. Meera only likes easy courses.
  2. Engineering courses are hard.
  3. All the courses in the CE department are easy.
  4. AI is a course in CE.
- Q. 8 Define Reinforcement Learning by using an appropriate diagram and explain it in detail with the help of a given example “Teaching a dog a new trick by the trainer”. 4-R
- Q. 9 Draw and explain the architecture of rule-based expert system architecture. 3-U
- Q. 10 Answer the questions by taking one example: 3-A
1. Draw a Flow chart of the Genetic Algorithm
  2. Explain the Roulette wheel selection method.
  3. Explain Uniform crossover.
  4. Explain the swap mutation technique.
  5. Explain the fitness function
  6. Explain the stopping criteria
  7. Write down the parameters of the Genetic algorithm.

#### Notes –

- 1) Students are required to write the answers of all above questions.
- 2) Once you have completed writing the assignment in FILE PAGES, get it signed by the lecturer faculty before the deadline. Then, convert your assignment to a PDF file. This PDF must be uploaded through the Google Form link provided in the QR code to submit your work. In addition, keep your written assignment, signed by the faculty lecturer, in your Practical File for your records.
- 3) Last date of online submission – 24<sup>th</sup> May 2024, 03:30 pm.

