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**TERM END EXAMINATIONS (TEE) – December 2021- January 2022**

Programme	: B. Tech, School of CSE	Semester	: Fall 2021-22
Course Name	: FUNDAMENTALS IN AI and ML	Course Code	: CSA2001
Faculty Name	: Simi V.R.	Slot / Class No	: B21+B22+B23/0060
Time	: 1½ hours	Max. Marks	: 50

**Answer ALL the Questions**

- | Q. No.                      | Question Description   | Marks  |
|-----------------------------|--|--|
| <b>PART - A ( 30 Marks)</b> |  |  |
| 1                           | (a) Suppose, instead of building a single intelligent agent to perform a given task, you wanted to build a team of two or more intelligent agents to perform the task together. Discuss the extra factors and complications you would need to consider. Suppose, your intelligent agents were competing rather than co-operating – what differences would that make?<br><br>OR<br>(b) Explain Breadth First Search on a binary tree with a suitable example. | 10<br><br><br><br><br><br><br><br><br><br><br>10 |
| 2                           | (a) Two tautologies are provided below. Provide proof of these tautologies using truth tables.<br><br>$(p \rightarrow q) \leftrightarrow \neg [p \wedge (\neg q)] \quad \text{and} \quad (p \rightarrow q) \leftrightarrow (\neg p) \vee q$<br><br>OR<br>(b) Explain different real world applications of AI using predicate logic   | 10<br><br><br><br><br><br><br><br><br><br><br>10 |
| 3                           | (a) The neuron given in figure 1 has three inputs $x = (x_1, x_2, x_3)$ that receive only binary signals (either 0 or 1). How many different input patterns this node can receive, and list the different patterns? Can you give a formula that computes the number of binary input patterns for a given number of inputs?   | 10   |

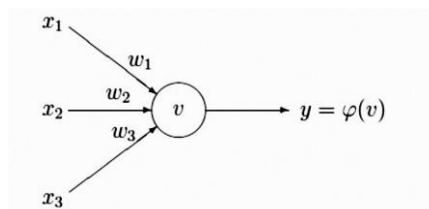


Figure 1

OR

- (b) Explain the architecture of a single layer perceptron with neat diagram 10

**PART - B (20 Marks)**

- 4 Pick an Artificial Intelligence system that has appeared in the news or on TV recently and work out PAGE (i.e. Percepts, Actions, Goals, Environment) descriptions for it. How do these relate to their PEAS (i.e. Performance, Environment, Actuators, Sensors) descriptions? 10
- 5 In Figure 2, a single artificial neuron with three inputs is depicted. 10

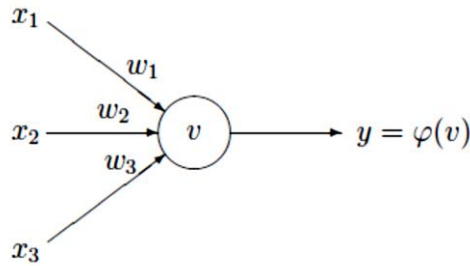


Figure 2

Suppose that the weights corresponding to the three inputs have the following values:  $w_1 = 3$ ,  $w_2 = -4$ ,  $w_3 = 2$ . The activation of the unit is given by the step-function:

$$\varphi(v) = \begin{cases} 1 & \text{if } v \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Calculate what will be the output value  $y$  of the unit for each of the following input patterns:

Pattern	$P_1$	$P_2$	$P_3$	$P_4$
$x_1$	1	0	1	1
$x_2$	0	1	0	1
$x_3$	0	1	1	1

