VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination for Academic Session 2025-26

COURSE NAME: SEMESTER: 5th

BRANCH NAME: Computer Science and Engineering

SUBJECT NAME: AIML

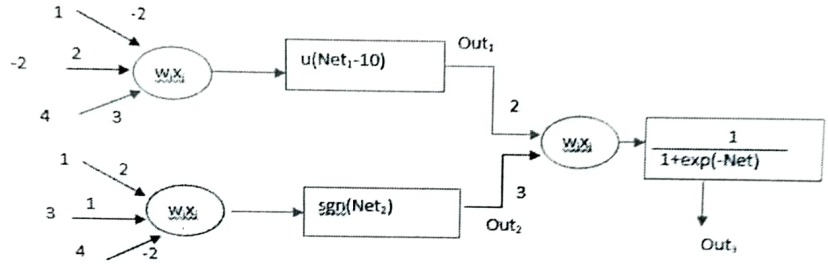
FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. [2 × 3]

a) Find the out_3 value of the ANN - CO1



b) P_1 = the-sky-is-cloudy, P_2 = it-will-rain and $P_3 = P_1 \rightarrow P_2$. Prove that $P_1, P_3 \rightarrow P_2$ using propositional logic . - CO2

c) Find the slope of sigmoid function at Net=0 - CO3

Q2. a) Determine the starting state, goal state, write the production rule and draw the state-space for the problem below: [8]
Given 2 water jugs, 4 liters and 3 liters. Neither has any measuring marks on it. There is a pump that can be used to fill the jugs. How can you get exactly 2 liters of water into 4-liter jugs?

b) Explain DFS algorithm and generate the state space using DFS algorithm for the problem mentioned in Q2(a) - CO1

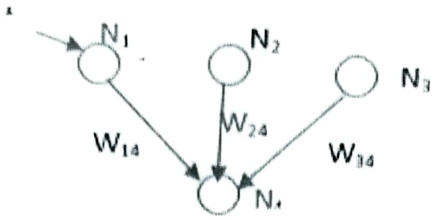
OR

a) Write the MINIMAX Algorithm and draw the state space for the NIM game for the match sticks 7. - CO1

b) What is heuristic function and write the heuristic function for water jug problem and draw the state space for water jug problem using the heuristic function

Q3. a) A fragment of a neural network comprising of 4 neurons is shown in the following figure. N_1, N_2 and N_3 are three neurons at the last but one layer, and neuron N_4 is present in the output(last) layer. Given $Out(N_1) = 0.9 units$, $Out(N_4) = 0.5 units$, error at $N_4 = 0.3 units$, weights $W_{14} = 0.6, W_{24} = 0.4$ and $W_{34} = 0.7$ and learning rate [8]

$\alpha = 0.03$, updates the value of W_{14} by Back-propagation algorithm. Also compute Back-propagation error at neuron N_1



b) Derive the Back-propagation error of ANN, when output neuron contains a non-linear function - CO2

OR

a) Explain the principle of Biological neuron and Draw an electrical equivalent of Biological neuron - CO2

b) How the perceptron model will adjust the weight of neuron for OR-gate and draw the truth table of OR gate using perceptron model.

Q4. a) Prove the following theorem Using Wang's Algorithm [8]

$$p \vee q,\ p \rightarrow r,\ q \rightarrow r \Rightarrow r$$

where p, q and rare propositions (atomic).

b) Consider the following knowledge base: - CO3

1. The-humidity-is-high and the-sky-is-cloudy.
2. If the-sky-is-cloudy then it-will-rain
3. If the-humidity-is-high then it-is-hot.
4. it-is-not-hot

and the goal: it-will-rain.

Prove by resolution theorem that the goal is derivable from the knowledge base

OR

a) What is state space of a problem? Write the production rule and generate the state space of the following problem using the production rule. - CO3

Initial State:

1	2	3
4	5	6
7	8	

Goal State :

1	2	3
4	5	1
6	8	

b) Consider the following facts:

1. Steve only likes easy courses
2. Science courses are hard
3. All the courses in the basket weaving department are easy.
4. BK301 is a basket weaving course

Use the resolution to answer the Question "what course would Steve likes"