SEVENTH SEMESTER BTECH. DEGREE END SEMESTER EXAMINATION DECEMBER 2023 SUBJECT: COMPUTATIONAL INTELLIGENCE AND ENVIRONMENTAL SUSTAINABILITY (ECE 4308), SET-1

TIME: 3 HOURS

MARKS: 50

MAX.

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

Q. No.	Questions	M*	C*	A*	B *
1A.	What are the three components involved in sustainability and Discuss the application of Computational Intelligence in achieving Environmental Sustainability with an example.	5	2	4,7	6
1B.	Discuss spatial analysis with Quantum Geographic Information System with an example. What is the purpose of the geographic coordinate system in spatial analysis?	3	3	3,6	6
1C.	 A 5-3-1 feed forward neural network architecture with one bias in input layer and one in hidden layer. Determine: i) Total Number of weights in the network ii) Sketch the network structure with 5 inputs [x1, x2, x3,x4,x5] = [0.8,0.6,0.4,0.2,0.1] and find out net-input to the output neuron , output Y for the network with binary sigmoidal activation function. Assume weights and biases. 	2	1	1,4	5
2A.	A multi-layer perceptron network as shown in Fig:2QA consists of two neurons in the input layer, two neurons in the hidden layer and one neuron in the output layer. A training pattern with input [0.4 -7] and target output [0.1] is presented to the MLP network. Calculate the modified weights [W] between hidden & output layers. Assume the initial weights as: $[V]^{\circ} = \begin{bmatrix} 0.1 & 0.4 \\ -0.2 & 0.2 \end{bmatrix} \qquad [W]^{\circ} = \begin{bmatrix} 0.2 \\ -0.5 \end{bmatrix}$	5	1	1,4	5

	Fig.2A: Network				
2B.	Investigate the limitation of standard Particle Swarm Optimization algorithm? Examine ScPSO hybrid approach by hybridizing Scout bee phase into standard PSO to upgrade its performance.	3	1	1,4	4
2C.	Compute a new food location (solution) X_{new} for j th element using ABC algorithm for random variable $X = [2\ 1\ 6\ 9]$ and $X_p = [0\ 4\ 7\ 2]$ j=2 and $\varphi=0.81$.	2	1	1,4	5
3A.	Discuss the flow chart for the training process using back propagation algorithm with relevant equations .	5	1	1,4	5
3B.	Construct an Artificial Neural Network model for the sustainable planning of waste management to address the issues with classical models.	3	5	4,7	6
3C.	Realize using McCulloch Pitts neuron model considering +1 as the bias value of the neuron. (i) Two-input AND logic (ii) Two-input NOR logic	2	1	1,4	3
4A.	Illustrate with an example the role of Artificial neural network in addressing any one regional environmental issue. Give ANN structure with relevant input and output parameters.	5	2	4,7	3
4B.	Develop rainfall prediction system using hybrid artificial neutral network. Give the network architecture and discuss weight optimization of the network using hybrid algorithm.	3	4	2,3	6
4C.	Perform 4-point crossover for the following cross sites at 2, 5, 9, 10 th place 00101100111011 and 11.001011011011.	2	1	1,4	5
5A.	What are the five paradigms of Computational Intelligence? Discuss with their origin and Illustrate application of nature inspired algorithms in environmental sustainability.	5	1	1,4	6
5B.	What are Large Language Models? What is the difference between BERT and GPT in natural language processing.	3	1	1,4	3
5C.	Suppose w=0.7, c1=c2=1.5, r_1 =[0.7 0.5 0.8 0.1], r_2 =[0.8 0.1 0.7 0.9], v=[3 0 2 1], x=[2 1 4 9], P_{best} =[2 1 4 9], G_{best} =[0 3 1 5], Determine updated particle velocity and position.	2	1	1,4	5

M*--Marks, C*--CLO, A*--AHEP LO, B* Blooms Taxonomy Level