SRM Institute of Science and Technology

ıeering and Technology

School of Computing

DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: AY 2023-2024-ODD SET A

Test: CLAT-1 **Date: 11/08/2023**

Course Code & Title: 18AIC301J, Deep Learning Techniques. **Duration: 60 minutes**

Year & Sem: 3rd year, Vth sem **Max. Marks: 25**

Course Articulation Matrix: ***(to be placed)***

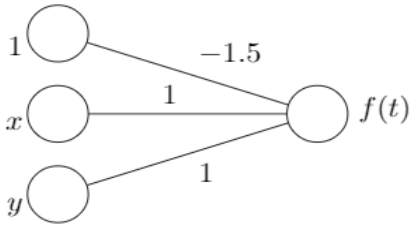
Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
CLR-1 :	Illustrate the basic concepts of deep learning	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Gain knowledge in Optimization algorithms and dimensionality reduction	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLR-3 :	Develop a broad understanding of word2vec models and Convolution Neural Network models																		
CLR-4 :	Acquire knowledge in Transfer learning and Sequential Models																		
CLR-5 :	Implement the attention mechanism and advanced deep learning models																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	Understand various deep learning models to solve real world problems	2	85	75	L	H	-	-	-	-	-	-	M	-	-	-	H	M	M
CLO-2 :	Compare the optimization algorithms and high dimensional data using reduction techniques	2	80	70	M	M	-	-	-	-	-	-	M	-	-	-	M	L	M
CLO-3 :	Implement word2vec models and Convolution Neural Network models	3	85	75	M	H	-	-	-	-	-	-	H	-	-	-	H	M	M
CLO-4 :	Apply RNN and transfer learning to real world scenarios	3	85	80	M	H	-	-	-	-	-	-	H	-	-	-	H	M	H
CLO-5 :	Use deep learning models to solve real-world applications	3	80	70	M	H	-	-	-	-	-	-	H	-	-	-	L	L	L

Part - A

(10 x1 = 10 Marks)

Instructions: Answer all

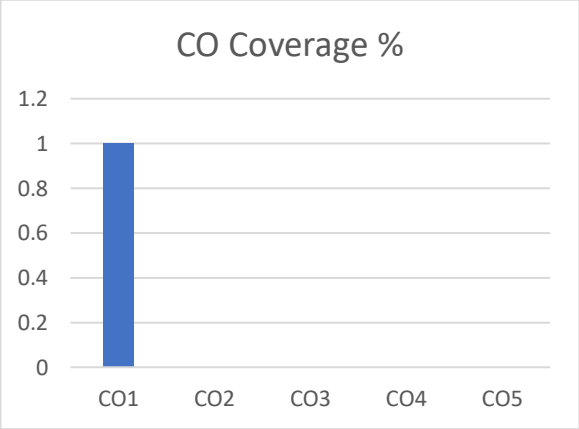
Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which of the following neural networks uses supervised learning? (A) Multilayer perceptron (B) Self organizing feature map (C) Hopfield network a) (A) only b) (B) only c) (A) and (B) only d) (A) and (C) only	1	1	1	1	1.6.1
2	Function of dendrites is? (a) receptors (b) transmitter (c) both receptor & transmitter (d) none of the mentioned	1	1	1	1	1.6.1
3	Positive sign of weight indicates? (a) excitatory input b) inhibitory input c) can be either excitatory or inhibitory as such d) none of the mentioned	1	1	1	1	1.6.1
4	Backpropagation is a learning technique that adjusts weights in the neural network by propagating weight changes (a)Backward from sink to source (b) Forward from source to sink	1	1	1	1	1.6.1

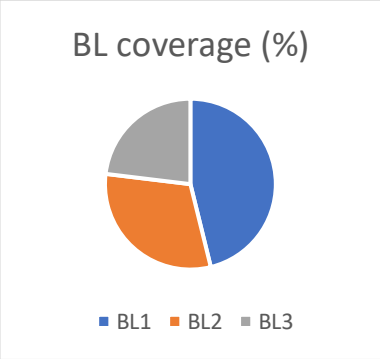
	(c) Backward from sink to hidden nodes (d) Forward from source to hidden nodes					
5	A four input has weights 1,2,3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. What is the output? (a)119 (b)238 (c)143 (d)78	**1**	**3**	**1**	**1**	**1.7.1**
6	Consider a single perception with weights as given in the following figure:  and f(t) is defined as $f(t)\begin{cases}1, t > 0\ 0, t \leq 0\end{cases}$ The above perception can solve (a)OR problem (b) AND problem (c) XOR problem (d) All of the above	**1**	**3**	**1**	**1**	**1.7.1**
7	Sigmoid is (a) Smooth (b) Continuous (c) Differentiable (d) All of the above	**1**	**2**	**1**	**1**	**1.6.1**
8	Which of the following gives non-linearity to a neural network? (a) Stochastic gradient Descent (b) Rectified Linear Unit (c) Convolution function (d) None of the above	**1**	**1**	**1**	**1**	**1.6.1**
9	The average positive difference between computed and desired outcome values (a)root mean square error (b)mean squared error (c)mean absolute error (d)mean positive error	**1**	**1**	**1**	**1**	**1.6.1**
10	What is a dead unit in a neural network? (a)A unit that does not update during training by any of its neighbor (b) A unit which does not respond completely to any of the training patterns (c) The unit which produces the biggest sum-squared error (d) None of these	**1**	**2**	**1**	**1**	**1.6.1**
	Part – B **(3 x 5 = 15 Marks)**					
11	Find the derivatives of the activation functions Sigmoid, TanH and ReLU. (Hint: equation of each activation function is provided for your reference)	**5**	**3**	**1**	**1**	**1.7.1**

	Sigmoid $f(x) = \frac{1}{1+e^{-x}}$ **TanH** $f(x) = \tanh(x) = \frac{2}{1+e^{-2x}} - 1$ **ReLU** $f(x) = \begin{cases} 0 \text{ for } x<0 \\ x \text{ for } x \geq 0 \end{cases}$					
12	What is backpropagation and explain its role in the learning of neural networks? Explain the algorithmic steps involved in backpropagation.	**5**	**2**	**1**	**1**	**1.6.1**
13	Name any three activation functions. Also provide some advantages and disadvantages of each of them.	**5**	**2**	**1**	**1**	**1.6.1**

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





SRM Institute of Science and Technology
Faculty of Engineering and Technology
School of Computing

Mode of Exam
OFFLINE

DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: AY2023-24-ODD

Test: CLAT-1 **Date: 11/08/2023**

Course Code & Title: 18AIC301J, Deep Learning Techniques. **Duration: 60 minutes**

Year & Sem: 3rd year, Vth sem **Max. Marks: 25**

Course Articulation Matrix: ***(to be placed)***

Course Learning Rationale (CLR):	The purpose of learning this course is to:		Learning				Program Learning Outcomes (PLO)														
CLR-1 :	Illustrate the basic concepts of deep learning		1	2	3		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Gain knowledge in Optimization algorithms and dimensionality reduction		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)		Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLR-3 :	Develop a broad understanding of word2vec models and Convolution Neural Network models																				
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CLO-1 :	Understand various deep learning models to solve real world problems		2	85	75		L	H	-	-	-	-	-	-	M	-	-	-	H	M	M
CLO-2 :	Compare the optimization algorithms and high dimensional data using reduction techniques		2	80	70		M	M	-	-	-	-	-	-	M	-	-	-	M	L	M
CLO-3 :	Implement word2vec models and Convolution Neural Network models		3	85	75		M	H	-	-	-	-	-	-	H	-	-	-	H	M	M
CLO-4 :	Apply RNN and transfer learning to real world scenarios		3	85	80		M	H	-	-	-	-	-	-	H	-	-	-	H	M	H
CLO-5 :	Use deep learning models to solve real-world applications		3	80	70		M	H	-	-	-	-	-	-	H	-	-	-	L	L	L

Part - A
(10 x 1 = 10 Marks)

Instructions: Answer all

Q. No	Answer with choice variable	Marks	BL	CO	PO	PI Code
1	a) (A) only	1	1	1	1	1.6.1*
2	a) receptors	1	1	1	1	1.6.1
3	a) excitatory input	1	1	1	1	1.6.1
4	a)Backward from sink to source	1	1	1	1	1.6.1
5	b)238	1	3	1	1	1.7.1
6	b) AND problem	1	3	1	1	1.7.1
7	d) All of the above	1	2	1	1	1.6.1
8	b) Rectified Linear Unit	1	1	1	1	1.6.1
9	c)mean absolute error	1	1	1	1	1.6.1
10	a)A unit that does not update during training by any of its neighbor	1	2	1	1	1.6.1
	Part – B (5 x 3 = 15 Marks)					
11	https://www.youtube.com/watch?v=P7_jFxTtJEo https://www.analyticsvidhya.com/blog/2021/04/activation-functions-and-their-derivatives-a-quick-complete-guide/	5	3	1	1	1.7.1
12	PPT slide 6	5	2	1	1	1.6.1

13	PPT SLIDE 3	**5**	**2**	**1**	**1**	**1.6.1**

Question Paper Setter

Approved by Audit Professor/ Course Coordinator

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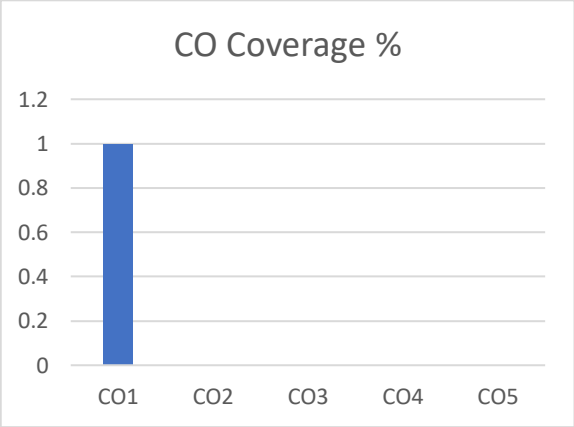
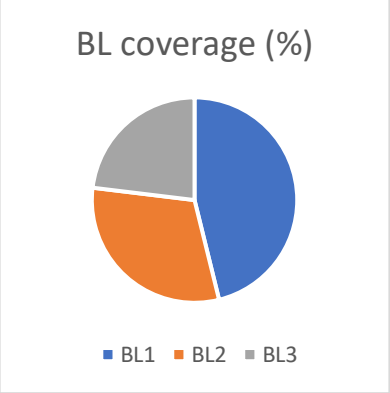
Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





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DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: AY2023-24 -ODD **SET C**

Test: CLAT-1 **Date: 11/08/2023**
Course Code & Title: 18AIC301J, Deep Learning Techniques. **Duration: 60 minutes**
Year & Sem: III/ V **Max. Marks: 25**

Course Articulation Matrix: ***(to be placed)***

Course Learning Rationale (CLR):	The purpose of learning this course is to:		Learning				Program Learning Outcomes (PLO)														
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CLR-3 :	Develop a broad understanding of word2vec models and Convolution Neural Network models																				
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CLO-2 :	Compare the optimization algorithms and high dimensional data using reduction techniques		2	80	70		M	M	-	-	-	-	-	-	M	-	-	-	M	L	M
CLO-3 :	Implement word2vec models and Convolution Neural Network models		3	85	75		M	H	-	-	-	-	-	-	H	-	-	-	H	M	M
CLO-4 :	Apply RNN and transfer learning to real world scenarios		3	85	80		M	H	-	-	-	-	-	-	H	-	-	-	H	M	H
CLO-5 :	Use deep learning models to solve real-world applications		3	80	70		M	H	-	-	-	-	-	-	H	-	-	-	L	L	L

Part - A
(10 x1 = 10 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	What is learning signal in this equation Δwij= μf(wi a)aj? a) μ b) wi a c) aj d) f(wi a)	1	2	1	1	1.6.1
2	State whether data clustering is which of the following type. a) supervised b) unsupervised c) either supervised or unsupervised d) can be both supervised & unsupervised	1	1	1	1	1.6.1
3	Where do the chemical reactions take place in neuron? a) dendrites b) axon c) synapses d) nucleus	1	1	1	1	1.6.1
4	State whether labeled data classification belongs to which of the following type. a) supervised b) unsupervised c) either supervised or unsupervised d) can be both supervised & unsupervised	1	1	1	1	1.6.1
5	What is delta (error) in perceptron model of neuron? a)error due to environmental condition b) difference between desired & target output c) can be both due to difference in target output or environmental condition d) none of the mentioned	1	1	1	1	1.6.1

6	Which of the following equation represent perceptron learning law? (hint: si is the output signal and bi is the target output) a) Δwij= μ(si) aj b) Δwij= μ(bi – si) aj c) Δwij= μ(bi – si) aj Á(xi),where Á(xi) is derivative of xi d) Δwij= μ(bi – (wi a)) aj	1	2	1	1	1.6.1
7	Which of the following is correct for the neural network? (i) The training time is dependent on the size of the network (ii) Neural networks can be simulated on the conventional computers (iii) Artificial neurons are identical in operation to a biological one a)All of the above b)(ii) is true c)(i) and (ii) are true d)None of the above	1	1	1	1	1.6.1
8	What is plasticity in neural networks? a) input pattern keeps on changing b) input pattern has become static c) output pattern keeps on changing d) output is static	1	2	1	1	1.6.1
9	What is an auto-association task in neural networks? a) find relation between 2 consecutive inputs b) related to storage & recall task c) predicting the future inputs d) none of the mentioned	1	1	1	1	1.6.1
10	On what parameters can change in weight vector depend? a) learning parameters b) input vector c) learning signal d) all of the mentioned	1	1	1	1	1.6.1

SRM INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

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SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: AY2022-23 -ODD **SET C**

Test: CLAT-1 **Date: 11/08/2023**
Course Code & Title: 18AIC301J, Deep Learning Techniques. **Duration: 60 minutes**
Year & Sem: III/ V **Max. Marks: 25**

Part – B (3 x 5 = 15 Marks)

11	How to identify loss optimization in training neural network with gradient descent algorithm. Explain with pseudo code for the same. Loss functions-1 mark Loss optimization functions-1 pseudo code with explanation -3	**5**	**2**	**1**	**1**	**1.6.1**

12	Use perception learning rules to train the network. The set of input training vector are as follows. x1= [1 -2 0 -1] x2= [0 1.5 -0.5 -1] x3= [-1 1 0.5 -1] and the initial weigh vector w1 is [1 -1 0 0.5] The learning constant =0.1 The desired response are d1= -1, d2= -1 and d3=1 Calculate the weight factor after one complete cycle. Learning steps- 2 marks each updation of weights (1 marks) W1=[-0.192 0/384 0 0.192] W2= [0 -0.196 0.06 0.131] W3 = [0.2 -0.2 0 0.1]	**5**	**3**	**1**	**1**	**1.7.1**
13	Differentiate between Sigmoid and ReLU. Also provide some advantages and disadvantages of each of them. Sigmoid equation and diagram - 2 mark ReLU equation and diagram - 2 mark advantages and disadvantages 1 marks	**5**	**2**	**1**	**1**	**1.6.1**

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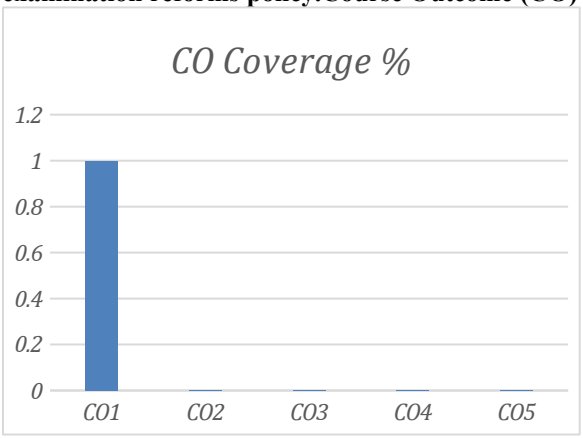

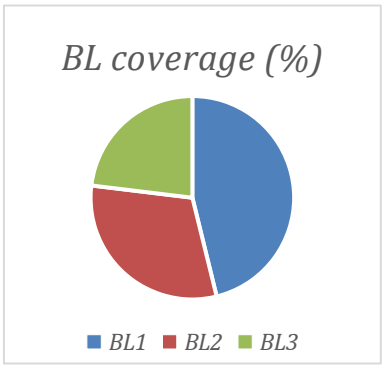

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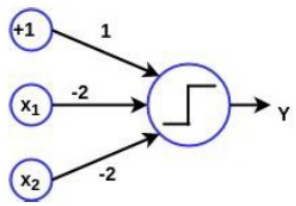
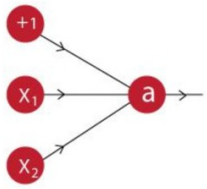
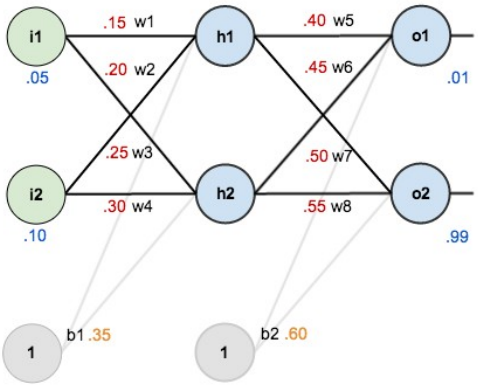
Part - A
(10 x1 = 10 Marks)

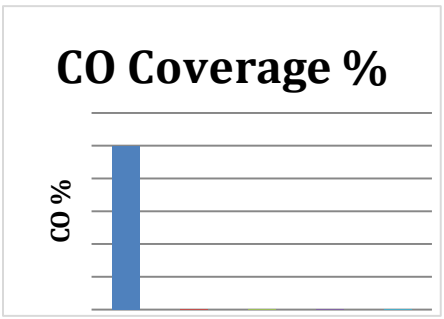
Instructions: Answer all

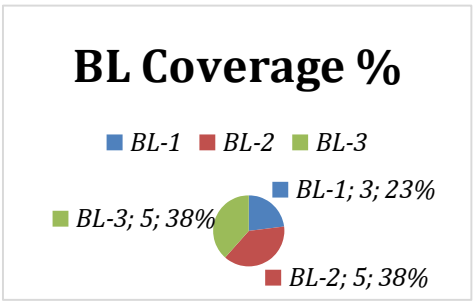
Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which logic function cannot be performed using a single layered neural network? a) AND b) OR c) XOR d) ALL	1	2	**1**	**2**	**2.5.1**
2	For a 2-class classification problem, what is the minimum number of nodes required for the output layer of the multi-layered neural network? a) 2 b) 1 c) 3 d) 4	1	1	**1**	**2**	**2.5.1**
3	Which of the following are potential benefits of using ReLU activation over sigmoid activation? a) ReLu helps in creating dense (most of the neurons are active) representations b) ReLu helps in creating sparse (most of the neurons are non-active) representations c) ReLu helps in mitigating vanishing gradient effect d) Both (b) and (c) e) only c	1	1	**1**	**1**	**1.6.1**
4	Consider the following neural network shown in figure with inputs x1, x2 and output Y. The inputs take the values x1, x2 Є {0, 1}. The logical operation performed by the network is ----  . a) AND b) OR c) XOR d)NOR	1	3	**1**	**2**	**2.5.2**
5	A four input has weights 1,3,5 and 7. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 5, 4, 7 and 10 respectively. What is the output? a)122 b)244 c)488 d)152	**1**	**3**	**1**	**2**	**2.5.3**

6	Which among the following options give the range for tanh function? a) -1 to 1 b) -1 to 0 c) 0 to 1 d) 0 or 1	**1**	**1**	**1**	**1**	**1.5.1**
7	Let X=[-1, 0, 3, 5] be the input of ith layer of a neural network. On this, we want to apply softmax function. What should be the output of it? a) [0.368, 1, 20.09, 148.41] b) [0.002, 0.006, 0.118,0.874] c) [0.3, 0.05,0.6,0.05] d) [0.04,0,0.06,0.9]	**1**	**3**	**1**	**2**	**2.5.1**
8	What is the main benefit of stacking multiple layers of neuron with non-linear activation functions over a single layer perceptron? a) Reduces complexity of the network b) Reduce inference time during testing c) Allows to create non-linear decision boundaries d) None	**1**	**2**	**1**	**1**	**1.5.1**
9	Let us assume we implement an AND function to a single neuron. The activation function of our neuron is denoted as: $f(x) = \begin{cases} 0, & for\ x < 0 \\ 1, & for\ x \geq 0 \end{cases}$  What would be the weights and bias? (Hint: For which values of w1, w2 and b does our neuron implement an AND function?) a)Bias = -1.5, w1 = 1, w2 = 1 b) Bias = 1.5, w1 = 2, w2 = 2 c) Bias = 1, w1 = 1.5, w2 = 1.5 d)None of these	**1**	**3**	**1**	**2**	**2.5.1**
10	Gradient Descent is an optimization algorithm used for, a) Certain Changes in algorithm b)minimizing the cost function in various machine learning algorithms c) maximizing the cost function in various machine learning algorithms d) remaining same the cost function in various machine learning algorithms	**1**	**2**	**1**	**1**	**1.5.1**
Part – B ANSWER ANY TWO QUESTIONS (2 x 5 = 10 Marks)						
11	State perceptron convergence theorem and prove it with an example. Answer: perceptron convergence theorem If two classes of vectors X_1 and X_2 are linearly separable, the application of the perceptron training algorithm will eventually result in a weight vector $\mathbf{w_0}$, such that $\mathbf{w_0}$ defines a TLU whose decision hyper-plane separates X_1 and X_2. Proof: Consider AND gate table, Let's say that w = 0.9 and w = 0.9, alpha=0.5, calculate the error for each sample and update the weight using delta rule to the convergence. Delta rule **w'=w** + a (t-y) **x**	**5**	**2**	**1**	**1**	**1.6.1**
12	Explain about any three activation functions with their advantage and disadvantages. Answer: Binary step function • If the input to the activation function is greater than a threshold, then the neuron is activated, else it is deactivated. i.e: f(x) = 1, x>=0	**5**	**2**	**1**	**1**	**1.6.1**

	f(x) = 0, x<0 Sigmoid Function • Most widely used non-linear activation function. • Sigmoid transforms the values between the range 0 and 1. • Mathematical expression : f(x) = 1/(1+e^-x • The gradient values are significant for range -3 and 3 but the graph gets much flatter in other regions. • for values greater than 3 or less than -3, will have very small gradients. Tanh Function • Similar to sigmoid activation function. Symmetric around the origin. • Range of values is from -1 to +1 • Mathematical expression tanh(x) = 2sigmoid(2x)-1 • The gradient values are steeper as compared to sigmoid function. • tanh is preferred over the sigmoid function since it is zero centered and the gradients are not restricted to move in a certain direction					
13	Consider the neural network with sigmoid function given below, calculate the error at neuron (O2), and back propagate the error to the input layer neurons. Find out the updated weight of w8 using chain rule.  Answer: Error at o2 =0.02356 Updated w8 = 0.5613	**5**	**3**	**1**	**2**	**2.5.3**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





QP Setter / Course Coordinator **Approved by the Audit Professor**

SRM Institute of Science and Technology

ıeering and Technology

School of Computing

DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: AY 2023-2024 **SET D**

Test: CLAT-1 **Date: 11/08/2023**
Course Code & Title: 18AIC301J, Deep Learning Techniques. **Duration: 60 minutes**
Year & Sem: III/ V **Max. Marks: 25**
Course Articulation Matrix:

Course Learning Rationale (CLR):	The purpose of learning this course is to:		Learning			Program Learning Outcomes (PLO)												
CLR-1 :	Illustrate the basic concepts of deep learning		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13
CLR-2 :	Gain knowledge in Optimization algorithms and dimensionality reduction		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1
CLR-3 :	Develop a broad understanding of word2vec models and Convolution Neural Network models																	
CLR-4 :	Acquire knowledge in Transfer learning and Sequential Models																	
CLR-5 :	Implement the attention mechanism and advanced deep learning models																	
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																	
CLO-1 :	Understand various deep learning models to solve real world problems		2	85	75	L	H	-	-	-	-	-	-	M	-	-	-	H
CLO-2 :	Compare the optimization algorithms and high dimensional data using reduction techniques		2	80	70	M	M	-	-	-	-	-	-	M	-	-	-	M
CLO-3 :	Implement word2vec models and Convolution Neural Network models		3	85	75	M	H	-	-	-	-	-	-	H	-	-	-	H
CLO-4 :	Apply RNN and transfer learning to real world scenarios		3	85	80	M	H	-	-	-	-	-	-	H	-	-	-	H
CLO-5 :	Use deep learning models to solve real-world applications		3	80	70	M	H	-	-	-	-	-	-	H	-	-	-	L

Part - A
(10 x1 = 10 Marks)

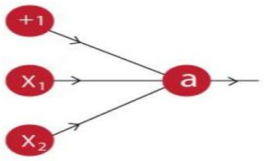
Instructions:

1) Answer ALL questions.

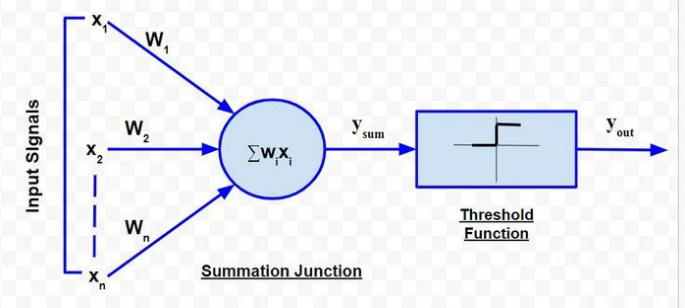
2) The duration for answering the part A is 15 minutes (this sheet will be collected after 15 minutes).

3) Encircle the correct answer (if more than one is right answer encircle appropriately)

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which of the following statement(s) correctly represents a biological neuron? a) A neuron has a single input and a single output only b) A neuron has multiple inputs but a single output only c) A neuron has a single input but multiple outputs d) A neuron has multiple inputs and multiple outputs **e) All of the above statements are valid**	**1**	**2**	**1**	**1**	**1.6.1**
2	The fundamental unit of network is a) brain b) nucleus **c) neuron** d) axon	**1**	**1**	**1**	**1**	**1.6.1**

3	Let us assume we implement an AND function to a single neuron. The activation function of our neuron is denoted as: $f(x) = \begin{cases} 0, & for\ x < 0 \\ 1, & for\ x \geq 0 \end{cases}$  What would be the weights and bias? (Hint: For which values of w1, w2 and b does our neuron implement an AND function?) **a)Bias = -1.5, w1 = 1, w2 = 1** b) Bias = 1.5, w1 = 2, w2 = 2 c) Bias = 1, w1 = 1.5, w2 = 1.5 d)None of these	**1**	**1**	**1**	**1**	**1.6.1**
4	A four input has weights 1,3,5 and 7. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 5, 4, 7 and 10 respectively. What is the output? a)122 **b)244** c)488 d)152	**1**	**1**	**1**	**1**	**1.6.1**
5	Consider a single perceptron with sign (signum) activation function. The perception is represented by weight vector **[0.4 - 0.3 0.1]^t** and a bias=0.if the input vector to the perceptron is **X = [0.2 0.6 0.5]** then the output of the perceptron is ? a) 1 b) 0 c) -0.05 **d)-1**	**1**	**1**	**1**	**1**	**1.6.1**
6	What is delta (error) in perceptron model of neuron? **a) error due to environmental condition** b) difference between desired & target output c) can be both due to difference in target output or environmental condition d) none of the mentioned	**1**	**2**	**1**	**1**	**1.6.1**
7	If 'b' in the figure below is the bias, then what logic circuit does it represents?  a) OR gate b) ANDgate c) **NOR gate** d) nand gate	**1**	**1**	**1**	**1**	**1.6.1**
8	What is shape of dendrites like a) oval b) round **c) tree** d) rectangular	**1**	**2**	**1**	**1**	**1.6.1**
9	Which is the most direct application of neural networks? a) vector quantization b) pattern mapping **c) pattern classification** d) control applications	**1**	**1**	**1**	**1**	**1.6.1**

10	Gradient Descent is an optimization algorithm used for, a) Certain Changes in algorithm **b)minimizing the cost function in various machine learning algorithms** c) maximizing the cost function in various machine learning algorithms d) remaining same the cost function in various machine learning algorithms	**1**	**1**	**1**	**1**	**1.6.1**

	Part – B (3 x 5 = 15 Marks)					
11	What is McCulloch Pitts Neuron? How will you model (i)Boolean OR, (ii)Boolean AND and (iii)Boolean XOR using MP neuron? Explain with neat diagrams 1. McCulloch-Pitts Model of Neuron (1 marks) figure (1 mark) Three Gates Explanation (3 marks) 	**5**	**2**	**1**	**1**	**1.6.1**
12	What is backpropagation? Explain their need, disadvantage and algorithm steps in detail. Forward Pass (2 marks) calculation of error (1 marks) Backward pass (2 marks)	**5**	**3**	**1**	**1**	**1.7.1**
13	How to identify loss optimization in training neural network with gradient descent algorithm. Explain with pseudo code for the same. *We want to find the network weights that* ***achieve the lowest loss*** $$W^* = \underset{W}{\operatorname{argmin}} \frac{1}{n} \sum_{i=1}^{n} \mathcal{L}(f(x^{(i)}; W), y^{(i)})$$ $$W^* = \underset{W}{\operatorname{argmin}} J(W)$$ **Gradient Descent** **Algorithm** 1. Initialize weights randomly $\sim \mathcal{N}(0, \sigma^2)$ 2. Loop until convergence: 3. Compute gradient, $\frac{\partial J(W)}{\partial W}$ 4. Update weights, $W \leftarrow W - \eta \frac{\partial J(W)}{\partial W}$ 5. Return weights	**5**	**2**	**1**	**1**	**1.6.1**

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

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