K L Deemed to be University
Department of CSE -- KLVZA
Course Handout
2021-2022, Even Sem

Course Title	:DEEP LEARNING
Course Code	:19CS3269S
L-T-P-S Structure	: 2-0-2-4
Pre-requisite	:
Credits	: 4
Course Coordinator	:SAGAR IMAMBI SHAIK
Team of Instructors	:
Teaching Associates	:

Syllabus : History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Perceptron's, Perceptron Learning Algorithm and Convergence, Multilayer Perceptron's (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feedforward Neural Networks, Backpropagation, Gradient Descent (GD), Momentum Based GD, Eigenvalues and eigenvectors, Eigenvalue Decomposition, Principal Component Analysis, Singular Value Decomposition. Autoencoders, Denoising autoencoders, Sparse autoencoders, Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Batch Normalization, Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet Object Detection Long Short Term Memory (LSTM) Restricted Boltzmann Machines, Deep Dream, GRU, Neural style transfer, Deep learning for computer vision, text and sequences. Markov models, Markov networks, Markov chains, Variational autoencoders, Autoregressive Models: NADE, MADE, Generative Adversarial Networks (GANs), how to train DCGAN, limitations of deep learning.

Text Books :1. Deep learning with python – Francois Chollet, Manning publishers, 2018, ISBN-9781617294433 2. Grokking deep learning, Andrew w Trask, 2019, Manning publishers, ISBN-9781617293702 3. Ian Goodfellow and Yoshua Bengio and Aaron Courville (2016) Deep Learning Book.

Reference Books :4. Deep Learning with PyTorch: A practical approach to building neural network models using PyTorch by Vishnu bramanian 5. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996 Pattern Recognition and Machine Learning, Christopher Bishop, 2007

Web Links : https://www.simplilearn.com/tutorials/deep-learning-tutorial https://www.kaggle.com/learn/intro-to-deep-learning

MOOCS :https://www.coursera.org/specializations/deep-learning https://www.coursera.org/professional-certificates/tensorflow-in-practice https://www.linkedin.com/learning-admin/content/learning-paths/1~AAAAAAVU26I=1774371?account=89447330

Course Rationale : Deep learning is a class of machine learning algorithms which enables computers to learn from examples. Deep learning techniques have been used successfully for a variety of applications, including automatic speech recognition, image recognition, natural language processing, drug discovery, and recommendation systems. In this course, students will learn the fundamentals of deep learning, and the main research activities in this field. Moreover, students will learn to implement, train, and validate their own neural network, and they will improve their understanding of the on-going research in this era.

Course Objectives : The objective of Deep Learning is to enable the student to understand the fundamentals of deep learning and its techniques in deep learning. Be able to design and implement deep neural network systems. Be able to identify new application requirements in the field of ANN. Be able to identify reasonable work goals and estimate the resources required to achieve the objectives

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Able to understand and remember the concepts of Perception, Back Propagation, PCA, Singular Value Decomposition	PSO1,PO1,PO2	2
CO2	Able to understand auto encoders- and apply Regularization, Denoising, Sparse, Contractive, Vectoral Representations of words Convolutional Neural Networks, LeNet, AlexNet	PSO1,PO2	3
CO3	Apply Long Short Term Memory (LSTM) Restricted Boltzmann Machines, Deep Dream, GRU, Neural style transfer, Deep learning for computer vision, text and sequences.	PSO2,PO3	3
CO4	Build Markov models, Markov networks, Markov chains, Variational autoencoders, Autoregressive Models: NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), how to train DCGAN, limitations of deep learning	PSO1,PO2,PO3	3
CO5	Implement basic Neural Networks, optimization algorithms, engine vector decomposition, various types of auto encoders, batch normalization, convolutional neural networks	PO3,PO5,PSO2	5

COURSE OUTCOME INDICATORS (COIs)::

Outcome No.	Highest BTL	COI-1	COI-2	COI-3	COI-5
CO1	2	**Btl-1** Basic of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Perceptron Learning Algorithm	**Btl-2** Sigmoid Neurons, Feedforward Neural Networks, Gradient Descent (GD), Dimensional Reduction		
CO2	3	**Btl-1** Able to recall Autoencoders, Denoising autoencoders	**Btl-2** able to understand Sparse autoencoders, Bias Variance Tradeoff, L2 regularization and parameter sharing	**Btl-3** Able to apply Convolutional Neural Networks, LeNet, AlexNet, and RCNN	
CO3	3	**Btl-1** Able to recall how Deep learning used in computer vision, NLP applications	**Btl-2** able to understand Long Short Term Memory (LSTM)	**Btl-3** able to apply Restricted Boltzmann Machines, Deep Dream, GRU, Neural style transfer	
CO4	3	**Btl-1** able to find limitations of deep learning	**Btl-2** Able to understand Generative Adversarial Networks	**Btl-3** Able to apply Markov models, Markov networks, Markov	

				(GANs), how to train DCGAN	chains, Variational autoencoders,	
CO5	5					**Btl-5** Able to implement Deep learning techniques DNN,RNN, LSTM, CNN and auto encoders for the real time applications.

PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES (POs/PSOs)

Po No.	Program Outcome
PO1	Engineering Knowledge:Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	Conduct Investigations of Complex Problems:Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
PO5	Modern Tool Usage:Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society:Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability:Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication:Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
PSO1	An ability to design and develop software projects as well as Analyze and test user requirements.

PSO2	An Ability to gain working Knowledge on emerging software tools and technologies.

Lecture Course DELIVERY Plan:

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	EvaluationComponents
1	CO1	COI-1	History of Deep Learning, Perceptron	TBook[2] ,Ch[1],Pg[13-15]	LTC,PPT,Talk	End Semester Exam,SEM-EXAM1
2	CO1	COI-1	Perceptron's, Perceptron Learning Algorithm and Convergence	TBook[3],Ch[1], Pg[5-8]	PPT,Talk	End Semester Exam,MOOCs Certification,MOOCs Review,SEM-EXAM1
3	CO1	COI-2	Feedforward Neural Networks,	TBook[3], Ch[6], Pg[168-227 ,151-153]	PPT,Talk	SEM-EXAM1
4	CO1	COI-2	Eigenvalue Decomposition	TBook[3],Ch[2], Pg [42-44]	PPT,Talk	SEM-EXAM1
5	CO1	COI-2	Principal Component Analysis	TBook[3], Ch[2], Pg [48-55], Ch[5], Pg[147-151]	PPT,Talk	SEM-EXAM1
7	CO2	COI-1	Autoencoders, Denoising autoencoders	TBook[3], Ch[14] Pg[493-497], Pg[501-506]	Chalk,LTC,PPT,Talk	End Semester Exam,SEM-EXAM1
8	CO2	COI-1	Bias Variance Tradeoff, L2 regularization, Early stopping	TBook[1], Ch[4] Pg[107-108],	Chalk,LTC,PPT,Talk	MOOCs Certification,MOOCs Review
9	CO2	COI-2	Dataset augmentation, Parameter sharing and tying, Injecting noise at input	TBook[3], Ch[7] Pg[233-234],	Chalk,LTC,PPT,Talk	SEM-EXAM1
10	CO2	COI-3	Ensemble methods, Batch Normalization	TBook[3], Ch[7] Pg[249-251],	Chalk,LTC,PPT,Talk	SEM-EXAM1
11	CO2	COI-3	Convolutional Neural Networks, LeNet, AlexNet	Ch[8] Pg[309-312	Chalk,LTC,PPT,Talk	SEM-EXAM1
12	CO2	COI-3	RCNN, Fast RCNN, Faster RCNN	TBook[3], Ch[9] Pg[249-251	Chalk,LTC,PPT,Talk	SEM-EXAM1

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	EvaluationComponents
13	CO3	COI-1	Recurrent NN, LSTM, GRU	TBook[3] Ch[10],Pg[397-408]	Chalk,LTC,PPT,Talk	End Semester Exam,SEM-EXAM2
14	CO3	COI-2	Variational autoencoders	TBook[3] Ch[17], Pg[605-614]	PPT,Talk	MOOCs Certification,MOOCs Review
15	CO3	COI-2	Deep Dream.	TBook[1] Ch[8], Pg[280-286]	Chalk,LTC,PPT,Talk	SEM-EXAM2
16	CO3	COI-2	Neural style transfer	TBook[1] Ch[8], Pg[287-295]	Chalk,LTC,PPT,Talk	SEM-EXAM2
17	CO3	COI-2	Deep learning for computer vision,	TBook[3] Ch[12], Pg[440-445]	Chalk	SEM-EXAM2
18	CO3	COI-3	Deep learning for text and sequences	TBook[1] Ch[6], Pg[180-195] [225-231]	Chalk,LTC,PPT,Talk	End Semester Exam,SEM-EXAM2
19	CO4	COI-2	Markov models	TBook[3] Ch[17], Pg[605-614]	Chalk,LTC,PPT,Talk	End Semester Exam,MOOCs Certification,MOOCs Review,SEM-EXAM2
20	CO4	COI-2	Markov networks	TBook[3] Ch[17], Pg[605-614]	PPT	SEM-EXAM2
21	CO4	COI-3	Markov chains	TBook[3] Ch[17], Pg[605-614]	PPT	SEM-EXAM2
22	CO4	COI-3	Restricted Boltzmann Machines	TBook[3] Ch[20], Pg[645-651]	Chalk,Talk	SEM-EXAM2
23	CO5	COI-5	Autoregressive Models: NADE, MADE	TBook[3] Ch[20], Pg[722]	PPT	SEM-EXAM2
24	CO5	COI-5	Generative Adversarial Networks (GANs),	t3	PPT	SEM-EXAM2

Lecture Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 1 able to understand History of DL

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	atetndance	1	Talk	--- NOT APPLICABLE ---
10	Introduction and History of DL,	1	Talk	--- NOT APPLICABLE ---
25	McCulloch Pitts Neuron	2	PPT	--- NOT APPLICABLE ---
10	Summary and QA	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 1 able to understand Perceptron Learning Algorithm and Convergence

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	atetndance	1	Talk	--- NOT APPLICABLE ---
20	Perceptron	2	PPT	--- NOT APPLICABLE ---
20	Multilayer Perceptron's (MLPs)	2	PPT	--- NOT APPLICABLE ---
5	summary	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 3

Session Outcome: 1 able to understand Feedforward Neural Networks,

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---

20	feed forward networks	2	PPT	--- NOT APPLICABLE ---
20	Backpropogation	2	PPT	--- NOT APPLICABLE ---
5	summary	2	Talk	Group Discussion

SESSION NUMBER : 4

Session Outcome: 1 Eigenvalue Decomposition

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	eigenvalues	2	PPT	--- NOT APPLICABLE ---
20	Eigenvalue Decomposition	2	PPT	--- NOT APPLICABLE ---
5	problem on eigenvalue	2	Talk	Group Discussion

SESSION NUMBER : 5

Session Outcome: 1 able to understand PCA

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	PCA introduction	2	PPT	--- NOT APPLICABLE ---
20	PCA calculation	2	PPT	--- NOT APPLICABLE ---
5	problem	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 7

Session Outcome: 1 Autoencoders, Denoising autoencoders

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Autoencoders	2	PPT	--- NOT APPLICABLE ---
20	Denoising autoencoders	2	PPT	--- NOT APPLICABLE ---
5	summary	2	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 8

Session Outcome: 1 able to understand Bias Variance Tradeoff, L2 regularization, Early stopping

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Bias Variance Tradeoff,	2	PPT	--- NOT APPLICABLE ---
20	L2 regularization, Early stopping	2	PPT	--- NOT APPLICABLE ---
5	summary	1	Talk	Just in-time teaching

SESSION NUMBER : 9

Session Outcome: 1 Able to understand Dataset augmentation, Parameter sharing and tying, Injecting noise at input

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Dataset augmentation,	2	PPT	--- NOT APPLICABLE ---
20	Parameter sharing and tying, Injecting noise at input	3	PPT	--- NOT APPLICABLE

5	summary	2	Talk	Group Discussion

SESSION NUMBER : 10

Session Outcome: 1 able to apply Ensemble methods, Batch Normalization

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Ensemble methods,	2	PPT	--- NOT APPLICABLE ---
20	Batch Normalization	3	PPT	--- NOT APPLICABLE ---
5	summary	2	PPT	Group Discussion

SESSION NUMBER : 11

Session Outcome: 1 Able to apply Convolutional Neural Networks,

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Convolutional Neural Networks,	3	PPT	--- NOT APPLICABLE ---
20	LeNet, AlexNet	3	PPT	--- NOT APPLICABLE ---
5	Problem on CNN	2	Talk	Group Discussion

SESSION NUMBER : 12

Session Outcome: 1 RCNN, Fast RCNN, Faster RCNN

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE

		1		---
20	RCNN,	2	PPT	--- NOT APPLICABLE ---
20	Fast RCNN, Faster RCNN	2	PPT	--- NOT APPLICABLE ---
5	summary	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 13

Session Outcome: 1 Recurrent NN, LSTM, GRU

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Recurrent NN	2	PPT	--- NOT APPLICABLE ---
20	LSTM, GRU	3	PPT	--- NOT APPLICABLE ---
5	summary	1	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 14

Session Outcome: 1 Variational autoencoders

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Variational autoencoders	2	PPT	--- NOT APPLICABLE ---
20	Variational autoencoders	3	PPT	--- NOT APPLICABLE ---
5	summary	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 15

Session Outcome: 1 Deep Dream.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	deep dream	2	PPT	--- NOT APPLICABLE ---
10	deep dream application and summary	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 16

Session Outcome: 1 Neural style transfer

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	2	Talk	--- NOT APPLICABLE ---
35	Neural style transfer	2	PPT	--- NOT APPLICABLE ---
10	sumamry	2	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 17

Session Outcome: 1 Deep learning for computer vision,

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
35	Deep learning for computer vision,	2	PPT	--- NOT APPLICABLE ---
10	summary	2	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 18

Session Outcome: 1 Deep learning for text and sequences

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
35	Deep learning for text and sequences	3	PPT	--- NOT APPLICABLE ---
10	summary	2	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 19

Session Outcome: 1 Markov models

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
20	Markov models	3	PPT	--- NOT APPLICABLE ---
20	Markov models	2	PPT	Group Discussion
5	summary	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 20

Session Outcome: 1 Markov networks

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
35	Markov networks	2	PPT	--- NOT APPLICABLE ---
10	summary	2	Talk	Group Discussion

SESSION NUMBER : 21

Session Outcome: 1 Markov chains

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Chalk	--- NOT APPLICABLE ---
35	Markov chains	3	PPT	--- NOT APPLICABLE ---
10	summary	3	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 22

Session Outcome: 1 Restricted Boltzmann Machines

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
35	Restricted Boltzmann Machines	2	PPT	--- NOT APPLICABLE ---
10	sumamary	1	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 23

Session Outcome: 1 Autoregressive Models: NADE, MADE

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Chalk	--- NOT APPLICABLE ---
35	Autoregressive Models: NADE, MADE,	2	Talk	--- NOT APPLICABLE ---
10	summary	2	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 24

Session Outcome: 1 Generative Adversarial Networks (GANs),

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
35	Generative Adversarial Networks (GANs),	2	Talk	--- NOT APPLICABLE ---
10	summary	2	PPT	--- NOT APPLICABLE ---

Tutorial Course DELIVERY Plan: NO Delivery Plan Exists

Tutorial Session wise Teaching – Learning Plan

No Session Plans Exists

Practical Course DELIVERY Plan:

Tutorial Session no	Topics	CO-Mapping
1	Implement the basic logic gates AND & OR using McCullough Pit s model	CO5
2	Implement a linear classifier(binary) for the given input data using multi layer perceptron	CO5
3	Use ANN for performing classification	CO5
4	Normalize the data in the given dataset and perform classification using ANN.	CO5
5	image classification	CO5
6	dropout layers and regularisation	CO5
7	Build CNN Model for COVID-19 Disease Detection .	CO5
8	Build a deep learning model which classifies cats and dogs using CNN.	CO5
9	Simple RNN train the model	CO5
10	Using LSTM train the model with train dataset , predict the weather	CO5

Tutorial Session no	Topics	CO-Mapping
11	Build a simple auto encoder on MNIST data using keras library	CO5
12	Build a simple denoisy auto encoder using keras on MNIST	CO5

Practical Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 1 Implement the basic logic gates AND & OR using McCullough Pit s model

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	Attendance	1	Talk	--- NOT APPLICABLE ---
30	demo	2	PPT	--- NOT APPLICABLE ---
35	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 1 Implement a linear classifier(binary) for the given input data using multi layer perceptron

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 3

Session Outcome: 1 Implement ANN for performing classification

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 4

Session Outcome: 1 Normalise the data in the given dataset and perform classification using ANN.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 5

Session Outcome: 1 Apply image classification with real word data

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT

				APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 6

Session Outcome: 1 Apply dropout layers and regularisation on Model

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 7

Session Outcome: 1 Build CNN Model for COVID-19 Disease Detection .

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 8

Session Outcome: 1 Build a deep learning model which classifies cats and dogs using CNN.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 9

Session Outcome: 1 Implement Simple RNN train the model

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	Talk	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 10

Session Outcome: 1 predict the weather Using LSTM train the model with train dataset ,

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---

| 40 | implemeting program | 3 | PPT | --- NOT APPLICABLE --- |
| 25 | evaluating program and viva | 5 | Talk | --- NOT APPLICABLE --- |

SESSION NUMBER : 11

Session Outcome: 1 Inlab: 1),Build a simple auto encoder on MNIST data using keras library

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 12

Session Outcome: 1 Build a simple denoisy auto encoder using keras on MNIST

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
25	demo	2	PPT	--- NOT APPLICABLE ---
40	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	PPT	--- NOT APPLICABLE ---

Skilling Course DELIVERY Plan:

Skilling session no	Topics/Experiments	CO-Mapping
1	Installing tensor flow, Perform basic operations	CO5
2	Perform basic operations and matrix functions using tensor flow.	CO5
4	Implement NAND,NOR using Mccullochpitts model with tensor flow	CO5
5	Implement Logistic Regression using sklearn library,	CO5
6	Implement MLP classifier using sklearn library.	CO5
7	Perform PCA by calculating Eigen values and Eigen vectors	CO5
8	Implement keras Regression using car price dataset	CO5
9	Implement ANN using keras library for Binary Classification,	CO5
10	Apply PCA for given dataset using ANN ,Normalize the data and apply classification of ANN	CO5
11	Perform multiclass classification using ANN(apply Softmax function)	CO5
12	Build ANN for MNIST dataset, Implement ANN using FLASK	CO5
13	Build CNN for identifying gestures of human being	CO5
14	Improve the model tuning hyper parameters	CO5
15	Implement LSTM. Perform LSTM on stock market analysis.	CO5
16	Implement basic AutoEncoder using Keras with the help of MNIST dataset.	CO5
17	Project selection	CO5
18	review	CO5
19	Project Analysis, module design	CO5
20	review	CO5
21	Implementation of Project	CO5
22	review	CO5
23	Document Preparation and submission	CO5

Skilling session no	Topics/Experiments	CO-Mapping
24	Project final review.	CO5

Skilling Session wise Teaching – Learning Plan

SESSION NUMBER : 1

Session Outcome: 1 Perform basic operations and matrix functions using tensor flow.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	2	PPT	--- NOT APPLICABLE ---
30	demo	2	PPT	--- NOT APPLICABLE ---
35	implemeting program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	4	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 2

Session Outcome: 1 Perform basic operations and matrix functions using tensor flow.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	2	PPT	--- NOT APPLICABLE ---
40	Analysing the program	3	PPT	--- NOT APPLICABLE ---
25	evaluating program and viva	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 4

Session Outcome: 1 Implement NAND,NOR using Mccullochpitts model with tensor flow

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
25	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 5

Session Outcome: 1 Implement Logistic Regression using sklearn library,

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implement Logistic Regression using sklearn library,	3	PPT	--- NOT APPLICABLE ---
40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
25	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 6

Session Outcome: 1 Implement MLP classifier using sklearn library.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---

40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 7

Session Outcome: 1 Perform PCA by calculating Eigen values and Eigen vectors

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	2	PPT	--- NOT APPLICABLE ---
30	Implementing the program	3	PPT	--- NOT APPLICABLE ---
40	Analysing the program	4	PPT	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Chalk	--- NOT APPLICABLE ---

SESSION NUMBER : 8

Session Outcome: 1 Implement keras Regression using car price dataset

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Chalk	Group Discussion

SESSION NUMBER : 9

Session Outcome: 1 Implement ANN using keras library for Binary Classification,

Time(min)	Topic	BTL	Teaching-	Active

			Learning Methods	Learning Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
30	Implement ANN using keras library for Binary Classification,	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 10

Session Outcome: 1 Apply PCA for given dataset using ANN ,Normalize the data and apply classification of ANN

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	3	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 11

Session Outcome: 1 Perform multiclass classification using ANN(apply Softmax function)

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	PPT	--- NOT APPLICABLE ---
40	Analysing the program	3	PPT	--- NOT APPLICABLE

20	evaluating program and viva	3	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 12

Session Outcome: 1 Build ANN for MNIST dataset, Implement ANN using FLASK

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	Chalk	--- NOT APPLICABLE ---
40	Analysing the program	4	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 13

Session Outcome: 1 Build CNN for identifying gestures of human being

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Talk	--- NOT APPLICABLE ---
30	Implementing the program	3	PPT	--- NOT APPLICABLE ---
40	Analysing the program	4	PPT	--- NOT APPLICABLE ---
20	evaluating program and viva	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 14

Session Outcome: 1 Improve the model tuning hyper parameters

Time(min)	Topic	BTL	Teaching-Learning	Active Learning

			Methods	Methods
10	recap/Attendance	1	PPT	--- NOT APPLICABLE ---
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	3	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 15

Session Outcome: 1 Implement LSTM. Perform LSTM on stock market analysis.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	PPT	One minute paper
30	Implementing the program	3	Talk	--- NOT APPLICABLE ---
40	Analysing the program	5	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 16

Session Outcome: 1 Implement basic AutoEncoder using Keras with the help of MNIST dataset.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
10	recap/Attendance	1	Chalk	--- NOT APPLICABLE ---
30	Implementing the program	2	PPT	--- NOT APPLICABLE ---
40	Analysing the program	3	Talk	--- NOT APPLICABLE ---
20	evaluating program and viva	5	PPT	--- NOT APPLICABLE

SESSION NUMBER : 17

Session Outcome: 1 Project selection

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
20	Project Planing	1	Talk	--- NOT APPLICABLE ---
60	Project selection and Abstract preparation	4	Talk	Group Discussion
20	review	5	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 18

Session Outcome: 1 abstract review

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	review project abstract	3	Talk	--- NOT APPLICABLE ---
50	discussions	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 19

Session Outcome: 1 Project Analysis, module design

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
40	Guiding project	3	PPT	--- NOT APPLICABLE ---
60	designing project	5	PPT	Group Discussion

SESSION NUMBER : 20

Session Outcome: 1 review

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods

50	review - project	3	Talk	--- NOT APPLICABLE ---
50	discussions	4	Talk	Group Discussion

SESSION NUMBER : 21

Session Outcome: 1 Implementation of Project

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
60	Implementation of Project	2	PPT	--- NOT APPLICABLE ---
40	Debugging and improving the project performance	4	PPT	--- NOT APPLICABLE ---

SESSION NUMBER : 22

Session Outcome: 1 present Review on project

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	review - project	5	Talk	--- NOT APPLICABLE ---
50	discussions	4	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 23

Session Outcome: 1 Document Preparation and submission

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
60	Guiding in Preparing project documentation	3	Talk	--- NOT APPLICABLE ---
40	Reeview and discussions	5	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 24

Session Outcome: 1 Project final review.

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
40	Final Document presentaion	2	Talk	--- NOT APPLICABLE ---
60	REeview and discussions	4	PPT	--- NOT APPLICABLE ---

WEEKLY HOMEWORK ASSIGNMENTS/ PROBLEM SETS/OPEN ENDEDED PROBLEM-SOLVING EXERCISES etc:

Week	Assignment Type	Assignment No	Topic	Details	co

COURSE TIME TABLE:

Day	Hour / Component	1	2	3	4	5	6	7	8	9
Mon	Theory	---	---	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	- -	- -	- -	--	--
	Tutorial	---	---	--	--	- -	- -	- -	--	--
	Lab	---	---	--	--	- -	- -	- -	--	--
	Skilling	---	---	--	--	- -	- -	- -	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7
Tue	Theory	--	--	---	---	- -	- -	- -	---	---
	Tutorial	--	--	---	---	- -	- -	- -	---	---
	Lab	V-S1,V-S1,V-S2,V-S2,V-S3,V-S3,V-S4,V-S4,V-S5,V-	V-S1,V-S1,V-S2,V-S2,V-S3,V-S3,V-S4,V-S4,V-S5,V-	---	---	- -	- -	- -	---	---

		S5,V-S6,V-S6,V-S7,V-S7	S5,V-S6,V-S6,V-S7,V-S7					
	Skilling	--	--	---	---	- - - - - - - - -	---	---
Wed	Theory	---	---	--	--	- - - - - - - - -	---	---
	Tutorial	---	---	--	--	- - - - - - - - -	---	---
	Lab	---	---	--	--	- - - - - - - - -	---	---
	Skilling	---	---	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	V-S1,V-S2,V-S3,V-S4,V-S5,V-S6,V-S7	- - - - - - - - -	---	---
Thu	Theory	--	--	--	--	- - - - - -	--	--
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	Lab	--	--	--	--	- - - - - -	--	--
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	Tutorial	--	--	--	--	- - - - - -	--	--
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Sat	Theory	--	--	--	--	- - - - - -	--	--
	Tutorial	--	--	--	--	- - - - - -	--	--
	Lab	--	--	--	--	- - - - - -	--	--
	Skilling	--	--	--	--	- - - - - -	--	--
Sun	Theory	--	--	--	--	- - - - - -	--	--
	Tutorial	--	--	--	--	- - - - - -	--	--

Lab	--	--	--	--	- -	- -	- -	--	--
Skilling	--	--	--	--	- -	- -	- -	--	--

REMEDIAL CLASSES:

Supplement course handout, which may perhaps include special lectures and discussions that would be planned, and schedule notified according

SELF-LEARNING:

Assignments to promote self-learning, survey of contents from multiple sources.

S.no	Topics	CO	ALM	References/MOOCS

DELIVERY DETAILS OF CONTENT BEYOND SYLLABUS:

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

S.no	Advanced Topics, Additional Reading, Research papers and any	CO	ALM	References/MOOCS

EVALUATION PLAN:

Evaluation Type	Evaluation Component	Weightage/Marks		Assessment Dates	Duration (Hours)	CO1	CO2	CO3	CO4	CO5
End Semester Summative Evaluation Total= 40 %	End Semester Exam	Weightage	20		100	5	5	5	5	
		Max Marks	100			25	25	25	25	
	Lab End Semester Exam	Weightage	10		100					10
		Max Marks	50							50
	Skill Sem-End Exam	Weightage	10		100					10
		Max Marks	50							50
In Semester Summative Evaluation Total= 35 %	Semester in Exam-I	Weightage	10	2-2-2022	100	5	5			
		Max Marks	50			25	25			
	Semester in Exam-II	Weightage	10	4-4-2022	100			5	5	
		Max Marks	50					25	25	
	Lab In Semester Exam	Weightage	5	6-4-2022	100					5
		Max Marks	50							50
	MOOCs Certification	Weightage	5		50	1.25	1.25	1.25	1.25	
		Max Marks	40			10	10	10	10	
	Skill In-Sem Exam	Weightage	5	6-4-2022	100					5
		Max Marks	50							50
In	Continuous	Weightage	10		100					10

Semester Formative Evaluation Total= 25 %	Evaluation - Lab Exercise	Max Marks	100							100
	MOOCs Review	Weightage	5		20	1.25	1.25	1.25	1.25	
		Max Marks	40			10	10	10	10	
	Skilling Continuous Evaluation	Weightage	10		100					10
		Max Marks	100							100

ATTENDANCE POLICY:

Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course
In every course, student has to maintain a minimum of 85% attendance to be eligible for appearing in Semester end examination of the course, for cases of medical issues and other unavoidable circumstances the students will be condoned if their attendance is between 75% to 85% in every course, subjected to submission of medical certificates, medical case file and other needful documental proof to the concerned departments

DETENTION POLICY :

In any course, a student has to maintain a minimum of 85% attendance and In-Semester Examinations to be eligible for appearing to the Semester End Examination, failing to fulfill these conditions will deem such student to have been detained in that course.

PLAGIARISM POLICY :

Supplement course handout, which may perhaps include special lectures and discussions

COURSE TEAM MEMBERS, CHAMBER CONSULTATION HOURS AND CHAMBER VENUE DETAILS:

Supplement course handout, which may perhaps include special lectures and discussions

Name of Faculty	Delivery Component of Faculty	Sections of Faculty	Chamber Consultation Day (s)	Chamber Consultation Timings for each day	Chamber Consultation Room No:	Signature of Course faculty:
SHAHANA BANO	P	1-B	-	-	-	-
KONGARA RAVINDRANATH	L	7-MA	-	-	-	-
KONGARA RAVINDRANATH	P	7-A	-	-	-	-
KONGARA RAVINDRANATH	S	7-MA	-	-	-	-
Kallipalli Raju	P	3-B	-	-	-	-
SAGAR IMAMBI SHAIK	L	1-MA	-	-	-	-
SAGAR IMAMBI SHAIK	P	1-A	-	-	-	-
SAGAR IMAMBI SHAIK	S	1-MA	-	-	-	-
SHASHI	L	6-MA	-	-	-	-

MEHROTRA						
SHASHI MEHROTRA	P	6-A	-	-	-	-
SHASHI MEHROTRA	S	6-MA	-	-	-	-
TATAVARTHY SRI	L	2-MA	-	-	-	-
TATAVARTHY SRI	P	2-A	-	-	-	-
TATAVARTHY SRI	S	2-MA	-	-	-	-
DEBRUP BANERJEE	P	4-B	-	-	-	-
vithya Ganesan	P	2-B	-	-	-	-
Sanasam Inunganbi	P	6-B	-	-	-	-
Madhusudhanan Sampath	L	5-MA	-	-	-	-
Madhusudhanan Sampath	P	5-A	-	-	-	-
Madhusudhanan Sampath	S	5-MA	-	-	-	-
mounika marreddy	P	7-B	-	-	-	-
Akhilesh Dubey	L	4-MA	-	-	-	-
Akhilesh Dubey	P	4-A	-	-	-	-
Akhilesh Dubey	S	4-MA	-	-	-	-
Lambodar Jena	P	5-B	-	-	-	-
Sandeep Sahratia	L	3-MA	-	-	-	-
Sandeep Sahratia	P	3-A	-	-	-	-
Sandeep Sahratia	S	3-MA	-	-	-	-

GENERAL INSTRUCTIONS

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

NOTICES

Most of the notices are available on the LMS platform.

All notices will be communicated through the institution email.

All notices concerning the course will be displayed on the respective Notice Boards.

Signature of COURSE COORDINATOR

(SAGAR IMAMBI SHAIK)

Signature of Department Prof. Incharge Academics & Vetting Team Member

Department Of CSE

HEAD OF DEPARTMENT:

Approval from: DEAN-ACADEMICS
(Sign with Office Seal) [object HTMLDivElement]