LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 9001:2015 Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. T.S.RAJARAJESWARI
Course Name & Code : Pattern Recognition (20CS20)
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech VI Sem AI & DS **A.Y.:** 2022-23

PREREQUISITE: Basic knowledge of probability & statistics, Data Mining
The main objective of the course is that the concept of a pattern and the fundamentals of pattern recognition and its relevance to classical and modern problems and to be able to identify where, when and how pattern recognition can be applied.

. **COURSE OUTCOMES (COs):** At the end of the course, student will be able to

CO1	Understand the primitives of Pattern Recognition.(Understand-L2)
CO2	Understand the fundamental concepts of Bayesian approach. (Apply–L3)
CO3	Understand Bayesian classifier with respect to its parameter estimation. (Understand-L2)
CO4	Gain knowledge of Mixture densities and clustering techniques. (Understand- L)
CO5	Develop a statistical frame work for Speech Recognition.(Apply-L3)

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	2	-	-	-	-	-	-	-	2	-	2	-
CO2	3	3	-	2	-	-	-	-	-	-	-	2	1	2	-
CO3	2	2	2	2	-	-	-	-	-	-	-	2	-	2	-
CO4	2	2	-	2	-	-	-	-	-	-	-	2	2	2	-
CO5	2	-	2	2	-	-	-	-	-	-	-	2	2	2	-
1 - Low			**2 –**Medium							**3 -** High					

TEXTBOOKS:

T1: Pattern classifications, Richard.O.Duda, Peter.E..Hart, David.G.Stroke.Wiley's student edition, Second Edition 2004.

T2: Pattern Recognition, an Introduction, V Susheela Devi, M NarasimhaMurthy, University Press, 2010

T3: Fundamentals of speech Recognition, Lawerence Rabiner, Biing-Hwang Juang Pearson Education

Reference Books:

R1: R.C Gonzalez and R.E.Woods,—Digital Image Processing ǁ,Addison Wesley,1992.

R2: Pattern Recognition and Image Analysis–Earl Gose, Richard John baugh, Steve Jost PHI 2004.

R3: Pattern Recognition, Sergios The odoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Pattern Recognition

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEOs and COs discussion, Pattern Recognition Syllabus Discussion	1	26-12-2022		1 & 2	
2.	Introduction	1	27-12-2022		1 & 2	
3.	Pattern Recognition Example	1	29-12-2022		1 & 2	
4.	Example	1	30-12-2022		1 & 2	
5.	Pattern Recognition Systems	1	02-01-2023		1 & 2	
6.	The Design Cycle	1	03-01-2023		1 & 2	
7.	Learning and adaptation	1	04-01-2023		1 & 2	
8.	**Bayesian Decision Theory:** Introduction	1	06-01-2023		1 & 2	
9.	continuous features–two categories classifications	1	07-01-2023		1 & 2	
10.	minimum error –rate classification	1	09-01-2023		1 & 2	
11.	zero–one loss function	1	10-01-2023		1 & 2	
12.	classifiers	1	19-01-2023		1 & 2	
13.	discriminate functions	1	20-01-2023		1 & 2	
14.	decision Surface	1	23-01-2023		1 & 2	
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Normal density

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	**Normal density:** Univariate density	1	24-01-2023		1 & 2	
16.	multivariate density	1	27-01-2023		1 & 2	
17.	discriminate functions for the normal Density case-1	1	30-01-2023		1 & 2	
18.	Case – 2	1	31-01-2023		1 & 2	
19.	Case – 3	1	02-02-2023		1 & 2	
20.	Bayes decision theory–discrete features	1	03-02-2023		1 & 2	
21.	compound Bayesian decision theory and context	1	06-02-2023		1 & 2	
22.	compound Bayesian decision theory and context	1	07-02-2023		1 & 2	
No. of classes required to complete UNIT-II: 8				**No. of classes taken:**		

UNIT-III: Maximum likelihood and Bayesian parameter estimation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	**Maximum likelihood and Bayesian parameter estimation:** Introduction	1	09-02-2023		1 & 2	
24.	maximum likelihood Estimation	1	10-02-2023		1 & 2	
25.	The Gaussian Case : Unknown μ	1			1 & 2	
26.	The Gaussian μ Case : Unknown μ and ∑	1	13-02-2023		1 & 2	
27.	Bayesian parameter estimation– Gaussian case.	1	14-02-2023		1 & 2	
28.	Bayesian estimation,	1	16-02-2023		1 & 2	
29.	Bayesian parameter estimation– Gaussian case	1	17-02-2023		1 & 2	
30.	The Univariate Case : p(x|D)	1	27-02-2023		1 & 2	
No. of classes required to complete UNIT-III: 8				**No. of classes taken:**		

UNIT-IV: Un-supervised learning and clustering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	**Un-supervised learning and clustering:** Introduction	2	28-02-2023 03-04-2023		1 & 2	
32.	mixture densities and identifiability	2	03-03-2023 06-03-2023		1 & 2	
33.	maximum likelihood estimates	2	07-03-2023 09-03-2023		1 & 2	
34.	application to normal mixtures case-1	1	10-03-2023		1 & 2	
35.	Case - 2	1	13-03-2023		1 & 2	
36.	K- means clustering	1	14-03-2023		1 & 2	
37.	Date description and clustering– similarity measures	2	16-03-2023 17-03-2023		1 & 2	
38.	criteria function for clustering.	2	20-03-2023 21-03-2023		1 & 2	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Pattern recognition using discrete hidden Markov models

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
39.	**Pattern recognition using discrete hidden Markov models:** Discrete-time Markov process	2	23-03-2023 27-03-2023		1 & 2	
40.	Extensions to hidden Markov models	2	28-03-2023 31-03-2023		1 & 2	
41.	Classification using HMMs	2	03-04-2023 06-04-2023		1 & 2	
42.	Three basic Problems using HMMs	2	09-04-2023 10-04-2023		1 & 2	
43.	Types of HMMs	2	13-04-2023		1 & 2	
44.	Revision	2	17-04-2022 22-04-2022		1 & 2	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	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.
PO 4	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.
PO 5	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
PO 6	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
PO 7	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.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to
PO 11	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.
PO 12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Ms.T.S.RajaRajeswari**			**Dr.O.RamaDevi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: S. SRINIVASA REDDY
Course Name & Code **:** BIGDATA ANALYTICS & 20CS19
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VI **A.Y.:** 2022-23

PREREQUISITE: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

Understanding the process of distributed data (Structured, Semi-Structured and Unstructured) that process the Terabytes of data using Hadoop Eco System Tools.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Identify Big Data and its Business Implications. **(Understand-L2)**
CO2	Process of distributed file system using Hadoop. **(Apply-L3)**
CO3	Illustrate the Map Reduce mechanism. **(Apply-L3)**
CO4	Develop Structured data processing tools. **(Apply-L3)**
CO5	Develop semi/ unstructured data processing tools. **(Apply– L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	-	2	3	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
CO4	2	3	-	-	1	-	-	-	-	-	-	2	-	-	-
CO5	2	3	-	-	1	-	-	-	-	-	-	2	-	-	-
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1 Tom White" Hadoop: The Definitive Guide" Third Edit, O'reilyMedia,2012.

T2 Big Data and Analytics, 2ed Seema Acharya, Subhashini Chellappan, Wiley2015.

REFERENCE BOOKS:

R1 Michael Berthold, DavidJ.Hand,"IntelligentDataAnalysis", Springer,2007.

R2 Jay Liebowitz ,"Big Data and Business Analytics" Auerbach Publications ,CRCpress (2013).

R3 Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop",McGraw-Hill/Osborne Media(2013),Oracle press.

R4 AnandRajaramanandJefreyDavidUlman,"MiningofMassiveDatasets",Cambri dgeUniversityPress,2012

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Big data

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Big data, CEOs and Cos discussion	1	26-12-2022		TLM1	
2.	Types of Digital Data	1	27-12-2022		TLM1	
3.	Classification of Digital Data	1	28-12-2022		TLM1	
4.	Characteristics of Data	1	29-12-2022		TLM1	
5.	Evolution of Big Data	1	02-01-2023		TLM1	
6.	Definition of Big Data, Challenges with Big Data	1	03-01-2023		TLM1	
7.	What is Big Data? Other Characteristics of Data Which are not Definitional Traits of Big Data	1	04-01-2023		TLM1	
8.	Why Big Data? analyzing Data with Unix tools	1	05-01-2023		TLM1	
9.	Analyzing Data with Hadoop	1	09-01-2023		TLM1	
10.	Hadoop Streaming	1	10-01-2023		TLM1	
11.	Hadoop Echo System	1	11-01-2023		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Hadoop Distributed File System

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
12.	The Design of HDFS	1	12-01-2023		TLM1	
13.	HDFS Concepts	1	18-01-2023		TLM1	
14.	Command Line Interface	1	19-01-2023		TLM1	
15.	Hadoop file system interfaces	1	23-01-2023		TLM1	
16.	Dataflow, Data Ingestion with Sqoop and Hadoop archives,	1	24-01-2023		TLM1	
17.	Dataflow, Data Ingestion with Sqoop and Hadoop archives,	1	25-01-2023		TLM1	
18.	Hadoop I/O: Compression	1	30-01-2023		TLM1	
19.	Serialization	1	31-01-2023		TLM1	
20.	Avro and File-Based Data structures	1	01-02-2023		TLM1	
21.	Bigdata Applications	1	02-02-2023		TLM1	
22.	Bigdata Analytics Use cases	1	06-02-2023		TLM1	
23.	Bigdata Analytics Use cases	1	07-02-2023		TLM1	
24.	Bigdata Analytics Challenges	1	08-02-2023		TLM1	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		

UNIT-III: Map Reduce Technique

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
25.	How Map Reduce works?	1	09-02-2023		TLM1	
26.	Anatomy of a Map Reduce Job Run	1	13-02-2023		TLM1	
27.	Job Failures	1	14-02-2023		TLM1	
28.	Job Scheduling	1	15-02-2023		TLM1	
29.	Shuffle and Sort	1	16-02-2023		TLM1	
30.	Task Execution	1	27-02-2023		TLM1	

31.	Map Reduce Types and Formats	1	28-02-2023		TLM1	
32.	Map Reduce Features	1	01-03-2023		TLM1	
No. of classes required to complete UNIT-III: 08				**No. of classes taken:**		

UNIT-IV: Structured Data Processing Tools

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
33.	Hive: Installation	1	02-03-2023		TLM1	
34.	Running Hive	1	06-03-2023		TLM1	
35.	Hive QL	1	07-03-2023		TLM1	
36.	Tables, Querying Data	1	08-03-2023		TLM1	
37.	User Defined functions	1	09-03-2023		TLM1	
38.	Sqoop: Introduction	1	13-03-2023		TLM1	
39.	generate code	1	14-03-2023		TLM1	
40.	Database import	1	15-03-2023		TLM1	
41.	working with imported data	1	16-03-2023		TLM1	
42.	Importing large objects	1	20-03-2023		TLM1	
43.	performing an export	1	21-03-2023		TLM1	
44.	Applications	1	23-03-2023		TLM1	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Semi-structured and unstructured Data Processing Tools Pig

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Introduction to PIG	1	27-03-2023		TLM1	
46.	Execution Modes of Pig	1	28-03-2023		TLM1	
47.	Comparison of Pig with Databases	1	29-03-2023		TLM2	
48.	Grunt, Pig Latin	1	03-04-2023		TLM2	
49.	User Defined Functions	1	04-04-2023		TLM2	
50.	Data Processing operators	1	06-04-2023		TLM2	
51.	HBase: Basics	1	10-04-2023		TLM2	
52.	Concepts, Clients	1	11-04-2023		TLM2	
53.	Example	1	12-04-2023		TLM2	
54.	HBase Versus RDBMS	1	13-04-2023		TLM2	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	BDA Use case – I	1	17-04-2023		TLM2	
2.	BDA Use case – II	1	18-04-2023		TLM2	
3.	BDA Use case - III	1	19-04-2023		TLM2	

4.		1	20-04-2023		TLM2	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	**Marks**
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**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.
PO 4	**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.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**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.
PO 7	**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.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**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.
PO 11	**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.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project. development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr. S. Srinivasa Reddy**	**Mr. G.V. Suresh**	**Dr. S. Jaya Pradha**	**Dr. D.Veeraiah**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P. Bhagath
Course Name & Code : Deep Learning & 20AD07
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech/VI/ A **A.Y.:** 2022-23
PREREQUISITES : **Probability and Statistics, LATT, Machine Learning**

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of the course is to make students learn the frameworks of deep learning and their application

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Apply the fundamentals of linear algebra to machine learning algorithms. **(Apply- L3)**
CO2	Understand the fundamental building blocks of deep learning **(Understand- L2)**
CO3	Apply the concepts of Convolutional Neural Networks to computer vision applications. **(Apply- L3)**
CO4	Apply the concepts of Recurrent Neural Networks to Natural Language Processing. **(Apply- L3)**
CO5	Apply the regularization techniques to improve the model performance. **(Apply- L3)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	-	1	1	-	3
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	2	2	-	-	-	-	-	-	-	2	-	2	2
CO4	2	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO5	2	2	2	2	-	-	-	-	-	-	-	2	2	2	-

1 - Low **2** –Medium **3** - High

TEXTBOOKS:

T1	Deep Learning, Ian Goodfellow, YoshuaBengio and Aaron Courvile, MIT Press, 2016
T2	Deep Learning with Python, Francois Chollet, Manning Publications, Released December 2017.
T3	Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence – Jon Krohn, Grant Beyleveld, AglaéBassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821
T4	Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412

REFERENCE BOOKS:

R1	Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009
R2	Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
R3	Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-HillEducation, 2004.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Mathematical foundations of Deep Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Mathematical foundations of Deep Learning	1	26-12-22		TLM1,2	
2.	Multiplying Matrices and Vectors	2	28-12-22 29-12-22		TLM1,2	
3.	Identity and Inverse Matrices	1	30-12-22		TLM1,2	
4.	Linear dependence and span	2	02-01-23 04-01-23		TLM1,2	
5.	Norms	2	05-01-23 06-01-23		TLM1,2	
6.	Special kinds of matrices and vectors	1	09-01-23		TLM1,2	
7	Trace operations	1	11-01-23		TLM1,2	
8	Eigen Decomposition	2	12-01-23 18-01-23		TLM1,2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Fundamentals of Deep Learning

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
7.	Anatomy of Neural Networks: Layers, Models, Loss functions and optimizers	4	19-01-23 20-01-23 23-01-23 25-01-23		TLM1,2	
8.	Training Deep Networks: Cost Functions, Optimizers	3	27-01-23 30-01-23 01-02-23		TLM1,2	
9.	Types of Deep Neural Networks	2	02-02-23 03-02-23		TLM1,2	
No. of classes required to complete UNIT-II: 09				**No. of classes taken:**		

UNIT-III: Convolutional Neural Networks

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Motivation	1	06-02-23		TLM1,2	
11.	Convolution Operation	1	08-02-23		TLM1,2	
12.	Types of layers	2	09-02-23 10-02-23		TLM1,2	
13.	Pooling	2	13-02-23 15-02-23		TLM1,2	
14.	LENET5 Architecture	3	16-02-23 17-02-23 27-02-23		TLM1,2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Recurrent Neural Networks

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Architecture of traditional RNN	2	01-03-23 02-03-23		TLM1,2	
16.	Types and applications of RNN	2	03-03-23 06-03-23		TLM1,2	
17.	Variants of RNNs	2	08-03-23 09-03-23		TLM1,2	
18.	Word Embedding using Word2vec	4	10-03-23 13-03-23 15-03-23 16-03-23		TLM1,2	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken:**		

UNIT-V: Cluster Analysis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
19.	Introduction to Regularization for Deep Learning	1	17-03-23		TLM1,2	
20.	L1 and L2 Regularizations	2	20-03-23 22-03-23		TLM1,2	
21.	Dropout	1	23-03-23		TLM1,2	
22.	Data Augmentation and Early Stopping	2	24-03-23 27-03-23		TLM1,2	
23.	Case study on MNIST data	2	29-03-23 30-03-23		TLM1,2	
24	Introduction to Autoencoders	1	31-03-23		TLM1,2	
25	Architecture and Implementation	2	03-04-23 05-04-23		TLM1,2	
26	Denoising Autoencoders	1	06-04-23		TLM1,2	
27	Sparse Autoencoders	1	07-04-23		TLM1,2	
28	Use cases	1	10-04-23		TLM1,2	
29	Projects and evaluation	05	11-04-23 12-04-23 13-04-23 14-04-23 17-04-23		TLM1,2	
No. of classes required to complete UNIT-V: 19				**No. of classes taken:**		

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project development using open-source programming environment for the success of Organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. P Bhagath**	**Dr. P Bhagath**	**Dr. P Bhagath**	**Dr. O. Rama Devi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. M. Srinivasa Rao
Course Name & Code : SOFTWARE ENGINEERING & 20IT01
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem : B.Tech/VI **A.Y.:** 2022-23

PREREQUISITE: Object Oriented Programming.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to provide an understanding of different s/w process models and how to choose one among them by gathering the requirements from a client and specifying them. Using those requirements in the design of the software architecture based on the choices with the help of modules and interfaces. To enable s/w development, by using different testing techniques like unit, integration and functional testing, quality assurance can be achieved.

COURSE OUTCOMES (COs): At the end of the course, student will be able to

CO1	Understand the fundamentals of software engineering concepts and software Process models.**(Understand-L2)**
CO2	Apply the requirement elicitation techniques for preparing SRS and design engineering. **(Apply-L3)**
CO3	Understanding the basic building blocks of UML, Class, and object diagrams. **(Understand-L2)**
CO4	Apply behavioral models for real world applications. **(Apply-L3)**
CO5	Demonstrate different software testing approaches for testing real time applications. **(Understand-L2)**

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3												3		
CO2		2											2	1	
CO3	3												3	2	
CO4		2												3	1
CO5	2	2													3
1 - Low			**2** –Medium							**3** - High					

TEXTBOOKS:

T1 Roger S. Pressman, "Software engineering- A practitioner 's Approach", TMH InternationalEdition, 6th edition, 2005..

T2 Grady Booch, James Rum baugh, Ivar Jacobson, "The Unified Modeling Language User Guide", PEARSON,4thImpression,2012.

REFERENCE BOOKS:

R1 Software Engineering- Concepts and practices: Ugrasen Suman, Cengage learning

R2 Object- oriented analysis and design using UML", Mahesh P. Matha, PHI

R3 Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI

R4 . https://onlinecourses.nptel.ac.in/noc20_cs68 **[1,2,3,4,5]**

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Software and software Engineering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	CEOs and COs discussion	1	26-12-2022		TLM1	
2.	The evolving role of Software	1	27-12-2022		TLM1	
3.	Characteristics of Software	1	28-12-2022		TLM1	
4.	Importance of software Engineering,	1	30-12-2022		TLM1	
5.	Changing nature of software	1	02-01-2023		TLM1	
6.	Legacy Software	1	03-01-2023		TLM1	
7.	Software Myths	1	04-01-2023		TLM1	
8.	Software process model: layered technology	1	06-01-2023		TLM1	
9.	Process framework The process and product	1	09-01-2023		TLM1	
10.	Waterfall model	1	10-01-2023		TLM1	
11.	Incremental model	1	11-01-2023		TLM1	
12.	Spiral and V model	1	18-01-2023		TLM1	
13.	Component based s/w development	1	20-01-2023			
14.	Unified Process model	1	23-01-2023			
No. of classes required to complete UNIT-I: 14				**No. of classes taken:**		

UNIT-II: Requirements Analysis and Software design

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Requirements gathering	1	24-01-2023		TLM1	
16.	Requirement analysis	1	25-01-2023		TLM1	
17.	Software requirement specification	1	27-01-2023		TLM1	
18.	SRS document case study	1	30-01-2023		TLM1	
19.	Overview of design process	1	31-01-2023		TLM1	
20.	Design concepts	1	01-02-2023		TLM1	
21.	Architectural concepts	1	03-02-2023		TLM1	
22.	Examples	1	06-02-2023		TLM1	
23.	Revision	1	07-02-2023		TLM1	
No. of classes required to complete UNIT-II: 9				**No. of classes taken:**		

UNIT-III: Design using UML

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Building Blocks of UML	1	08-02-2023		TLM1	
25.	Defining things	1	10-02-2023		TLM1	
26.	Defining relationships and diagrams	1	13-02-2023		TLM1	
27.	Common Mechanism in UML	1	14-02-2023		TLM1	
28.	Class diagrams	1	27-02-2023		TLM1	
29.	Examples	1	28-02-2023		TLM1	
30.	Object diagrams and examples	1	01-03-2023		TLM1	
31.	Revision	1	03-03-2023		TLM1	
No. of classes required to complete UNIT-III: 08				**No. of classes taken:**		

UNIT-IV: Behavioral Modeling

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Interactions	1	06-03-2023		TLM1	
33.	Interaction diagrams	1	07-03-2023		TLM1	
34.	Use-cases	1	10-03-2023		TLM1	
35.	Use-case diagrams	1	13-03-2023		TLM1	
36.	Activity diagrams	1	14-03-2023		TLM1	
37.	Events and signals, state machines	1	15-03-2023			
38.	processes and Threads, time, and space	1	17-03-2023		TLM1	
39.	State chart diagrams	1	20-03-2023		TLM1	
40.	Component diagrams	1	21-03-2023		TLM1	
41.	Deployment diagrams	1	24-03-2023		TLM1	
42.	Examples	1	27-03-2023		TLM1	
43.	Revision	1	28-03-2023		TLM1	
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Testing Techniques

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
44.	Software testing fundamentals	1	29-03-2023		TLM1	
45.	Unit testing	1	31-03-2023		TLM1	
46.	Integration testing	1	03-04-2023		TLM1	
47.	Blackbox testing	1	04-04-2023		TLM1	
48.	Whitebox testing	1	10-04-2023		TLM1	
49.	Debugging	1	11-04-2023		TLM1	
50.	System testing	1	12-04-2023		TLM1	
51.	Examples	1	17-04-2023		TLM1	
52.	Revision	1	18-04-2023		TLM1	
No. of classes required to complete UNIT-V: 09				**No. of classes taken:**		

Content Beyond the Syllabus:

S No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50	Case study version control	1	19-04-2023		TLM1	
51	Case study test case preparation	1	21-04-2023		TLM1	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

EVALUATION PROCESS (R17 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5
II- Descriptive Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	M2=15
II-Quiz Examination (UNIT-III (Remaining Half of the Syllabus), IV & V)	Q2=10
Mid Marks =80% of Max ((M1+Q1+A1), (M2+Q2+A2)) + 20% of Min ((M1+Q1+A1), (M2+Q2+A2))	M=30
Cumulative Internal Examination (CIE): M	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**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.
PO 4	**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.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**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.
PO 7	**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.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**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.
PO 11	**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.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	To apply the fundamental engineering knowledge, computational principles, and methods for extracting knowledge from data to identify, formulate and solve real time problems.
PSO 2	To develop multidisciplinary projects with advanced technologies and tools to address social and environmental issues.
PSO 3	To provide a concrete foundation and enrich their abilities for Employment and Higher studies in Artificial Intelligence and Data science with ethical values.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.M Srinivasa Rao**	**Dr.M Srinivasa Rao**	**Dr.M Srinivasa Rao**	**Dr. O. Rama Devi**
Signature				

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Phone:08659-222933,Fax:08659-222931

DEPARTMENTOFARTIFICIALINTELLIGENCE&DATASCIENCE

COURSEHANDOUT
PART-A

Name of Course Instructor: V.Sowjanya
CourseName&Code : CASE TOOLS LAB (20AD 55)
L-T-PStructure : 0-0-3 **Credits:**1.5
Program/Sem/Sec : B.Tech IV Sem AI&DS-A **A.Y.:**2022-23

PRE-REQUISITE: Object Oriented Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is that a student will be familiar with principles behind the Object-Oriented Design and able to apply those principles in a project setting. Students will analyze applications and know how to take a pragmatic approach to software design and development.

COURSE OUTCOMES (COs): At the end of the course, students are able to

CO1	Analyze Software Requirements for the given Real-World Application using Use Cases. **(Analyze-L4)**
CO2	Develop the UML Diagrams to view Software System in static aspects. **(Analyze-L4)**
CO3	Develop the UML Diagrams to view Software System in dynamic aspects. **(Analyze-L4)**
CO4	Improve individual /team work skills, communication & report writing skills with Ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, PO's & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	-	-	-	-	-	-	1	1	-	-
CO2	-	2	1	-	-	-	-	-	-	-	-	1	1	-	-
CO3	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-
CO4	-	2	-	-	-	-	-	-	3	-	-	-	-	1	-

Note: Enter Correlation Levels **1** or **2** or **3.**

If there is no correlation, **put '-'**

1-Slight(Low), **2** – Moderate (Medium), **3** -Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSONPLAN): Section-A

S.No.	Topics to be covered	No.of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Cycle-1: Analyze the Requirements for the following Case Studies. 1) Automated Teller Machine(ATM) 2) Library Management System 3) Railway Ticket Reservation System	3	4.1.23		TLM4	
2	Cycle-2: Analyze the Requirements for the following Case Studies. 1) Point-of-Sale Terminal 2) Customer Support Service Operations 3) Cab Booking Service	3	18.1.23		TLM4	
3	Cycle-3: Basics of UML 1) Introduction to UML 2) Familiarization with any one of the Software such as Rational Rose or Umbrello or Gliffy Diagram etc.	3	25.1.23		TLM4	
4	Cycle-4: For each case study given earlier, Construct Use Case Diagram for following: 1) Identify and Analyze the Actors. 2) Identify the Actions. 3) Analyze the Relationships between Actors and Actions. 4) Sketch the Use Case Diagram.	3	1.2.23		TLM4	
5	Cycle-5 and Cycle-6: For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram	3	8.2.23		TLM4	
6	Cycle7: For each case study given earlier, Construct Interaction Diagrams in the following manner: 1) Identify the Objects participating in Communication. 2) Identify the Messages between the objects. 3) Give numbering to messages. 4) Use Flat Sequencing or Procedural Sequencing for numbering.	3	15.2.23		TLM4	
7	Cycle-8: For each case study given earlier, Construct Activity Diagram in the following manner: 1) Identify activities in your case study. 2) Identify relationships among	3	1.3.23		TLM4	

	activities. 3) Use Fork or Join, if necessary. 4) Sketch the diagram.					
8	Cycle9: For each case study given earlier, Construct State Chart Diagram in the following manner: 1) Identify the different states in your case study. 2) List out the different sub-states present in the state. 3) Identify relationships among the state to state. 4) Sketch the diagram.	3	15.3.23		TLM4	
9	Cycle10: For each case study given earlier, Construct Component Diagram in the following manner: 1) Identify the different components in your case study. 2) Create a visual for each of the component. 3) Describe the organization and relationships between components using interfaces, ports etc. 4) Sketch the diagram.	3	29.3.23		TLM4	
10	Cycle11: For each case study given earlier, Construct Deployment Diagram in the following manner: 1) Identify the nodes. 2) Identify the relationships among the nodes. 3) Sketch the Diagram.	3	12.4.23		TLM4	
11	Internal Exam		19.4.23			

TeachingLearningMethods			
TLM1	Chalkand Talk	**TLM4**	Demonstration(Lab/FieldVisit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/ MOOCS)
TLM3	Tutorial	**TLM6**	GroupDiscussion/Project

PART-C

EVALUATION PROCESS (R20Regulations):

According to Academic Regulations of R20 Distribution and Weight age of Marks for Laboratory Courses is as follows

(a) Continuous Internal Evaluation (CIE): The Continuous Internal Evaluation(CIE) is based on the following parameters:

Parameter	Marks
DaytoDaywork	05
Record	05
InternalTest	05
Total	15

(b) Semester End Examinations (SEE): The Semester End examinations (SEE) for laboratory courses shall be jointly conducted by internal and external examiners with 3hours duration and evaluated for 35marks. The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	Marks
Procedure/Algorithm	05
Experimentation/Programexecution	10
Observations/Calculations/Validation	10
Result/Inference	05
Vivavoce	05
Total	35

PART-D

PROGRAMMEOUTCOMES(POs):

PO1	**Engineering knowledge**:Applytheknowledgeofmathematics,science,engineering fundamentals, and an engineering specialization to the solution of complex engineeringproblems.
PO 2	**Problem analysis**: Identify,formulate,review research literature,and analyze complexengineeringproblemsreachingsubstantiatedconclusionsusingfirstprinciplesofmathematics,natural sciences,andengineering sciences.
PO 3	**Design/developmentofsolutions**:Designsolutionsforcomplexengineeringproblemsanddesignsystemcomponentsorprocessesthatmeetthespecifiedneeds withappropriateconsiderationforthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations.
PO 4	**Conductinvestigationsofcomplexproblems**:Useresearch-basedknowledgeandresearchmethodsincludingdesignofexperiments,analysisandinterpretationofdata, andsynthesisoftheinformationtoprovidevalidconclusions.
PO 5	**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,and modernengineeringandITtoolsincludingpredictionandmodellingtocomplexengineering activitieswithanunderstandingofthelimitations
PO 6	**Theengineerandsociety**:Applyreasoninginformedbythecontextualknowledgeto assesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevanttotheprofessionalengineering practice
PO 7	**Environmentandsustainability**:Understandtheimpactoftheprofessionalengineeringsolutionsinsocietalandenvironmentalcontexts,anddemonstratethe knowledgeof,andneedforsustainabledevelopment.
PO 8	**Ethic**s:Applyethicalprinciplesandcommittoprofessionalethicsandresponsibilities andnormsoftheengineeringpractice.
PO 9	**Individualandteamwork**:Functioneffectivelyasanindividual,andasamemberorleader in diverseteams,and in multidisciplinarysettings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with theengineering community and with society at large, such as, being able to comprehendandwriteeffectivereportsanddesigndocumentation,makeeffectivepresentations, andgiveandreceiveclearinstructions.
PO 11	**Project management andfinance**: Demonstrate knowledgeandunderstandingof theengineeringandmanagementprinciplesandapplythesetoone'sownwork,asa memberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments.
PO 12	**Life-longlearning**:Recognizetheneedforandhavethepreparationandabilityto engageinindependentandlife-longlearninginthebroadestcontextoftechnologicalchange.

PROGRAMMESPECIFICOUTCOMES(PSOs):

PSO 1	Toapplythefundamentalengineeringknowledge,computationalprinciples,andmethodsforextracting knowledgefromdatatoidentify,formulateandsolverealtimeproblems.
PSO 2	Todevelopmultidisciplinaryprojectswithadvancedtechnologiesandtoolstoaddresssocialandenvironmentalissues.
PSO 3	To provide a concrete foundation and enrich their abilities for employment and Higher studies in Artificial Intelligence and Data Science with ethical values.

Title	CourseInstructor	CourseCoordinator	ModuleCoordinator	Headofthe Department
Nameofthe Faculty	V.Sowjanya	Dr.M.Sitha Ram	Dr.K.Naga Prasanthi	Dr. O.RamaDevi
Signature				

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L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: S. SRINIVASA REDDY
Course Name & Code : DATA ANALYTICS AND VISUALIZATION LAB & 20CS62
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech /VI/C **A.Y.:** 2022-23

PREREQUISITE: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queries and sub queries), exposure to Linux Environment

COURSE EDUCATIONAL OBJECTIVE(CE0):
The Objective of the course is to provide practical, foundation level training that enables immediate and effective participation in Big Data and other Analytics projects using Hadoop and Data Visualization using Tableau.

COURSE OUTCOMES (CO):
CO1: Demonstrate the installation of Big data analytic tools. **(Understand–L2)**
CO2: Apply data modeling techniques to large datasets. **(Apply–L3)**
CO3: Conduct exploratory data analysis using visualization. **(Understand–L2)**
CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between Cos, Pos & PSOs):

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	-	2	2	-	-	-	-	-	-	1	-	-	-
CO2	2	-	-	3	-	-	-	-	-	-	-	1	-	-	-
CO3	2	1	-	2	2	-	-	-	-	-	-	1	-	-	-
CO4	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-

Note: 1- Slight (Low), **2 -** Moderate (Medium), **3 -** Substantial (High)

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	HOD Sign
1.	Refreshing Linux Commands and Installation of Hadoop	3	30-12-2023		
2.	Implementation of Run a basic Word Count Map Reduce program	3	06-01-2023		
3.	Implementation of Matrix Multiplication with Hadoop Map Reduce	3	13-01-2023		
4.	Implementation of Weather mining by taking weather dataset using Map Reduce	3	20-01-2023		
5.	Installation of Hive along with practice examples	3	27-01-2023		
6.	Installation of Sqoop along with Practice examples	3	03-02-2023		
7.	Downloading and installing Tableau Understanding about importing data, saving, opening, and sharing work books	3	10-02-2023		
8.	Data Preparation with Tableau	3	17-02-2023		
9.	Charts: Bar Charts, Legends, Filters ,and Hierarchies ,Step Charts, Line Charts	3	24-02-2023		
10.	Maps: Symbol Maps, Filled Maps, Density Maps, Maps with Pie Charts	3	03-03-2023		
11.	Interactive Dash boards	3	10-03-2023		
12.	Interactive Dash boards	3	17-03-2023		
13.	Interactive Dash boards	3	24-03-2023		
14.	Lab Internal Exam	3	31-03-2023		

PART-C

PROGRAMME OUTCOMES (POs):

PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**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.
PO 4	**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.
PO 5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**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.
PO 7	**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.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**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.
PO 11	**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.
PO 12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	The ability to apply Software Engineering practices and strategies in software project. development using open-source programming environment for the success of organization.
PSO 2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO 3	To inculcate an ability to analyze, design and implement database applications.

Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Mr. S. Srinivasa Reddy**	**Mr. G V Suresh**	**Dr. S. Jaya Pradha**	**Dr. D. Veeraiah**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I), ISO 9001:2015 Certified Institution

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr. P. Bhagath
Course Name & Code : Deep Learning using TensorFlow Lab (20AD54)
L-T-P Structure : 0-0-3 Credits: 1.5
Program/Sem/Sec : B.Tech., CSE., VI-Sem., Sec-A A.Y : 2022-23

PRE-REQUISITE : Python Programming

COURSE EDUCATIONAL OBJECTIVES (CEOs):: The Objective of the course is to provide practical, foundation level training that enables to handle various high dimensional data sets using various deep learning techniques

COURSE OUTCOMES (COs): At the end of the course, students can

CO 1	Implement deep neural networks to solve real world problems (Apply-L3)
CO 2	Choose an appropriate pre-trained model to solve real-time problems. (Analyze – L4)
CO 3	Interpret the results of two different deep learning models. (Analyze – L4)
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values.

COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-		1	1	-	3
CO2	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	2	3	2	2	-	-	-	-	-	-	-	2	-	2	2

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**
1- Slight (Low), **2 –** Moderate (Medium), **3 -** Substantial (High).

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Numerical Methods to solve matrix problems in Python	6	27-12-22 03-01-23		TLM4	

2	Eigen Value decomposition techniques	3	10-01-23		TLM4	
3	Dimensionality Reduction-PCA	6	24-01-23 31-01-23		TLM4	
4	Fundamentals of Tensor flow	6	07-02-23 14-02-23		TLM4	
5	Build a Convolution Neural Network for MNIST Handwritten Digit Classification	6	28-02-23 07-03-23		TLM4	
6	Build a Convolution Neural Network for simple image Classification	6	14-03-23		TLM4	
7	Implement one hot encoding of words or characters	3	21-03-23		TLM4	
8	Word2vec Framework	3	28-03-23		TLM4	
9	Implement word embeddings for IMDB dataset.	6	04-04-23 11-04-23		TLM4	
10	Implement a Recurrent Neural Network for IMDB movie review classification problem	3	18-04-23		TLM4	

Teaching Learning Methods			
TLM1	Chalk and Talk	**TLM4**	Demonstration (Lab/Field Visit)
TLM2	PPT	**TLM5**	ICT (NPTEL/Swayam Prabha/MOOCS)
TLM3	Tutorial	**TLM6**	Group Discussion/Project

PART-C

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Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**Dr. P. Bhagath**	**Dr. P. Bhagath**	**Dr. P. Bhagath**	**Dr. O. Rama Devi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCES

COURSE HANDOUT

Name of Course Instructor : **Dr. Sujith Kumar Rath& Mr. B Sagar**
Course Name & Code : **Soft skills & soft skills Laboratory (20HSS1)**
L-T-P Structure : **0-0-1+2** **Credit : 2**
Program/Sem/Sec : **B.Tech.,AI&DS , VI-Sem.,** **A.Y: 2022-23**

Course Description & Objectives:

The Soft Skills Laboratory course equips students with required behavioural, interpersonal & Intrapersonal skills, communication skills, leadership skills etc. It aims at training undergraduate students on soft skills leading to enhanced self confidence, esteem and acceptability in professional circles.

Course Outcomes (COs): At the end of the course, student will be able to

CO1	**Infer** the self awareness and personality **(Understand – L2)**
CO2	Work effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.**(Apply – L3)**
CO3	Communicate through verbal/oral communication and improve the listening skills**(Apply – L3)**
CO4	**Relate** thecritical & lateral thinking while dealing with personal/social/professional issues. **(Apply – L3)**

Course Content:

Personality Development Skills

Role of language in Personality – How language reflects, impactsPersonality – Using gender-neutral language in MNCs – being culturally-sensitive-Personality Traits- Grooming & Dress code

Activities: Group Discussion/Role play/Presentations (authentic materials: News papers, pamphlets and news clippings)

Impactful Communication

Activities: Extempore / Story Telling/ Group Discussion (Case studies/Current affairs etc.)/ Elocution on Interpretation of given quotes/Critical Appreciation and Textual Analysis/ Writing reviews on short story/videos/book/Social Media profiling/ Pronunciation Practice

ProfessionalSkills:

Career Planning- job vs. career- goal setting- SWOT analysis-Timemanagement – self-management – stress-management.

Activities: SWOT analysis of the self/Goal setting-Presentation/Writing Report/Listening exercises/Effective Resume-Writing and presentation/ Interview Skills: Mock interviews/Video samples.

REFERENCEBOOKS:

1. Edward Holffman, "Ace the Corporate Personality", McGraw Hill,2001
2. Adrian Furnham, Personality and Intelligence at Work, Psychology Press, 2008.
3. M.Ashraf Rizvi, "Effective Technical Communication", 1 st edition, Tata McGraw Hill, 2005
4. Ace of Soft skillsGopalaswamy Ramesh, Pearson Education India, 2018
5. Soft Skills for the Workplace, Goodheart-Willcox Publisher · 2020.
6. How to Win Friends and Influence People, Dale Carnegie · 2020

S.No.	No. of Lecture Hours	Date	Planned Topics	Actual Date	HOD Sign Weekly
1	1	26-12-22	Role of language in personality		
2	2	26-12-22	Extempore		
3	1	02-01-23	How language reflects, impacts Personality		
4	2	02-01-23	Story Telling		
5	1	09-01-23	Using gender-neutral language in MNCs		
6	2	09-01-23	Case Studies		
7	1	23-01-23	Being culturally-sensitive-Personality Traits- Grooming & Dress code		
8	2	23-01-23	Using authentic materials: News papers, pamphlets and news clippings		
9	1	30-01-23	Career Planning		
10	2	30-01-23	Public Speaking		
11	1	06-02-23	Job vs. career- goal setting		
12	2	06-02-23	Critical Appreciation and Textual Analysis		
13	1	13-02-23	SWOT analysis		
14	2	13-02-23	Writing a review on a given short story/videos/book		

15	1	27-02-23	Time management		
16	2	27-02-23	Empathetic speaking		
17	1	06-03-23	Self-management		
18	2	06-03-23	Telephonic conversation		
19	1	13-03-23	Stress-management		
20	2	13-03-23	Situation based dialogues		
21	1	20-03-23	Effective Resume-Writing and presentation		
22	2	20-03-23	Listening to dialogues and analyzing		
23	1	27-03-23	Interview Skills		
24	2	27-03-23	Pronunciation Practice		
25	1	03-04-23	Body Language, Postures, Gestures, Eye contact		
26	2	03-04-23	Personality Traits		
27	1	10-04-23	Pronunciation Practice		
28	2	10-04-23	Interpretation of the given quotes		
29	1	17-04-23	Mock interviews		
30	2	17-04-23	Finding contextual meaning of the words in the given passages		

Signature of Faculty

Signature of HOD