LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade, ISO 9001:2015 Certified Institution

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

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

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr.N V NAIK
Course Name & Code : DAA (20CS06)
L-T-P Structure : 3-0-0 Credits : 3
Program/Sem/Sec : B.Tech., AI&DS., IV-Sem., A.Y: 2021-22

PRE-REQUISITE:Data structures and DMS

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to learn various algorithm design techniques and analyze the computing resources of the algorithms and motivate the students to design new algorithms for various problems.

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

CO 1	Identify the characteristic of an algorithm and analyses its time and space complexity. (UnderstandL2)
CO 2	Apply the divide-and-conquer method for solving problems like searching and sorting. (Apply - L3)
CO 3	Design Greedy algorithms for the optimization problems like knapsack problem, minimum cost spanning tree, single source shortest path problem. (Apply - L3)
CO 4	Apply dynamic programming paradigm to solve optimization problems like travelling salesperson problem,0/1 knapsack problem, Optimal binary search tree (Apply– L3)
CO 5	Analyze the backtracking and branch and bound search methods on optimization problems like N-queen, sum of subsets.0/1 knapsack, Hamiltonian circuit and so on. (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	3	2	-	-	-	-	-	-	-	-	-	3		
CO2	2	3	1	-	-	-	-	-	-	-	-	-	3		
CO3	2	3	1	-	-	-	-	-	-	-	-	-	3		
CO4	2	3	1	-	-	-	-	-	-	-	-	-	1		
CO5	2	3	1	-	-	-	-	-	-	-	-	-	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).

TEXT BOOKS:

T1: Ellis Horowitz, SartajSahni, 'Fundamentals of Computer Algorithms', Galgotia Publications.

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson ,

2007.

REFERENCE BOOKS:

R1: Aho, Hopcroft& Ullman, 'The Design and Analysis of Computer Algorithms', Addison Wesley publications

R2: Thomas H. Cormen et al, 'Introduction to Algorithms', PHI.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section C

UNIT-I :Introduction, Divide and conquer

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	1	07.03.2022		TLM1	
2.	Algorithm definition and Specifications	1	09.03.2022		TLM1	
3.	Performance Analysis	1	11.03.2022		TLM1	
4.	Time Complexity and space complexity	1	14.03.2022		TLM1	
5.	Asymptotic Notations-Big-Oh, Omega and Theta	1	16.03.2022		TLM1	
6.	Divide & Conquer Technique: General Method	1	19.03.2022		TLM1	
7.	Binary Search and its analysis	1	21.03.2022		TLM1	
8.	Finding Maximum and Minimum and its Analysis	1	23.03.2022		TLM1	
9.	Merge sort and its Analysis	1	25.03.2022		TLM1	
10.	Quick Sort algorithm and its analysis	1	26.03.2022		TLM1	
11.	Closest pair of points	1	28.03.2022		TLM1	
12.	Tutorial – 1	1	01.04.2022		**TLM3**	
No. of classes required to complete UNIT-I		**12**		**No of classes taken**		

UNIT-II: The Greedy method

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Greedy Method – Introduction, General method	1	04.04.2022		TLM1	
15.	Knapsack problem, Example problem	2	06.04.2022 & 08.04.2022		TLM1	
16.	Job sequencing with deadlines,	1	09.04.2022		TLM1	

	Example problem					
17.	Minimum cost spanning trees, example problem	2	11.04.2022 & 11.04.2022		TLM1	
18.	Optimal storage on tapes, Example problem	1	13.04.2022		TLM1	
19.	Single source shortest path problem	1	16.04.2022		TLM1	
20.	Huffman coding	1	18.04.2022		TLM1	
21.	Tutorial – II / Quiz – II	1	20.04.2022		TLM3	
No. of classes required to complete UNIT-II		**10**		**No of classes taken**		

UNIT-III: Dynamic Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Dynamic Programming-General method	1	22.04.2022		TLM1	
23.	Multistage Graph, Example problem	2	23.04.2022 02.05.2022		TLM1	
24.	All pairsshortest path, Example problem	2	04.05.2022 06.05.2022		TLM1	
25.	Optimal Binary Search Tree, Example problem	2	07.05.2022 09.05.2022		TLM1	
26.	0/1 Knapsack Problem	1	11.05.2022		TLM1	
27.	Travelling Salesperson Problem	2	13.05.2022 14.05.2022		TLM1	
28.	Single source shortest path problem, Example Problem	1	16.05.2022		TLM1	
29.	Reliability design, Example Problem	2	18.05.2022 20.05.2022		TLM1	
30.	Tutorial – III / Quiz – III	1	21.05.2022		**TLM3**	
No. of classes required to complete UNIT-III		**14**		**No of classes taken**		

UNIT-IV: Back tracking

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.	General Method	1	23.05.2022		TLM1	
32.	The 8-Queens problem	1	25.05.2022		TLM1	
33.	Sum of subsets problem	2	27.05.2022 28.05.2022		TLM1	
34.	Graph coloring problem	1	30.05.2022		TLM1	
35.	Hamiltonian cycles	1	01.06.2022		TLM1	
36.	Tutorial – IV / Quiz – IV	1	03.06.2022		**TLM3**	
No. of classes required to complete UNIT-IV		**07**		**No of classes taken**		

UNIT-V: Branch and Bound

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Branch and Bound-General method-job sequencing with deadlines	1	04.06.2022		TLM1	
44.	LC Branch and bound solution for Travelling Salesperson Problem	2	06.06.2022 08.06.2022		TLM2	
45.	LC Branch and bound solution 0/1 Knapsack problem	1	10.06.2022		TLM2	
46.	FIFO Branch and bound solution for Travelling Sales Person Problem	2	11.06.2022 13.06.2022		TLM2	
47.	FIFO Branch and bound solution 0/1 Knapsack problem	1	15.06.2022		TLM2	
48.	LIFO Branch and Bound	1	17.06.2022		TLM2	
49.	Tutorial – V / Quiz - V	1	18.06.2022		**TLM3**	
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
1.	Convex hull	1	18.06.2022		TLM2	

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 Regulations):

Evaluation Task	**Marks**
Assignment-I (Unit-I , Unit-II , Unit-III)	A1=5
Assignment-II (Unit-III , Unit-IV , Unit-V)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
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	**Ethic**s: 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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
N V NAIK	Dr.M.Sitaram	Dr.D V Subbaiah	Dr.D.Veeraiah

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.P.Sobha Rani

Course Name & Code : 20HS01: Univeral Human Values 2: Understanding Harmony

L-T-P Structure : **3-0-0** **Credits:** 3

Program/Sem/Sec : B.Tech IV sem AI&DS **A.Y.:** 2021-22

PREREQUISITE: Nil

COURSE EDUCATIONAL OBJECTIVES (CEOs): To become more aware of themselves and their surroundings (family, society, nature); they would become more responsible in life and in handling problems with sustainable solutions while keeping human relationships and human nature in mind.

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

CO1	Apply the value inputs in life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the self and the Body
CO3	Understand the role of a human being in ensuring harmony in society
CO4	Understand the role of a human being in ensuring harmony in the nature and existence
CO5	Distinguish between ethical and unethical practices

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

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

TEXTBOOKS:

T1 R R Gaur, r singal, G P Bagaria, "Human values and Professional Ethics", Excel Books, New Delhi,2010

REFERENCE BOOKS:

R1 Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999

R2 Human values, A N Tripathi, New Age Publishers, New Delhi, 2004

R3 The story of my experiments with Truth, Mohandas Karamchand Gandhi

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Need, Basic Guide lines, content and Process for value Education

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, COs	1	7-3-2022		TLM1	
2.	Process for self exploration: Natural Acceptance	1	8-3-2022		TLM1	
3.	Experiential validation	1	9-3-2022		TLM1	
4.	Continuous Happiness and prosperity	1	14-3-2022		TLM1	
5.	A look at basic human aspirations: Right understanding	1	15-3-2022		TLM1	
6.	Relationship	1	16-3-2022		TLM1	
7.	Physical facility	1	21-3-2022		TLM2	
8.	Understanding Happiness and prosperity	1	22-3-2022		TLM2	
9.	Understanding Happiness and prosperity	1	23-2-2022		TLM2	
No. of classes required to complete UNIT-I:				**No. of classes taken:**		

UNIT-II: Understanding Harmony in the Human Being-Harmony in myself

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.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	28-3-2022		TLM2	
11.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	29-3-2022		TLM2	
12.	Understanding the Body as an instrument of 'I'	1	30-3-2022		TLM2	
13.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	4-4-2022		TLM2	
14.	Understanding the harmony of I with the Body	1	6-4-2022		TLM2	
15.	Sanyam and Health	1	11-4-2022		TLM2	
16.	Correct appraisal of Physical needs	1	12-4-2022		TLM2	
17.	Meaning of prosperity in detail	1	13-4-2022		TLM1	
No. of classes required to complete UNIT-II:				**No. of classes taken:**		

UNIT-III: Understanding Harmony in the Family and society-Harmony in Human-Human Relationship

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Understanding values in human-human relationship: meaning of justice	1	18-4-2022		TLM2	

19.	Program for fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship	1	19-4-2022		TLM2	
20.	Understanding Harmony in the society: Resolution	1	20-4-2022		TLM2	
21.	I-Mid examinations		25-4-2022 to 30-4-2022			
22.	Prosperity, fearlessness and co-existence as comprehensive human goals	2	2-5-2022 4-5-2022		TLM2	
23.	Visualizing a universal harmonious order in the society- undivided society	1	9-5-2022		TLM2	
24.	Universal order-from family to world family	1	10-5-2022		TLM2	
25.	Gratitude as a universal value in relationships	1	16-5-2022		TLM2	
No. of classes required to complete UNIT-III:				**No. of classes taken:**		

UNIT-IV: Understanding Harmony in the Nature and Existence- Whole existence as Coexistence

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Understanding Harmony in the Nature	1	17-5-2022		TLM2	
27.	Interconnectedness and mutual fulfillment among four orders of nature	1	18-5-2022		TLM2	
28.	Recyclability and self regulation in nature	1	23-5-2022		TLM2	
29.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	24-5-2022		TLM2	
30.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	25-5-2022		TLM2	
31.	Holistic perception of harmony at all levels of existence	1	30-5-2022		TLM2	
No. of classes required to complete UNIT-IV:				**No. of classes taken:**		

UNIT-V: Implications of the above Holistic understanding of Harmony on professional ethics

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.	Natural acceptance of human values	1	31-5-2022 1-6-2022		TLM2	
33.	Definitiveness of ethical human conduct	1	6-6-2022		TLM2	
34.	Basis for humanistic education	1	7-6-2022		TLM2	
35.	Humanistic constitution and humanistic universal order	1	8-6-2022		TLM2	
36.	Competence in professional ethics	1	13-6-2022		TLM2	
37.	Strategy for transition from the present state to universal human order	1	14-6-2022		TLM2	
38.	Revision	1	15-6-2022		TLM2	
No. of classes required to complete UNIT-V:				**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 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	**Ethic**s: 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.

Title	Course Instructor	Module Coordinator	Head of the Department
Name of the Faculty	**Dr.P.Sobha Rani**		
Signature			

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

Part-A

PROGRAM : **B.Tech. IV-Sem., AI&DS**

ACADEMIC YEAR : **2021-22**

COURSE NAME & CODE : **INTRODUCTION TO AI&DS – 20AD03**

L-T-P STRUCTURE : **3-0-0**

COURSE CREDITS : **3**

COURSE INSTRUCTOR : **Mr. K. VENKATESH.**

COURSE COORDINATOR : **Mr. K. VENKATESH**

PRE-REQUISITE: Knowledge of Computer fundamentals & Data structures& Algorithms

Course Educational Objective:

The objective of the course is to provide a strong foundation of fundamental concepts in Artificial Intelligence and a basic exposition to the goals and methods of Artificial Intelligence and also provide fundamentals of Data Science.

Course Outcomes: At the end of this course, the student will be able to

- **CO1:** Enumerate the history and foundations of Artificial Intelligence. **(Understand-L2)**
- **CO2:** Apply the basic principles of AI in problem solving. **(Apply-L3)**.
- **CO3:** Choose the appropriate representation of Knowledge. **(Understand-L2)**.
- **CO4:** Enumerate the fundamentals of data science and NumPy. **(Understand-L2)**.
- **CO5:** Summarize and compute descriptive statistics using pandas. **(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
CO1	2	3	2	-	3	-	-	-	-	-	-	2	3	-
CO2	2	3	3	3	3	-	-	-	-	-	-	2	3	-
CO3	2	3	3	-	3	-	-	-	-	-	-	2	3	-
CO4	2	3	3	-	3	-	-	-	-	-	-	2	3	-
CO5	2	3	3	2	3	-	-	-	-	-	-	2	3	-

Note: Enter Correlation Levels **1** or **2** or **3.** If there is no correlation, **put '-'**

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

BOS APPROVED TEXT BOOKS:

1) Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall
2) Wes McKinney, "Python for Data Analysis",O'REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.
3) Rachel Schutt & O'neil, "Doing Data Science", O'REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013

BOS APPROVED REFERENCE BOOKS:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill
3. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010.
4. Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.
5. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015
6. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Discussion of CEO's and CO's, Introduction to programming.	1	09-03-2022		TLM1	CO1	-	
2.	Introduction: What Is AI?, The Foundations of Artificial Intelligence.	1	10-03-2022		TLM2	CO1	T1	
3.	The History of Artificial Intelligence, The State of the Art,	1	11-03-2022		TLM2	CO1	T1	
4.	Agents and Environments	1	12-03-2022		TLM2	CO1	T1	
5.	Agents and Environments	1	16-03-2022		TLM2	CO1	T1	
6.	Good Behavior: The Concept of Rationality	1	17-03-2022		TLM2	CO1	T1	
7.	The Nature of Environments	1	19-03-2022		TLM2	CO1	T1	
8.	Types of agents	1	23-03-2022		TLM1	CO1	T1	
9.	Types of agents	1	24-03-2022		TLM1	CO1	T1	
10.	The Structure of Agents.	1	25-03-2022		TLM2	CO1	T1	
No. of classes required to complete UNIT-I				10	No. of classes taken:			

UNIT-II :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
11.	Problem-Solving Agents,	1	26-03-2022		TLM2	CO2	T1	
12.	Uninformed Search Strategies	1	30-03-2022		TLM2	CO2	T1	
13.	Uninformed Search Strategies	1	31-03-2022		TLM2	CO2	T1	
14.	Informed (Heuristic) Search Strategies	1	01-04-2022		TLM2	CO2	T1	
15.	Informed (Heuristic) Search Strategies	1	02-04-2022		TLM2	CO2	T1	
16.	Local Search Algorithms and Optimization Problems	1	06-04-2022		TLM2	CO2	T1	
17.	Local Search Algorithms and Optimization Problems	1	07-04-2022		TLM2	CO2	T1	
18.	Searching with Nondeterministic Actions	1	08-04-2022		TLM2	CO2	T1	
No. of classes required to complete UNIT-II				08	No. of classes taken:			

UNIT-III :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
19.	Knowledge Representation	1	09-04-2022		TLM1	CO3	T1	
20.	Knowledge-Based Agents	1	13-04-2022		TLM1	CO3	T1	
21.	Propositional Logic, A Very Simple Logic	1	16-04-2022		TLM1	CO3	T1	
22.	Ontological Engineering	1	20-04-2022		TLM1	CO3	T1	
23.	Categories and Objects,	1	21-04-2022		TLM1	CO3	T1	
24.	Events, Mental Events	1	22-04-2022		TLM1	CO3	T1	
25.	Mental Objects	1	23-04-2022		TLM1	CO3	T1	
26.	Reasoning Systems for Categories	1	04-05-2022		TLM1	CO3	T1	
27.	Reasoning Systems for Categories	1	05-05-2022		TLM1	CO3	T1	
28.	The Internet Shopping World.	1	06-05-2022		TLM1	CO3	T1	

No. of classes required to complete UNIT-III	10	No. of classes taken:

UNIT-IV :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	What is Data science? Datafication	1	07-05-2022		TLM1	CO4	T2	
30.	Exploratory Data Analysis,	1	11-05-2022		TLM1	CO4	T2	
31.	The Data science process,	1	12-05-2022		TLM1	CO4	T2	
32.	A data scientist role in this process.	1	13-05-2022		TLM1	CO4	T2	
33.	The NumPyndarray: A Multidimensional Array Object	1	14-05-2022		TLM1	CO4	T2	
34.	Creating ndarrays ,Data Types for ndarrays	1	18-05-2022		TLM1	CO4	T2	
35.	Operations between Arrays and Scalars	1	19-05-2022		TLM1	CO4	T2	
36.	Basic Indexing and Slicing,	1	20-05-2022		TLM1	CO4	T2	
37.	Boolean Indexing, Fancy Indexing,	1	21-05-2022		TLM1	CO4	T2	
38.	Data Processing Using Arrays	1	25-05-2022		TLM1	CO4	T2	
39.	Expressing Conditional Logic as Array Operations,	1	26-05-2022		TLM1	CO4	T2	
40.	Methods for Boolean Arrays ,	1	27-05-2022		TLM1	CO4	T2	
41.	Sorting , Unique	1	28-05-2022		TLM1	CO4	T2	
No. of classes required to complete UNIT-IV				13	No. of classes taken:			

UNIT-V :

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
42.	Introduction to pandas, Library Architecture,	1	01-06-2022		TLM1	CO5	T2	
43.	Features, Applications,	1	02-06-2022		TLM1	CO5	T2	
44.	Data Structures, Series, DataFrame	1	03-06-2022		TLM1	CO5	T2	

45.	Index Objects, Essential Functionality Reindexing	1	04-06-2022		TLM1	CO5	T2	
46.	Dropping entries from an axis	1	08-06-2022		TLM1	CO5	T2	
47.	Sorting and ranking,	1	09-06-2022		TLM1	CO5	T2	
48.	Summarizing and Computing Descriptive Statistics,	1	10-06-2022		TLM1	CO5	T2	
49.	Unique Values, Value Counts,	1	15-06-2022		TLM1	CO5	T2	
50.	Handling Missing Data, filtering out missing data.	1	16-06-2022		TLM1	CO5	T2	
No. of classes required to complete UNIT-V			09		No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
51.	Turing test	1	17-06-2022		**TLM1**	-	-	
52.	Interview Questions	1	18-06-2022		**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 (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	**Ethic**s: 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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Mr. K.VENKATESH**	**Mr. K.VENKATESH**	**Dr. O. Rama Devi**	**Dr. O. Rama Devi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor : **Mr. S. Siva Rama Krishna**

Course Name & Code : **Data Warehousing and Data Mining (20CS10)**

L-T-P Structure : **3-0-0** **Credits: 3**

Program/Sem/Sec : **B.Tech / IV Sem** **A.Y.: 2021-22**

PREREQUISITE: DBMS and Probability and Statistics

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The Objective of the course is to introduce the concepts of data warehouse and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

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

CO1	Summarize the architecture of data warehouse. **(Understand- L2)**
CO2	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data. **(Apply – L3)**
CO3	Construct a decision tree and resolve the problem of model overfitting. **(Analyze – L4)**
CO4	Compare Apriori and FP-growth association rule mining algorithms for frequent item set Generation. **(Apply - L3)**
CO5	Apply suitable clustering algorithm for the given data set. **(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	2		
CO2	3	2		2									2	1	1
CO3	2	3	2	2								2	2	1	
CO4	2	2		2									2	2	1
CO5	2	2	2	2								2	2	1	
1 - Low **2 –**Medium **3 -** High															

TEXTBOOKS:

T1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Fifth Impression, Pearson, 2015.

T2. Data Mining concepts and Techniques, 3rd Edition, Jiawei Han, Michel Kamber, Elsevier, 2011

REFERENCE BOOKS:

R1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning, 2010.

R2. Data Mining : Introductory and Advanced topics : Dunham, First Edition, Pearson, 2020

R3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH, 2008.

R4. Data Mining Techniques, Arun K Pujari, Universities Press, 2001

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Python Programming (20CS10)

UNIT-I: Data Warehouse and OLAP Technology

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.	Discussion of CO'S and CEO'S	1	08-03-22		TLM1	
2.	An Overview: Data Warehouse	1	10-03-22		TLM1	
3.	Characteristics	1	12-03-22		TLM1	
4.	Components	1	15-03-22		TLM1	
5.	A Multidimensional Data Model	1	17-03-22		TLM1	
6.	Schemas	1	19-03-22		TLM1	
7.	Data Warehouse Architecture	1	22-03-22		TLM1	
8.	Data Models	1	24-03-22		TLM1	
9.	Data Warehouse Implementation	1	25-03-22		TLM1	
10.	From Data Warehousing to Data Mining.	1	26-03-22		TLM1	
11.	Assignment-1	1	26-03-22		TLM1	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Data Mining and Preprocessing.

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.	Introduction to **Data Mining**	1	29-03-22		TLM1	
13.	Motivating challenges	1	29-03-22		TLM1	
14.	The origins of Data Mining	1	31-03-22		TLM1	
15.	Data Mining Tasks	1	01-04-22		TLM1	
16.	Types of Data	1	05-04-22		TLM1	
17.	Data Quality	1	07-04-22		TLM1	
18.	**Data Preprocessing:** Aggregation	1	08-04-22		TLM1	
19.	Sampling, Dimensionality Reduction	1	09-04-22		TLM1	
20.	Feature Subset Selection, Feature creation, Discretization and Binarization	1	12-04-22		TLM1	
21.	Variable Transformation, Measures of Similarity and Dissimilarity	1	16-04-22		TLM1	
22.	Assignment-2	1	16-04-22		TLM1	
No. of classes required to complete UNIT-II : 11				**No. of classes taken:**		

UNIT-III: Classification, Model Overfitting

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.	Basic Concepts, General Approach to solving a classification problem	1	19-04-22		TLM1	
24.	Decision Tree Induction: Working of Decision Tree	1	21-04-22		TLM1	
25.	building a decision tree	1	22-04-22		TLM1	
26.	methods for expressing an attribute test conditions	1	23-04-22		TLM1	
27.	measures for selecting the best split	1	23-04-22		TLM1	

28.	Algorithm for decision tree induction	1	30-04-22		TLM1	
29.	Due to presence of noise, due to lack of representation samples	1	05-05-22		TLM1	
30.	evaluating the performance of classifier: holdout method	1	06-05-22		TLM1	
31.	random sub sampling	1	07-05-22		TLM1	
32.	cross-validation, bootstrap	1	10-05-22		TLM1	
33.	Bayes Theorem, Naïve Bayes Classifier	1	12-05-22		TLM1	
34.	Assignment-3	1	13-05-22		TLM1	
No. of classes required to complete UNIT-III : 12				**No. of classes taken:**		

UNIT-IV: Association 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
35.	Basic Concepts	1	14-05-22		TLM1	
36.	Algorithms: Problem Definition	1	17-05-22		TLM1	
37.	Frequent Item Set Generation	1	19-05-22		TLM1	
38.	Apriori Principle	1	20-05-22		TLM1	
39.	Apriori Algorithm	1	21-05-22		TLM1	
40.	Rule Generation	1	24-05-22		TLM1	
41.	Compact Representation of Frequent Itemsets	1	26-05-22		TLM1	
42.	FP Growth Algorithm	1	27-05-22		TLM1	
43.	FP Growth Algorithm	1	28-05-22		TLM1	
44.	Assignment-4	1	31-05-22		TLM1	
No. of classes required to complete UNIT-IV : 10				**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
45.	Basic Concepts and Algorithms: Overview	1	02-06-22		TLM1	
46.	What Is Cluster Analysis? Different Types of Clustering	1	02-06-22		TLM1	
47.	Different Types of Clusters; K-means	1	03-06-22		TLM1	
48.	The Basic K-means Algorithm	1	04-06-22		TLM1	
49.	K-means Additional Issues, Bisecting K-means	1	07-06-22		TLM1	
50.	Strengths and Weaknesses	1	09-06-22		TLM1	
51.	Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm	1	10-06-22		TLM1	
52.	DBSCAN: Traditional Density Center-Based Approach	1	11-06-22		TLM1	
53.	DBSCAN Algorithm	1	14-06-22		TLM1	
54.	Strengths and Weaknesses	1	16-06-22		TLM1	
55.	Assignment-5	1	17-06-22		TLM1	
No. of classes required to complete UNIT-V : 11				**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		1	18-06-22		TLM5	

51		1	18-06-22		TLM5	

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	**Ethic**s: 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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. S. Siva Ramakrishna	Mr. S. Siva Ramakrishna	Dr O. Rama Devi	Dr O. Rama Devi

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr O Rama Devi

Course Name & Code : Operating Systems -20CS11

L-T-P Structure :3-0-0 **Credits:** 3

Program/Sem/Sec : II B.tech/IV-sem **A.Y.:** 2021-22

PREREQUISITE: Knowledge of Computer fundamentals & Data structures & algorithms

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The main objective of the course is to provide basic knowledge of computer operating system structure and functioning. Students able to understand how Operating Systems evolved with advent of computer architecture. Comprehend the different CPU scheduling algorithms, page replacement algorithms, and identify best one.

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

CO1	Demonstrate the underlying principles and techniques of operating system (Understand-l2)
CO2	Interpret scheduling and communication methods of processes handled by operating systems (Understand-L2)
CO3	Distinguish the process synchronization methods and deadlock handling approaches employed in operating systems (Understand-L2)
CO4	Classify memory management techniques and virtual memory mechanisms (Understand-L2)
CO5	Interpret the strategies of disk scheduling algorithms and file system architecture(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	2												2		
CO2		2	1										2		
CO3		2	1										2		
CO4		2	1										2		
CO5		2	1										2		
1 - Low						**2** –Medium							**3** - High		

TEXTBOOKS:

T1 Silberschatz& Galvin, ―Operating System Concepts‖, Wiley, 7th edition, 2007.

REFERENCE BOOKS:

R1 William Stallings, ―Operating Systems‖, PHI, 5th Edition, 2004.

R2 B.A.Forounz & R.F. Giberg,---Unix and shell programming,Thomson,first Edition,New Delhi,2003

R3 http://codex.cs.yale.edu/avi/os-book/os9/slide-dir/index.html
R4 http://swayam.gov.in/ndl_noc19_cs50/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction to Operating Systems

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 Operating systems	1	7-3-2022		TLM2	
2.	Introduction to Operating systems	1	9-3-2022		TLM2	
3.	Introduction to Operating systems	1	10-3-2022		TLM2	
4.	Introduction to Operating systems	1	12-3-2022		TLM2	
5.	Operating system services and user operating system interfaces	1	14-3-2022		TLM2	
6.	System calls and types of system calls	1	16-3-2022		TLM2	
7.	System programs, OS design and implementation	1	17-3-2022		TLM2	
8.	OS structure and Virtual Machine	1	19-3-2022		TLM2	
9.	OS generation and System Boot	1	21-3-2022		TLM2	
No. of classes required to complete UNIT-I: 9				**No. of classes taken:**		

UNIT-II: Process Management

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.	Concepts and process scheduling	1	23-3-2022		TLM2	
11.	Operations on process	1	24-3-2022		TLM2	
12.	IPC and examples on IPC	1	28-3-2022		TLM2	
13.	Communication in client server systems	1	30-3-2022		TLM2	
14.	Treads overview, Multithreading Models	1	31-3-2022		TLM2	
15.	Thread libraries and Thread issues	1	4-4-2022		TLM2	
16.	Scheduling Criteria	1	6-4-2022		TLM2	
17.	Scheduling algorithms	1	7-4-2022		TLM2	
18.	Scheduling algorithms	1	9-4-2022		TLM2	
19.	Multi-Processor Scheduling	1	11-4-2022		TLM2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	The Critical section problem, Peterson's solutions	1	13-4-2022		TLM1	
21.	Synchronization hardware	1	16-4-2022		TLM1	
22.	Semaphores, Classic problems of Synchronization	1	18-4-2022		TLM1	
23.	Monitors, Synchronization examples	1	20-4-2022		TLM1	
24.	atomic transactions	1	21-4-2022		TLM1	

25.	System model and deadlock characterization	1	2-5-2022		TLM1	
26.	Methods for Handling deadlocks and deadlock prevention	1	4-5-2022		TLM1	
27.	Deadlock Avoidance	2	7-5-2022& 9-5-2022		TLM1	
28.	Deadlock detection	2	11-5-2022& 12-5-2022		TLM1	
29.	Recovery from deadlock	1	14-5-2022		TLM1	
No. of classes required to complete UNIT-III: 12						

UNIT-IV: Memory management

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Swapping	1	16-5-2022		TLM1	
31.	Contiguous Memory Allocation	1	18-5-2022		TLM1	
32.	Paging and structure of a page table	1	19-5-2022		TLM1	
33.	Segmentation	1	18-5-2022		TLM1	
34.	Demand paging	1	21-5-2022		TLM1	
35.	Page replacement	1	23-5-2022		TLM1	
36.	Allocation of frames	1	23-5-2022		TLM1	
37.	Thrashing	1	25-5-2022		TLM1	
38.	Memory mapped files	1	26-5-2022		TLM1	
39.	Allocating kernel memory	1	28-5-2022		TLM1	
No. of classes required to complete UNIT-IV: 10				**No. of classes taken:**		

UNIT-V: File System Management

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40.	Overview of Mass storage structure	1	30-5-2022		TLM2	
41.	Disk structure	1	1-6-2022		TLM2	
42.	Disk Attachment	1	2-6-2022		TLM2	
43.	Disk Scheduling	1	4-6-2022		TLM2	
44.	Disk Management	1	6-6-2022		TLM2	
45.	The Concept of a file and access methods	1	8-6-2022		TLM2	
46.	File System structure	1	9-6-2022		TLM2	
47.	File system implementation	1	11-6-2022		TLM2	
48.	Directory implementation	1	13-6-2022		TLM2	
49.	Allocation methods	1	15-6-2022		TLM2	
50.	Free space management	1	16-6-2022		TLM2	
51.	Efficiency and performance, recovery	1	18-6-2022		TLM2	
No. of classes required to complete UNIT-V: 12				**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 (R19 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 toaddress 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 O Rama Devi**	**Dr O Rama Devi**	**Dr O Rama Devi**	**Dr O Rama Devi**
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT
PART-A

Name of Course Instructor: Mr. K Venkatesh
Course Name & Code **:** INTRODUCTION TO AI & DS LAB – 20AD52
L-T-P Structure **:0-0-3** **Credits:** 1.5
Program/Sem/Sec : II B.tech/IV-sem **A.Y.:** 2021-22

PRE-REQUISITE: Knowledge of Computer fundamentals & Data structures& Algorithms

Course Educational Objective: The objective of the course is to provide a strong foundation of fundamental concepts in Artificial Intelligence and a basic exposition to the goals and methods of Artificial Intelligence and also provide fundamentals of Data Science.

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

CO 1	Apply the basic principles of AI in problem solving using LISP/PROLOG/Python **(Apply – L3)**
CO 2	Implement different algorithms using LISP/PROLOG/ Python**(Apply – L3)**
CO 3	Perform various operations using numpy and pandas **(Understand - L2)**
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	3	3	3	-	-	-	-	-	1	-		2	3	2	1
CO2	3	3	3	-	-	-	-	-	1	-		2	3	2	1
CO3	3	3	3	-	-	-	-	-	3	3		2	3	1	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).

BOS APPROVED Web References:

1. https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy- tutorial-for-data-science- beginners/
2. https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-key- concepts/
3. https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/
4. https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit- learn/
5. https://www.analyticsvidhya.com/blog/2020/02/beginner-guide-matplotlib-data-visualization-explorationpython/

CP LAB SCHEDULE (LESSON PLAN): Section-A

Expt. No	COs	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	--	Introduction to Lab experiments	3	10.03.2022		TLM8	
2	CO1	Implementation of DFS for water jug problem using LISP/PROLOG	3	17.03.2022		TLM8	
3	CO1	Implementation of BFS for tic-tac-toe problem using LISP/PROLOG/Java	3	24.03.2022		TLM8	
4	CO1	Implementation of TSP using heuristic approach using Java/LISP/Prolog	3	31.03.2022		TLM8	
5	CO2	Implementation of Simulated Annealing Algorithm using LISP/PROLOG	3	07.04.2022		TLM8	
6	CO2	Implementation of Hill-climbing to solve 8- Puzzle Problem	3	21.04.2022		TLM8	
7	CO2	Implementation of Monkey Banana Problem using LISP/PROLOG	3	28.04.2022		TLM8	
8	CO2	Creating a NumPy Array	3	05.05.2022		TLM8	
9	CO2	The Shape and Reshaping of NumPy Array	3	12.05.2022		TLM8	
10	CO3	Indexing and Slicing of NumPy Array	3	19.05.2022		TLM8	
11	CO3	Perform following operationsusing pandas • Creating dataframe • concat() • Setting conditions • Adding a new column	3	26.05.2022		TLM8	
12	CO3	Read the following file formats using pandas	3	02.06.2022		TLM8	
13	CO3	Read the following file formats using pandas	3	09.06.2022		TLM8	
14	CO3	Internal Lab Examination	3	16.06.2022		TLM8	
No. of classes required to complete Lab			42	No. of classes conducted:			

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

PART-C

EVALUATION PROCESS (R20 Regulations):

According to Academic Regulations of R20 Distribution and Weightage 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**
Day to Day work	05
Record	05
Internal Test	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 3 hours duration and evaluated for 35 marks. The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	**Marks**
Procedure/Algorithm	05
Experimentation/Program execution	10
Observations/Calculations/Validation	10
Result/Inference	05
Viva voce	05
Total	35

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	**Ethic**s: 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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. K. Venkatesh	**Mr. K. Venkatesh**	**Dr. O. Rama Devi**	**Dr. O. Rama Devi**

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PROGRAM : B.Tech. IV-Sem.

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE : **R Programming Lab– 20IT53**

L-T-P STRUCTURE : **0-0-3**

COURSE CREDITS : **1.5**

COURSE INSTRUCTOR : **P GANDHI PRAKASH**

COURSE COORDINATOR : **P GANDHI PRAKASH**

1. **Pre-requisite :** Nil

2. **Course Educational Objective**: In this course student will learn about the fundamentals of R programming, standard R libraries, solid understanding of R functions, write programs using the R and gain skills in R programming Language, get acquaintances with Arrays, Files, Strings, Packages, and distributions using R.

3. **Course Outcomes**: At the end of this course, the student will be able to:

CO 1	Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming. **(Understand - L2)**
CO 2	Implement the concepts of R Script to extract the data from data frames and file operations. **(Apply – L3)**
CO 3	Implement the various statistical techniques with visualization using R add-on packages. **(Apply – L3)**
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values

4. **Course Articulation Matrix:**

		PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES	
		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**	**PSO2**
COURSE OUTCOMES	CO1	2	1	3	1	3	-	-	-	-	-	-	-	1	-
	CO2	1	2	3	1	3	-	-	-	-	-	-	-	1	-
	CO3	1	2	3	1	3	-	-	-	-	-	-	-	1	-
	CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-

5. List of Experiments

S No	Program to be executed
1	a) Installing R and RStudio b) Basic functionality of R, variable, data types in R
2	a) Implement R script to show the usage of various operators available in R language. b) Implement R script to read person‘s age from keyboard and display whether he is eligible for voting or not. c) Implement R script to find biggest number between two numbers. d) Implement R script to check the given year is leap year or not.
3	a) Implement R Script to create a list. b) Implement R Script to access elements in the list. c) Implement R Script to merge two or more lists. d) Implement R Script to perform matrix operation
4	Implement R script to perform following operations: a) various operations on vectors b) Finding the sum and average of given numbers using arrays. c) To display elements of list in reverse order. d) Finding the minimum and maximum elements in the array.
5	a) Implement R Script to perform various operations on matrices b) Implement R Script to extract the data from dataframes. c) Write R script to display file contents. d) Write R script to copy file contents from one file to another
6	a) Write an R script to find basic descriptive statistics using summary(), str(), quartile() function on mtcars datasets. b) Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset
7	a) Reading different types of data sets (.txt, .csv) from Web or disk and writing in file in specific disk location. b) Reading Excel data sheet in R. c) Reading XML dataset in R
8	a) Implement R Script to create a Pie chart, Bar Chart, Scatter Plot and Histogram (Introduction to ggplot2 graphics) b) Implement R Script to perform mean, median, mode, range, summary, variance, standard deviation operations
9	a) Implement R Script to perform Normal, and Binomial distributions. b) Implement R Script to perform correlation, Linear and multiple regression.

10	a) Introduction to Non-Tabular Data Types: Time series ,spatial data ,Network data. b) Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding
11	Introduction to Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling.
12	Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Google Spreadsheets, API and web scraping examples

6.Course Delivery Plan:

S No	Program to be executed	Tentative dates	Actual Dates	DM
1	a) Installing R and RStudio b) Basic functionality of R, variable, data types in R	08-03-22		5
2	a) Implement R script to show the usage of various operators available in R language. b) Implement R script to read person‘s age from keyboard and display whether he is eligible for voting or not. c) Implement R script to find biggest number between two numbers. d) Implement R script to check the given year is leap year or not	15-03-22		5
3	a) Implement R Script to create a list. b) Implement R Script to access elements in the list. c) Implement R Script to merge two or more lists. d) Implement R Script to perform matrix operation	22-03-22		5
4	Implement R script to perform following operations: a) various operations on vectors b) Finding the sum and average of given numbers using arrays. c) To display elements of list in reverse order. d) Finding the minimum and maximum elements in the array.	29-03-22		5
5	a) Implement R Script to perform various operations on matrices b) Implement R Script to extract the data from dataframes. c) Write R script to display file contents. d) Write R script to copy file contents from one file to another	12-04-22		1,5

6	a) Write an R script to find basic descriptive statistics using summary(), str(), quartile() function on mtcars datasets. b) Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset	19-04-22		5
7	a) Reading different types of data sets (.txt, .csv) from Web or disk and writing in file in specific disk location. b) Reading Excel data sheet in R. c) Reading XML dataset in R	10-05-22		1,5
8	a) Implement R Script to create a Pie chart, Bar Chart, Scatter Plot and Histogram (Introduction to ggplot2 graphics) b) Implement R Script to perform mean, median, mode, range, summary, variance, standard deviation operations	17-05-22		1,5
9	a) Implement R Script to perform Normal, and Binomial distributions. b) Implement R Script to perform correlation, Linear and multiple regression.	24-05-22		5
10	a) Introduction to Non-Tabular Data Types: Time series ,spatial data ,Network data. b) Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding	31-05-22		1,5
11	Introduction to Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling.	07-06-22		5
12	Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Google Spreadsheets, API and web scraping examples	14-06-22		5
13	Internal Lab	28-06-22		

Delivery Methods (DM):

1. Chalk & Talk 2. ICT Tools 3. Tutorial 4. Assignment/Test/Quiz
5. Laboratory/Field Visit 6. Web based learning.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**HOD**
Name of the Faculty	P Gandhi Prakash	P Gandhi Prakash	Dr.O.Rama Devi	Dr.O.RamaDevi
Signature				

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

PROGRAM : B.Tech. IV-Sem.

ACADEMIC YEAR : 2021-22

COURSE NAME & CODE : Data Mining Using Python Lab – 20CS58

L-T-P STRUCTURE : 0-0-3

COURSE CREDITS : 1.5

COURSE INSTRUCTOR : Mr. S. Siva Rama Krishna

COURSE COORDINATOR : Mr. S. Siva Rama Krishna

PRE-REQUISITE: Python Programming.

Course Educational Objective:
The objective of this lab is to Practical exposure on implementation of well-known data mining algorithms and Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

Course Outcomes (CO): At the end of this course, the student will be able to:
CO1: Apply preprocessing techniques on real world datasets.(Apply-L3)
CO2: Apply apriori algorithm to generate frequent itemsets. (Apply L3)
CO3: Apply Classification and clustering algorithms on different datasets. (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	2	2	1
CO2	3	2		2									2	2	
CO3	2	3	2	2								2	2	2	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).

BOS APPROVED TEXT BOOKS:

T1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Fifth Impression, Pearson, 2015.
T2. Data Mining concepts and Techniques, 3rd Edition, Jiawei Han, Michel Kamber, Elsevier, 2011

PART-B

DM LAB SCHEDULE (LESSON PLAN): Section-A

Expt. No	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Introduction to Lab, Discussion of CO'S and CEO'S	1	11-03-22		TLM8	
2	Demonstrate the following data preprocessing tasks using python libraries. a) Loading the dataset b) Identifying the dependent and independent variables. c) Dealing with missing data	1	25-03-22		TLM8	
3	Demonstrate the following data preprocessing tasks using python libraries. a) Dealing with categorical data. b) Scaling the features. c) Splitting dataset into Training and Testing Sets	1	01-04-22		TLM8	
4	Demonstrate the following Similarity and Dissimilarity Measures using python a) Pearson's Correlation b) Cosine Similarity c) Jaccard Similarity d) Euclidean Distance e) Manhattan Distance	1	08-04-22		TLM8	
5	Build a model using linear regression algorithm on any dataset.	1	22-04-22		TLM8	
6	Build a classification model using Decision Tree algorithm on iris dataset	1	06-05-22		TLM8	
7	Apply Naïve Bayes Classification algorithm on any dataset	1	13-05-22		TLM8	
8	Generate frequent item sets using Apriori Algorithm in python and also generate association rules for any market basket data.	1	20-05-22		TLM8	
9	Apply K- Means clustering algorithm on any dataset.	1	27-05-22		TLM8	
10	Apply Hierarchical Clustering algorithm on any dataset.	1	03-06-22		TLM8	
11	Apply DBSCAN clustering algorithm on any dataset.	1	10-06-22		TLM8	
12	Internal Lab	1	17-06-22		TLM8	

Teaching Learning Methods					
TLM1	Chalk and Talk	**TLM4**	Problem Solving	**TLM7**	Seminars or GD
TLM2	PPT	**TLM5**	Programming	**TLM8**	Lab Demo
TLM3	Tutorial	**TLM6**	Assignment or Quiz	**TLM9**	Case Study

PART-C

EVALUATION PROCESS (R20 Regulations):

According to Academic Regulations of R20 Distribution and Weightage 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**
Day to Day work	05
Record	05
Internal Test	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 3 hours duration and evaluated for 35 marks. The performance of the student shall be evaluated as per the parameters indicated below:

Parameter	**Marks**
Procedure/Algorithm	05
Experimentation/Program execution	10
Observations/Calculations/Validation	10
Result/Inference	05
Viva voce	05
Total	35

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	**Ethic**s: 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.

Course Instructor	Course Coordinator	Module Coordinator	HOD
Mr. S. Siva Ramakrishna	Mr. S. Siva Ramakrishna	Dr. O. Rama Devi	Dr. O. Rama Devi

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE HANDOUT

PART-A

Name of Course Instructor: V.Chandra Kumar
Course Name & Code : Web Application Development using Full Stack - Module-II (Backend Development) & 20CSS2
L-T-P Structure : 1-0-2-2 **Credits:** 2
Program/Sem/Sec : B.Tech. – AI&DS/IV **A.Y.:** 2021-22

PREREQUISITE: Object Oriented Programming and Data Base Management Systems.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this course is to learn the importance of client-server architecture in the web application development and able to develop dynamic data driven web applications by using advanced java technologies (Servlets, JSP, Struts2 and Hibernate framework).

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

CO1	Apply JDBC concepts to establish the communication between Java Applications and database. **(Apply-L3)**
CO2	Develop Static and Dynamic Web Applications by using Servlets and Java Server Pages (JSP). **(Apply L3)**
CO3	Develop Dynamic Data Driven Web Applications by using Struts2 and Hibernate frameworks. **(Apply L3)**
CO4	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	3
CO2	-	-	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	-	-	2	-	2	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
1 - Low **2 –**Medium **3 -** High															

REFERENCE BOOKS:

R1	Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.
R2	Kathy Sierra & Bert Bates, "Headfirst Servlets and JSP: Passing the Sun Certified Web Component Developer Exam", O'Reilly Publications Second Edition.
R3	Budi Kurniawan, "Struts 2 Design and Programming: A Tutorial", BrainySoftware, 2nd Edition, 2008.

R4	Christian Bauer, Gavin King, Gary Gregory "Java Persistence with Hibernate: Revised Edition of Hibernate in Action Paperback", Manning Publication, 2nd Edition, 2006.
R5	Santosh Kumar K, "JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns, Black Book", Dreamtech publication, 2ndEdition.
R6	Mahmoud Parsian, "JDBC Recipes: A Problem-Solution Approach", Apresss.
R7	Madhusudhan Konda**, "**Just Hibernate, A Lightweight Introduction to the Hibernate Framework"**,** O'Reilly Media**.**
R8	Chuck Cavaness, "Programming Jakarta Struts",O'Reilly Media, 2nd Edition.

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	Teaching Learning Methods	HOD Sign Weekly
1.	Lab Cycle-1	3	07-03-2022		**DM5**	
2.	Lab Cycle-1	3	14-03-2022		**DM5**	
3.	Lab Cycle-2	3	21-03-2022		**DM5**	
4.	Lab Cycle-2	3	28-03-2022		**DM5**	
5.	Lab Cycle-3	3	04-04-2022		**DM5**	
6.	Lab Cycle-3	3	11-04-2022		**DM5**	
7.	Lab Cycle-4	3	18-04-2022		**DM5**	
8.	Lab Cycle-5	3	02-05-2022		**DM5**	
9.	Lab Cycle-6	3	09-05-2022		**DM5**	
10.	Lab Cycle-6	3	16-05-2022		**DM5**	
11.	Lab Cycle-7	3	23-05-2022		**DM5**	
12.	Lab Cycle-8	3	30-05-2022		**DM5**	
13.	Lab Cycle-8	3	06-06-2022		**DM5**	
14.	Lab Cycle-8	3	13-06-2022		**DM5**	

Teaching Learning Methods			
DM1	Chalk and Talk	**DM4**	Assignment/Test/Quiz
DM2	ICT Tools	**DM5**	Laboratory/Field Visit
DM3	Tutorial	**DM6**	Web-based Learning

PART-C

EVALUATION PROCESS (R20 Regulation):

Evaluation Task	**Marks**
Report	10
Quality of work	10
Presentation	20
Interaction / Queries	10
Total	50

PART-D

PROGRAMME OUTCOMES (POs):

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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.
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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. V.Chandra Kumar)	Mr. V.Chandra Kumar	Dr.O.Rama Devi	(Dr. O.Rama Devi
Signature				