FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT

PART-A

PROGRAM : II B. Tech., III-Sem., AI&ML
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : PROBABILITY AND STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : M. Rami Reddy
COURSE COORDINATOR : M. Rami Reddy
PRE-REQUISITES : None

COURSE EDUCATIONAL OBJECTIVES (CEO): The objective of this course is to provide students with the foundations and applications of probabilistic and statistical methods mainly used in varied applications in engineering and science.

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

CO1	Understand various probabilistic situations using the laws of probability and Random variables.	**L2**
CO2	Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems.	**L3**
CO3	Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data.	**L3**
CO4	Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis.	**L4**
CO5	Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data.	**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	2	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	3	2	2	3	-	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	2	-	-	-
CO5	3	2	2	3	-	-	-	-	-	-	-	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).

BOS APPROVED TEXTBOOKS:

T1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012.
T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:

R1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.
R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Probability and Random Variables

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 class, course outcomes	1	07-08-23		TLM1	
2.	Basic concepts of probability	1	09-08-23		TLM1	
3.	problems on basic probability	1	11-08-23		TLM1	
4.	Addition theorem, problems	1	14-08-23		TLM1	
5.	Problems on Addition theorem	1	16-08-23		TLM1	
6.	Multiplication theorem, examples	1	18-08-23		TLM1&2	
7.	Independent events, theorems	1	19-08-23		TLM1	
8.	Baye's theorem, Examples	1	21-08-23		TLM1	
9.	Problems on Baye's theorem	1	23-08-23		TLM1&2	
10.	Random variables, Expectations	1	25-08-23		TLM1	
11.	Problems on PMF	1	26-08-23		TLM1	
12.	Problems on PMF	1	28-08-23		TLM1	
13.	Problems on PDF	1	30-08-23		TLM1	
14.	Problems on PDF	1	01-09-23		TLM1	
No. of classes required to complete UNIT-I: 14				No. of classes taken:		

UNIT-II: Probability Distributions

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.	Binomial Distribution- mean & variance	1	02-09-23		TLM1&2	
2.	Problems on Binomial distribution	1	04-09-23		TLM1	
3.	Fitting of binomial distribution	1	06-09-23		TLM1	
4.	Poisson distribution, mean and variance	1	08-09-23		TLM1&2	
5.	Problems on Poisson distribution	1	11-09-23		TLM1	
6.	Fitting of Poisson distribution	1	13-09-23		TLM1	
7.	Normal distribution: mean &variance	1	15-09-23		TLM1&2	
8.	Problems on Normal Distribution	1	16-09-23		TLM1	
9.	Problems on Normal Distribution	1	18-09-23		TLM1	
10.	Applications of Normal Distribution	1	20-09-23		TLM1	
11.	Exponential distribution	1	22-09-23		TLM1	
12.	Problems on Exponential distribution	1	23-09-23		TLM1	
No. of classes required to complete UNIT-II: 12				No. of classes taken:		

UNIT-III: Sampling distribution and 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
1.	Sampling distribution, definitions	1	25-09-23		TLM1&2	
2.	Sampling distribution of mean, variance	1	27-09-23		TLM1	
3.	Sampling distribution -problems	1	29-09-23		TLM1&2	
4.	Central limit theorem, Examples	1	30-09-23		TLM1&2	
	Mid-I examinations	02-10-23 to 07-10-23				
5.	Problems on central limit theorem	1	09-10-23		TLM1	
6.	Point and interval estimation	1	11-10-23		TLM1&2	
7.	Confidence Interval of mean	1	13-10-23		TLM1	
8.	Problems	1	16-10-23		TLM1	
9.	Confidence Interval of proportion	1	18-10-23		TLM1	
10.	Confidence Interval of mean (n<30)	1	20-10-23		TLM1	
11.	problems	1	21-10-23		TLM1&2	
No. of classes required to complete UNIT-III: 11				No. of classes taken:		

UNIT-IV: Tests of Hypothesis

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.	Testing of Hypothesis, definitions	1	25-10-23		TLM1&2	
2.	Z-test for single mean	1	27-10-23		TLM1	
3.	Z-test for difference of means	1	28-10-23		TLM1	
4.	Z-test for single Proportion	1	30-10-23		TLM1	
5.	Z-test for difference of Proportions	1	01-11-23		TLM1	
6.	t-test for single mean	1	03-11-23		TLM1	
7.	t-test for difference of means	1	04-11-23		TLM1	
8.	Paired t-test	1	06-11-23		TLM1	
9.	problems on means	1	08-11-23		TLM1	
10.	F-test for variances	1	10-11-23		TLM1	
11.	χ^2-test for goodness of fit	1	13-11-23		TLM1	
12.	χ^2-test for independence of attributes	1	15-11-23		TLM1	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

UNIT-V: Correlation and Regression

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.	Simple Bi-variate Correlation	1	17-11-23		TLM1&2	
2.	Problems on Pearson's Correlation	1	18-11-23		TLM1	
3.	Regression lines	1	20-11-23		TLM1	
4.	Problems on Regression lines	1	21-11-23		TLM1	
5.	Problems on Regression lines	1	24-11-23		TLM1	
6.	Properties of Regression coefficients	1	25-11-23		TLM1&2	
7.	Problems on Regression coefficients	1	27-11-23		TLM1	
8.	Problems on rank Correlation	1	29-11-23		TLM1	
9.	Problems on repeated ranks	1	01-12-23		TLM1	
10.	Practice problems	1	02-12-23		TLM1	
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/SwayamPrabha/MOOCS)
TLM3	Tutorial	TLM6	Group Discussion/Project

PART-C

EVALUATION PROCESS (R20 Regulations):

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

Program Educational Objectives (PEOs):

PEO1	Pursue higher education, entrepreneurship, and research to compete at global level.
PEO2	Design and develop products innovatively in the area of computer science and engineering and in

	other allied fields.
PEO3	Function effectively as individuals and as members of a team in the conduct of interdisciplinary projects; and even at all the levels with ethics and necessary attitude.
PEO4	Serve ever-changing needs of the society with a pragmatic perception.

Program Outcomes (POs):

PO1 - Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2 - Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3 - Design / Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4 - Conduct Investigations of Complex Problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5 - 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.
PO6 - The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7 - Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8 - Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9 - Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10 - Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11 - Project Management and Finance	Demonstrate knowledge and understanding of the ring and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12 - Life-long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1	The ability to apply Software Engineering practices and strategies in software project development using open source programming environment for the success of organization.
PSO2	The ability to design and develop computer programs in networking, web applications and IoT as per the society needs.
PSO3	To inculcate an ability to analyze, design and implement database applications.

Course Instructor	Course Coordinator	Module Coordinator	HOD
(M.Rami Reddy)	(M.Rami Reddy)	(Dr.A.Rami Reddy)	(Dr.A.Rami Reddy)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with'A' Grade & NBA (Under Tier - I),
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcse@lbrce.ac.in, cseoffice@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. GOPI SURSH A
Course Name & Code :Discrete Mathematical Structures, 20CS04
L-T-P Structure : **3-0-0** **Credits:**03
Program/Sem/Sec : B.Tech-CSE (AI&ML)/ III SEM / A
A.Y. :2023-24

PRE-REQUISITE: Basic mathematical knowledge

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of the course is to perform the operations associated with relations and functions. Relate practical examples to the functions and relationsand interpret the associated operations and terminology used in the context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior ofsoftware or to solve problems such as puzzles.

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

CO1	Construct mathematical arguments using logical connectives and quantifiers and verify them.**(Apply -L3)**
CO2	Demonstrate the basic terminology of functions, relations, lattices and their operations. **(Understand - L2)**
CO3	Apply the properties of graphs to solve the graph theory problems in Computer science. **(Apply- L3)**
CO4	Illustrate the basic principles/techniques to solve different algebraic structures & combinatorial problems. **(Understand- L2)**
CO5	Solve linear recurrence relations by recognizing homogeneity using constant coefficients, characteristic roots and Generating functions. **(Apply – L3)**

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

CO	Program Outcomes (POs)												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	1													
CO2	3	2	1												
CO3	3	3	1												
CO4	3	3	1												
CO5	3	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).

TEXTBOOKS:

1. Tremblay, Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH Publications, 2008

REFERENCE BOOKS:

1. Chandrasekaran, Umaparvathi, DiscreteMathematics,PHI, 2010.
2. Ralph. P.Grimaldi, Ramana, Discrete and Combinational Mathematics,Pearson,5th edition.
3. https://nptel.ac.in/courses/106/106/106106183/

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Mathematical Logic

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1.	Mathematical Logic: Propositional Calculus	1	07/08/2023		**TLM1**	CO1	
2.	Statement and Notations, Connectives, Truth Tables	1	10/08/2023		**TLM1**	CO1	
3.	Tautologies	1	11/08/2023		**TLM1**	CO1	
4.	Equivalence of Formulas	1	12/08/2023		**TLM1**	CO1	
5.	Duality Law, Tautological Implications	1	14/08/2023		**TLM1**	CO1	
6.	Normal Forms, DNF	1	17/08/2023		**TLM2**	CO1	
7.	CNF	1	18/08/2023		**TLM2**	CO1	
8.	PCNF, PDNF	1	19/08/2023		**TLM2**	CO1	
9.	Theory of inference for statement Calculus	1	21/08/2023		**TLM2**	CO1	
10.	RULE CP	1	23/08/2023		**TLM2**	CO1	
11.	Consistency of Premises Indirect Method of Proof	1	24/08/2023		**TLM1**	CO1	
12.	Predicative Logic	1	28/08/2023		**TLM1**	CO1	
13.	Statement Functions, Variables, Free & Bound Variables, QUANTIFIERS	1	29/08/2023		**TLM1**	CO1	
No. of classes required to complete UNIT-I		13	No. of classes taken:				

UNIT-II: Sets, Relations & Functions

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1.	Set Theory: Introduction,	1	31/08/2023		**TLM1**	CO2	
2.	Representation of Sets	1	04/09/2023		**TLM1**	CO2	
3.	Operations on Binary Sets	1	05/09/2023		**TLM2**	CO2	

4.	Relations: Properties of Binary Relations	1	06/09/2023		**TLM1**	CO2	
5.	Relation Matrix and Digraph Operations on Relations	1	07/09/2023		**TLM1**	CO2	
6.	Partition and Covering, Transitive Closure	1	11/09/2023		**TLM1**	CO2	
7.	Equivalence Relation	1	12/09/2023		**TLM2**	CO2	
8.	Compatible Relation, Partial Ordering Relation	1	13/09/2023		**TLM1**	CO2	
9.	Hasse Diagrams, Lattices	1	14/09/2023		**TLM1**	CO2	
10.	Functions: Bijective Functions	1	18/09/2023		**TLM1**	CO2	
11.	Composition of Functions, Inverse Functions	1	19/09/2023		**TLM1**	CO2	
No. of classes required to complete UNIT-2		11	No. of classes taken:				

UNIT – III: Graph Theory I & II

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1.	Basic Concepts of Graphs	1	20/09/2023		**TLM1**	CO3	
2.	Matrix Representation of Graphs	1	25/09/2023		**TLM1**	CO3	
3.	Adjacency Matrices, Incidence Matrices	1	26/09/2023		**TLM1**	CO3	
4.	Isomorphic Graphs, Paths and circuits	1	27/09/2023		**TLM1**	CO3	
5.	Eulerian Graphs, Hamiltonian Graphs	1	28/09/2023		**TLM2**	CO3	
6.	Multigraphs, Planar Graphs, Euler‟s Formula	1	02/10/2023		**TLM1**	CO3	
7.	Graph Colouring and Covering, Chromatic Number	1	03/10/2023		**TLM1**	CO3	
8.	Trees Introduction	1	04/10/2023		**TLM1**	CO3	
9.	BFS, DFS	1	05/10/2023		**TLM2**	CO3	
10.	Spanning Trees: Properties	1	10/10/2023		**TLM2**	CO3	
11.	Algorithms for Minimum Spanning Trees	2	11/10/2023 12/10/2023		**TLM2**	CO3	
No. of classes required to complete UNIT-3		12	No. of classes taken:				

UNIT-IV: Algebraic Structures & Combinatorics

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1.	Algebraic Systems with one Binary Operation	1	16/10/2023		**TLM1**	CO4	
2.	Properties of Binary operations, Semi groups and Monoids	1	18/10/2023		**TLM1**	CO4	
3.	Homomorphism of Semi groups and Monoids, Groups	1	19/10/2023		**TLM1**	CO4	
4.	Abelian Group, Cosets, Subgroups	1	26/10/2023		**TLM1**	CO4	
5.	Langrage's Theorem	1	30/10/2023		**TLM1**	CO4	
6.	Basic of Counting, Permutations	1	31/10/2023		**TLM1**	CO4	
7.	Combinations	1	06/11/2023		**TLM1**	CO4	
8.	Circular Permutations, Restricted Permutations	1	07/11/2023		**TLM1**	CO4	
9.	Combinations with repetition Pigeonhole Principle and its Applications	2	08/11/2023 to 09/11/2023		**TLM1**	CO4	
10.	Principle of inclusion-exclusion	2	14/11/2023 to 15/11/2023		**TLM1**	CO4	
No. of classes required to complete UNIT-4		12	No. of classes taken:				

UNIT-V: Recurrence Relation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcomes	HOD Sign Weekly
1.	Generating Functions of Permutations and Combinations	2	16-11-2023 20-11-2023		**TLM1**	CO5	
2.	Calculating Coefficient of Generating Functions	2	21-11-2023 23-11-2023		**TLM1**	CO5	
3.	Recurrence Relations	2	27-11-2023 28-11-2023		**TLM1**	CO5	
4.	solving linear homogeneous recurrence Relations by substitution	2	29-11-2023 30-11-2023		**TLM1**	CO5	
5.	generating functions	2	04-12-2023 05-12-2023		**TLM1**	CO5	
6.	The Method of Characteristic Roots	2	06-12-2023 07-12-2023		**TLM1**	CO5	
No. of classes required to complete UNIT-5		10	No. of classes taken:				

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

EVALUATION PROCESS:

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, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering 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 anddesign 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 researchmethods 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 modernengineering 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 assesssocietal, 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 solutionsin 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 ofthe engineering practice.
PO 9	**Individual and team work**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
PO 10	**Communication**: Communicate effectively on complex engineering activities with the engineeringcommunity 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 theengineer**ing 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 inindependent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	An ability to apply software engineering practices and strategies in software project development using open-source programming environment for the success of organization
PSO 2	AnAbility 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**	**Head of the Department**
Name of the Faculty	Mr. GOPI SURSH A	Mr.GOPI SURESH A	Dr.S.Jaya Pradha	Dr. D Veeraiah
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: RAZEENA BEGUM SHAIK
Course Name & Code : DATABASE MANAGEMENT SYSTEMS & 20CS07
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech CSE AI&ML/III Sem/A **A.Y.:** 2023-2024

PREREQUISITE:

COURSE EDUCATIONAL OBJECTIVES (CEOs): The Objective of this course is to know about basic concepts of DBMS, Database Languages, Database Design, Normalization Process, Transaction Processing, Indexing, and Interfacing with NOSQL using MongoDB.

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

CO1	State the Basic Components of Database Management System and data modelling using Entity-Relationship Diagrams**. (Understand- L2)**
CO2	Examine the relational model using Structured Query Language (SQL). **(Apply - L3)**
CO3	Employ principles of normalization for effective database design. **(Apply - L3)**
CO4	Demonstrate the necessity of transaction processing, Concurrency control mechanisms and recovery strategies in DBMS. **(Understand- L2)**
CO5	Describe file organization, indexing techniques and the competency in selecting NoSQL Database. **(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	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	3	1	-	-	-	-	-	-	-	-	-	3	-	-
1 - Low			**2 –**Medium							**3 -** High					

TEXTBOOKS:

T1 Henry F. Korth, Abraham Silberschatz, S.Sudarshan, "Database System Concepts", McGrawHill, 6th edition, 2009.
T2 Shashank Tiwari, " ProfessionalNoSql", John Wiely& Sons, 2011.

REFERENCE BOOKS:

R1 Raghu Ramakrishnan, JohanneseGehrke, —Database Management System||, McGrawHill, 3rd edition, 2000.
R2 Date C J, —An Introduction to Database System, Pearson Education, 8th edition, 2003.
R3 RamezElmasri, ShamkanthB.Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th edition, 2010.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: DBMS Introduction & Data Modelling using the Entity Relationship Model

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, **Introduction:** An overview of Database Management System	1	07-08-23		1 & 2	
2.	Database System Vs File System	1	08-08-23		1 & 2	
3.	Database System Concepts	1	10-08-23		1 & 2	
4.	Three Schema Architecture	1	14-08-23		1 & 2	
5.	DataModels	1	17-08-23		1 & 2	
6.	Database Schema and Instances,DataIndependence	1	19-08-23		1 & 2	
7.	Database Languages, Database Structure	1	21-08-23		1 & 2	
9.	**Data Modelling using the Entity Relationship Model:** ER model concepts, Notation for ER Diagram	1	22-08-23		1 & 2	
10.	Mapping Constraints, Keys	1	24-08-23		1 & 2	
11	Concepts of Super Key, Candidate Key, Primary Key	2	26-08-23		1 & 2	
12	Generalization, Aggregation	1	29-08-23		1 & 2	
13	Reduction of an ER Diagrams toTables, Relationships of Higher Degree.	1	31-08-23		1 & 2	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Relational Data Model and Language & Introduction to SQL

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	**Relational Data Model and Language:** Relational Data Model Concepts, Integrity Constraints	1	02-09-23		1 & 2	
15	Entity Integrity, Referential Integrity	1	04-09-23		1 & 2	
16	Key Constraints, Domain Constraints	1	05-09-23			
17	Relational Algebra	1	07-09-23			
18	**Introduction to SQL:** Characteristics of SQL, Advantage of SQL	1	11-09-23		1 & 2	
19	SQL Data types and Literals, Insert, Update and Delete Operations	1	12-09-23		1 & 2	
20	Tables, Views, and Indexes	1	14-09-23		1 & 2	
21	Nested Queries, Aggregate Functions	1	16-09-23		1 & 2	
22	Joins, Unions, Intersection, Minus	1	18-09-23		1 & 2	
23	Cursors in SQL, Triggers in SQL	1	21-09-23		1 & 2	
No. of classes required to complete UNIT-II: 10				**No. of classes taken:**		

UNIT-III: Normalization

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	**Normalization:** Functional Dependencies	1	23-09-23		1 & 2	
25	Normal Forms - First, Second	1	25-09-23		1 & 2	
26	Third Normal Forms, BCNF	2	26-09-23		1 & 2	
I MID EXAMINATIONS						
27	Inclusion Dependences, Loss Less Join Decompositions	2	09-10-23		1 & 2	
28	Multi Valued Dependencies	2	12-10-23		1 & 2	
29	Fourth Normal Form	2	17-10-23		1 & 2	
30	Join Dependencies and Fifth Normal Form	2	21-10-23		1 & 2	

No. of classes required to complete UNIT-III: 12	**No. of classes taken:**

UNIT-IV: Transaction Processing Concepts, Concurrency Control Techniques & Crash Recovery

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	**Transaction Processing Concepts:** Transaction System, Testing of Serializability	1	28-10-23		1 & 2	
32	Serializability of Schedules	1	30-10-23		1 & 2	
33	Conflict & View Serializability	1	31-10-23		1 & 2	
34	Recoverability, Deadlock Handling	1	02-11-23		1 & 2	
35	**Concurrency Control Techniques:** Concurrency Control	1	04-11-23		1 & 2	
36	Locking Techniques for Concurrency Control	1	06-11-23		1 & 2	
37	Time Stamping Protocols for Concurrency Control	1	07-11-23		1 & 2	
38	Validation Based Protocol	1	09-11-23		1 & 2	
39	Multiple Granularity	1	13-11-23		1 & 2	
40	Recovery with Concurrent Transactions	1	14-11-23		1 & 2	
41	Log Based Recovery, Checkpoints	1	16-11-23		1 & 2	
42	ARIES Algorithm	1	18-11-23		1 & 2	
No. of classes required to complete UNIT-IV: 12				**No. of classes taken:**		

UNIT-V: Physical Database Design & Interfacing and Interacting with NoSQL

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.	**Physical Database Design:** Storage and file structure	1	20-11-23		1 & 2	
43	indexed files, hashed files	1	21-11-23		1 & 2	
44	B+ trees	1	23-11-23		1 & 2	
45	Files with dense index	1	25-11-23		1 & 2	
46	files with variable length records	1	27-11-23		1 & 2	
47	**Interfacing and interacting with NoSQL:** Introduction to NoSQL	2	28-11-23		1 & 2	
48	Storing and Accessing Data	1	30-11-23		1 & 2	
49	Storing Data in and Accessing Data from MongoDB	1	01-12-23		1 & 2	
50	Querying MongoDB	1	02-12-23		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	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	**Mrs.Razeena Begum**	**Mrs.G.V.Rajya Lakshmi**	**Dr.K.Naga Prasanthi**	**Dr. S.Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING(AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr. S Jayaprada
Course Name & Code **:** COMPUTER ARCHITECTURE**&** 20AD02
L-T-P Structure **: 3-0-0** **Credits:** 3
Program/ Sem /Sec : B.Tech CSE AI& ML/III Sem/A **A.Y.:** 2023-24

PREREQUISITES **:** Fundamentals of computer hardware

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of the course is to learn about the functional blocks and data representation of computer system and understands the design principles of processor and organization and management of memory and peripheral devices.

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

CO1: Identify the functional blocks of a computer and Instruction set architecture of CPU. **(Understand-L2)**
CO2: Understand Data representation and perform computer arithmetic operations. **(Apply-L3)**
CO3: Illustrate the design principles of control unit and pipelining. **(Understand-L2)**
CO4: Analyze the memory hierarchy in a computer system. **(Analyze-L4)**
CO5: Discuss the working principles of peripheral devices, their interfaces, and characteristics. **(Understand-L2)**

.

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	PSO1	PSO2	PSO3
CO1	2	2										1	1		
CO2	1	3										2	2		
CO3	2	2										2	2		
CO4	2	2										2	2		
CO5	1	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).

TEXT BOOKS:

T1. M. Morris Mano, "Computer Systems Architecture", Pearson Education publishers. [units- 1,2]

T2. Carl Hamacher, Zvonks Vranesic, SafeaZaky, "Computer rganization", TMHpublications. [units-3,4,5]

REFERENCE BOOKS:

R1. William Stallings, "Computer Organization and Architecture", Pearson/PHI publishers, 6th edition, 2004.

R2. Andrew S. Tanenbaum, "Structured Computer Organization", Pearson/PHI publishers, 4th edition, 2005.

R3. Sivarama P. Dandamudi, "Fundamentals or Computer Organization and Design", Springer publishers, 1st edition, 2003.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Functional blocks of a computer

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.	Block Diagram of a Computer, Basic Functional Units of a Computer	1	07.08.2023		TLM2	
2.	CPU, memory, input-output subsystems, control unit.	1	08.08.2023		TLM2	
3.	Instruction set architecture of a CPU–registers	2	09.08.2023/ 14.08.2023		TLM2	
4.	Instruction execution cycle	2	16.08.2023		TLM2	
5.	RTL interpretation of instructions	2	19.08.2023/ 21.08.2023		TLM2	
6.	Addressing modes	1	22.08.2023/ 23.08.2023		TLM2	
7.	Instruction set	1	26.08.2023		TLM2	
8.	Case study – instruction sets of some common CPUs.	1	28.08.2023/ 29.08.2023		TLM2	
No. of Classes Required to complete UNIT I: 11				**No. of classes taken:**		

UNIT-II: Data representation

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.	Signed number representation	1	30.08.2023		TLM2	
11.	fixed and floating-point representations	1	02.09.2023			
12.	character representation, Computer arithmetic – integer addition	2	04.09.2023/ 05.09.2023		TLM2	
13.	Subtraction	2	11.09.2023/ 12.09.2023		TLM2	
14.	Carry look- a head adder	1	13.09.2023		TLM2	
15.	Multiplication – shift-and add	1	16.09.2023		TLM2	
16.	Booth multiplier	2	19.09.2023/ 20.09.2023		TLM2	
17.	Division restoring and non- restoring techniques	2	23.09.2023/ 25.09.2023		TLM2	
18.	Floating point arithmetic	1	26.09.2023		TLM2	
No. of Classes Required to complete UNIT II :13				**No. of classes taken:**		

UNIT-III: CPU control unit 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
19.	Hardwired and micro-programmed design approaches.	1	27.09.2023		TLM2	

20.	Pipelining: Basic concepts of pipelining.	1	30.09.2023		TLM2	
MID EXAMINATION-I 03.10.2023 to 09.10.2023						
21.	Throughput and speedup	1	10.10.2023		TLM2	
22.	pipeline hazards	1	11.10.2023		TLM2	
23.	**Parallel Processors**: Introduction to parallel processors	2	16.10.2023/ 17.10.2023		TLM2	
24.	Concurrent access to memory	2	18.10.2023/ 21.10.2023		TLM2	
25.	Cache coherency	2	24.10.2023/ 25.10.2023		TLM2	
No. of Classes Required to complete UNIT III: 10				**No. of classes taken:**		

UNIT-IV: Memory system 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
25.	Semiconductor memory technologies	2	28.10.2023/ 30.10.2023		TLM2	
26.	Memory organization	2	31.10.2023/ 01.11.2023		TLM2	
27.	Memory interleaving	2	04.11.2023/ 06.11.2023		TLM2	
28.	Concept of hierarchical memory organization	2	07.11.2023/ 08.11.2023		TLM2	

29.	Cache memory, cache size vs. block size	2	13.11.2023/ 14.11.2023		TLM2	
30.	Mapping functions, replacement algorithms, write policies	1	15.11.2023		TLM2	
No. of Classes Required to complete UNIT IV : 11				**No. of classes taken:**		

UNIT-V: Peripheral devices and their characteristics

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.	Input-output subsystems	1	18.11.2023		TLM2	
32.	I/O device interface	2	20.11.2023/ 21.11.2023		TLM2	
33.	I/O transfers– program controlled	1	22.11.2023		TLM2	
34.	Interrupt driven and DMA	1	25.11.2023		TLM2	
35.	Privileged and non-privileged instructions	2	27.11.2023/ 28.11.2023		TLM2	
36.	Software interrupts and exceptions	2	29.11.2023/ 02.12.2023		TLM2	
No. of Classes Required to complete UNIT V: 09				**No. of classes taken:**		
MID EXAMINATION-II 04.12.2023 to 09.12.2023						

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

PEVALUATION 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 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.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and 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	**Dr. S Jayaprada**	**Dr. CH. Venkata Narayana**	**Dr.D.Venkata Subbaiah**	**Dr. S Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: P JAGADEESWARA RAO
Course Name & Code **:** OBJECT ORIENTED PROGRAMMING & 20CS09
L-T-P Structure **: 4-0-0** **Credits:** 3
Program/Sem/Sec : B. Tech-CSE(AI&ML)/III **A.Y.:** 2023-24

PREREQUISITE: Programming for Problem Solving using C

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to learn the constructs of the Java programming language along with built-in facilities to create different applications such as console & graphical user interfaces. In the process of learning the language, they will be applying knowledge of object-oriented programming; they will get the fundamental knowledge reason collection framework.

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

CO1	Demonstrate the fundamentals of object-oriented programming and basic building blocks of Java. **(Understand- L2)**
CO2	Apply object-oriented programming principles to solve problems. **(Apply - L3)**
CO3	Demonstrate JAVA built-in API packages and create user-defined packages and interfaces **(Understand- L2)**
CO4	Develop multitasking applications using JAVA multithreaded programming and handling runtime errors using Exception Handling. **(Apply – L3)**
CO5	Develop GUI applications using AWT (Abstract Window Toolkit). **(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	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	-	2	1	-	-	-	-	-	-	-	-	-	-	2	-
1 - Low			**2 –**Medium								**3 -** High				

TEXTBOOKS:

T1 Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006

T2 Cay S. Horstmann, "Core Java Volume I – Fundamentals", Pearson, Eleventh edition, 2018

REFERENCE BOOKS:

R1 Dr.R.NageswaraRao, "Core JAVA: An Integrated Approach", Dreamtech Press, 1st Edition2008.

R2 E. Balaguruswamy, "Programming with JAVA", TMH Publications, 2ndEdition, 2000.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I:

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.	Programming Paradigms	1	07-08-2023		TLM1	
2.	Difference Between OOP vs POP	1	09-08-2023		TLM1	
3.	Principles of OOP	1	11-08-2023		TLM1	
4.	Java Introduction- History, Buzzwords	1	14-08-2023		TLM1	
5.	Data Types	1	16-08-2023		TLM1	
6.	Keywords, Variables	1	18-08-2023		TLM1	
7.	Operators	1	19-08-2023		TLM1	
8.	Control Statements	1	21-08-2023		TLM1	
9.	Class Definition, Variables and Methods, Declaring Objects	1	23-08-2023		TLM1	
10.	Constructors, this Keyword	1	25-08-2023		TLM1	
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	HOD Sign Weekly
11.	Overloading Methods and Constructors	1	26-08-2023		TLM1	
12.	Parameter Passing and Returning Objects	1	28-08-2023		TLM1	
13.	Recursion and Access Control	1	30-08-2023		TLM1	
14.	Nested and Inner Classes	1	01-09-2023		TLM1	
15.	Final Keyword & Static	1	02-08-2023		TLM1	
16.	Variable and Command Line Arguments	1	04-08-2023		TLM1	
17.	Inheritance Introduction, Types of Inheritance	1	08-09-2023		TLM1	
18.	Super Keyword, Overriding and Dynamic Method Dispatch	1	11-09-2023		TLM1	
19.	Abstract Class and Final with Inheritance	1	13-09-2023		TLM1	
20.	String	1	15-09-2023		TLM1	
21.	StringBuffer and StringTokenizer	1	16-09-2023		TLM1	
No. of classes required to complete UNIT-II: 11				**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
22.	Interfaces, Inheritance in interfaces	1	20-09-2023		TLM1	
23.	Packages -Introduction, Creation	1	22-09-2023		TLM1	
24.	Java Built in Packages	1	23-09-2023		TLM1	
25.	Exception Hierarchy	1	25-09-2023		TLM1	
26.	Try, catch, throw	1	27-09-2023 29-09-2023		TLM1	
27.	Throws and finally	1	30-09-2023 09-10-2023		TLM1	
28.	User Defined Exception	1	09-10-2023 11-10-2023		TLM1	
29.	Assertions	1	13-10-2023		TLM1	
No. of classes required to complete UNIT-III: 11				**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	HOD Sign Weekly
30.	Multi-Threading -Introduction	1	16-10-2023		TLM1	
31.	Thread Life Cycle	1	18-10-2023		TLM1	
32.	Creation of Thread	1	20-10-2023		TLM1	
33.	Naming a Thread, Joining a Thread	1	21-10-2023		TLM1	
34.	Thread Priorities, Daemon Thread	1	30-10-2023		TLM1	
35.	Thread Pool, Thread Group	1	01-11-2023		TLM1	
36.	Thread Synchronization, Inter Thread Communications	1	03-11-2023		TLM1	
37.	Collections Framework	1	04-11-2023		TLM1	
38.	Hierarchy, Generics	1	06-11-2023		TLM1	
39.	List, Set	1	08-11-2023		TLM1	
40.	Queue and Map	1	10-11-2023		TLM1	
No. of classes required to complete UNIT-IV: 11				**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	HOD Sign Weekly
41.	AWT Hierarchy	1	13-11-2023		TLM1	
42.	Components & Containers	1	15-11-2023		TLM1	
43.	Button, Label, Text Field	1	17-11-2023		TLM2	
44.	Checkbox, Choice, List	1	18-11-2023		TLM2	
45.	Canvas, Scrollbar, Menus	1	20-11-2023		TLM2	
46.	Layout Managers	1	22-11-2023		TLM2	
47.	Event Delegation Model, Event Classes	1	24-11-2023 25-11-2023		TLM2	
48.	Listener Interfaces	1	27-11-2023		TLM2	
49.	Key Listener and Window Listener	1	29-11-2023		TLM2	
50.	Adapter Classes	1	01-12-2023 02-12-2023		TLM2	
No. of classes required to complete UNIT-V: 12				**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.	Java Arrays	1	30-10-2023		TLM1	
2.	Applets	1	15-11-2023		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 (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 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. P Jagadeeswara Rao**	**Dr. Y Vijay Bhaskar Reddy**	**Dr. K Naga Prasanthi**	**Dr. S. Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT
PART-A

Name of Course Instructor: Razeena Begum Shaik

Course Name & Code :Database Management Systems Lab (20CS56)
L-T-P Structure :0-0-3 **Credits:**1.5
Program/Sem/Sec : B.Tech CSE AI&ML/III SEM/A **A.Y.:** 2023-2024

PRE-REQUISITE : Programming language, Discrete Mathematical Structures, and Data Structures.

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objective of this lab is to provide a strong formal foundation in database concepts, technology, and practice to the participants to groom them into well-informed database application developers.

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

CO 1	Create & manipulate the relational database using SQL**. (Apply- L3)**
CO 2	Implement Views, procedures, triggers, and cursors on relational database. **(Apply- L3)**
CO 3	Create Unstructured Databases using MongoDB**. (Apply- L3)**
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
CO1	-	2	2	-	2	-	-	-	-	-	-	-	3	-
CO2	-	1	1	1	1	-	-	-	-	-	-	-	3	-
CO3	3	-	1	1	1	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	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-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	Introduction to SQL, syntax	3	11-08-23		TLM4	
2	Experiment - 1	3	18-08-23		TLM4	
3	Experiment - 2	3	25-08-23		TLM4	
4	Experiment - 3	3	01-09-23		TLM4	
5	Experiment - 4	3	08-09-23		TLM4	
6	Experiment – 5,6,7,8	6	15-09-23		TLM4	
7	Experiment – 9,10,11	3	29-09-23		TLM4	
8	Experiment – 12,13	6	13-10-23		TLM4	
9	Experiment – 14	6	27-10-23		TLM4	
10	Experiment – 15	3	10-11-23		TLM4	
11	Design database for Case study	6	17-11-23		TLM4	
12	Internal Exam	3	01-12-23		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

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 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	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	**Mrs.Razeena Begum**	**Mrs.G.V.Rajya Lakshmi**	**Dr.K.Naga Prasanthi**	**Dr.S.Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor: P JAGADEESWARA RAO
Course Name & Code **:** OBJECT ORIENTED PROGRAMMING LAB & 20CS57
L-T-P Structure **: 0-0-3** **Credits:** 3
Program/Sem/Sec : B. Tech-CSE(AI&ML)/III **A.Y.:** 2023-24

PREREQUISITE: Programming for Problem Solving using C and Data Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to learn the constructs of the Java programming language along with built-in facilities to create different applications such as console & graphical user interfaces. They will be applying knowledge of object-oriented programming, collection framework to perform all operations on data.

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

CO1	Solve basic mathematical problems using fundamentals of Java and its object-oriented principles **(Apply - L3)**
CO2	Implement multithreading and exception handling mechanisms. **(Apply - L3)**
CO3	Develop GUI applications and basic data structures using collection framework. **(Apply - L3)**
CO4	Improve individual / teamwork skills, communication & report writing skills with ethical values. **(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	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	1	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
1 - Low			**2 –**Medium								**3 -** 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.	Introduction Lab	3	08-08-2023		
2.	Java Basic Programs	3+3	22-08-2023 29-08-2023		
3.	Classes and Objects, Constructors & Parameter Passing	3+3	05-09-2023 12-09-2023		
4.	Static Keyword Strings	3	19-09-2023		
5.	Inheritance & Polymorphism	3	26-09-2023		
6.	Dynamic Method Dispatch & Interfaces	3	10-10-2023		
7.	Packages & Exception Handling	3	17-10-2023		
8.	Multithreading Programs	3	31-10-2023		
9.	Collections Framework	3	07-11-2023		
10.	AWT Controls	3	14-11-2023		
11.	Event Handling	3	21-11-2023		
12.	Lab Internal Exam	3	28-11-2023		

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. P Jagadeeswara Rao**	**Dr. Y Vijay Bhaskar Reddy**	**Dr. K Naga Prasanthi**	**Dr. S. Jayaprada**
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

Part-A

PROGRAM : B.Tech. III-Sem., CSE(AI&ML)
ACADEMIC YEAR : 2023-24
COURSE NAME & CODE : R Programming Lab (20IT53)
L-T-P STRUCTURE : 0-0-3
COURSE CREDITS : 1.5
COURSE INSTRUCTOR : Dr S Jayaprada
COURSE COORDINATOR : Mr.G.V.Suresh

PRE-REQUISITES: Basics of Mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs): 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

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

CO1: Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming. **(Understand - L2)**

CO2: Implement the concepts of R Script to extract the data from data frames and file operations. **(Apply – L3)**

CO3: Implement the various statistical techniques with visualization using R add-on packages. **(Apply – L3)**

CO4: Improve individual / teamwork skills, communication & report writing skills with ethical values

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	Learning Outcome COs	HOD Sign Weekly
1	**Week 1:** a) Installing R and RStudio b) Basic functionality of R, variable, data types in R	3	10-08-2023		TLM4/TLM5	CO1	
2	**Week 2:** a) Implement R script to show the usage of various operators available in R language. b) Implement R script toread person‘s age from keyboard and display whether he is eligible forvoting or not. c) Implement R script tofind biggest number between two numbers. d) Implement R script to check the given year is leap year or not.	3	17-08-2023		TLM4/TLM5	CO1	
3	**Week 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	3	24-08-2023		TLM4/TLM5	CO1	
4	**Week 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.	3	31-08-2023		TLM4/TLM5	CO2	

5	**Week 5:** a) Implement R Script to perform various operations on matrices b) Implement R Script to extract the data from data frames. c) Write R script to display file contents. d) Write R script to copy file contents from one file to another	3	07-09-2023		TLM4/TLM5	CO2	
6	**Week 6:** 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	3	14-09-2023		TLM4/TLM5	CO2	
7	**Week 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	3	21-09-2023		TLM4/TLM5	CO2	
8	**Week 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.	3	28-09-2023		TLM4/TLM5	CO2	

9	**Week 9:** a) Implement R Script to perform Normal, and Binomial distributions. b) Implement R Script to perform correlation, Linear and multiple regression.	3	12-10-2023		TLM4/TLM5	CO3	
10	**Week 10:** Introduction to Non- Tabular Data Types: Timeseries, spatial data, Network data. Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geo coding.	6	19-10-2023		TLM4/TLM5	CO3	
11	**Week 11:** Introduction Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling.	3	26-10-2023		TLM4/TLM5	CO3	
12	**Week 12:** Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Google Spreadsheets,API and web scraping examples	3	02-11-2023		TLM4/TLM5	CO3	
	LAB INTERNAL	3	09-11-2023				

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

PROGRAM 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 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.

PROGRAM 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 S Jayaprada	Mr.G.V.Suresh	Dr .K.Naga Prasanthi	Dr. S Jayaprada
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
hodcsm@lbrce.ac.in, csmoffice@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (AI&ML)

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr. B. Rajendra Prasad
Course Name & Code : Web Application Development using Full Stack - Module-I (Frontend Development) & 20CSS1
L-T-P Structure : 1-0-2 **Credits:** 2
Program/Sem/Sec : B.Tech. – CSE(AI&ML)/III/A **A.Y.:** 2023-24

PREREQUISITE: Knowledge of basic Computer hardware & software.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of the course is to understand the design of HTML web pages, Styling of HTML pages using CSS, web forms validation using JavaScript and developing responsive web page using JQuery.

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

CO1	Understand the basic UI/UX design and styling of web pages **(Understand- L2)**
CO2	Understand the DOM of web design, markup language and client-side scripting. **(Understand- L2)**
CO3	Understand the responsive web design using DHTML. **(Understand- L2)**
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	-	-	-	-	-	-	-	3	2	-
CO2	-	-	2	-	2	-	-	-	-	-	-	-	3	2	-
CO3	-	-	2	-	2	-	-	-	-	-	-	-	3	2	-
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

REFERENCE BOOKS:

R1	HTML & CSS: The Complete Reference, 5thEditionby Thomas Powell, McGrawHill,2017.
R2	Beginning HTML, XHTML, CSS, and JavaScript by Jon Duckett, Wiley India, 2010.
R3	jQuery Cookbook by Cody Lindley, O'Reilly Media, 2009
R4	HTML, XHTML, and CSS Bible, 5th Edition by Steven M. Schafer, Wiley India, 2011.
R5	Web Development with jQuery by Richard York, Wiley India, 2015
R6	Head first HTML & CSS 2nd Edition by Elisabeth Robson, Eric Freeman, O'Reilly

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	4	07-08-23		**DM5**	
2.	Lab Cycle-1	4	14-08-23		**DM5**	
3.	Lab Cycle-2	4	21-08-23		**DM5**	
4.	Lab Cycle-2	4	28-08-23		**DM5**	
5.	Lab Cycle-3	4	04-09-23		**DM5**	
6.	Lab Cycle-3	4	11-09-23		**DM5**	
7.	Lab Cycle-4	4	18-09-23		**DM5**	
8.	Lab Cycle-4	4	25-09-23		**DM5**	
9.	Lab Cycle-5	4	09-10-23		**DM5**	
10.	Lab Cycle-5	4	16-10-23		**DM5**	
11.	Lab Cycle-6	4	23-10-23		**DM5**	
12.	Lab Cycle-6	4	30-10-23		**DM5**	
13.	Lab Cycle-6	4	06-11-23		**DM5**	
14.	Revision	4	13-11-23		**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):

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	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	Mr. B. Rajendra Prasad	Dr. S. Nagarjuna Reddy	Dr. N. Naga Prashanthi	Dr. S. Jaya Prada
Signature				