LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.M.S.Giridhar
Course Name   : Optimization Techniques   **Course Code :** 23HS01
Credits: 3 **L-T-P Structure:** 2-0-0
Program/Sem/Sec   : B.Tech/IV Semester – EEE Section-A   **A.Y.**   : 2024-25

PREREQUISITE: Linear Algebra, Vector Calculus

Course Objectives:
The course aims to equip students with the ability to define objective and constraint functions in terms of design variables for optimization problems, including both single and multi- variable problems with and without constraints. It covers the application of linear programming techniques, including the use of slack and surplus variables in the Simplex method, and the formulation of transportation and assignment problems as linear programming problems. Additionally, the course presents nonlinear programming techniques for both unconstrained and constrained problems, including the use of exterior and interior penalty functions

Course Outcomes: At the end of the course, students will be able to:
CO1: State and formulate optimization problems, with and without constraints, using design variables from an engineering design problem. **(Remember-L1)**
CO2: Apply classical optimization techniques to minimize or maximize a multi-variable objective function, with or without constraints, and arrive at an optimal solution. **(Understand- L2)**
CO3: Apply and solve transportation and assignment problems using the Linear Programming Simplex method. **(Apply-L3)**
CO4: Apply gradient and non-gradient methods to nonlinear optimization problems, using interior or exterior penalty functions for constraints, to derive optimal solutions. **(Apply-L3)**

CO5: Formulate and apply Dynamic Programming techniques to problems such as inventory control, production planning, and engineering design, to reach a final optimal solution from the current optimal solution. **(Analyse-L4)**

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	3	3							1	3			
CO2	3	3	1	3	3								2	1		
CO3	3	3	1	3	3								2	2		
CO4	3	3	1	2	2											

Textbooks:
1. "Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research", H.S. Kasene& K.D. Kumar, Springer (India), Pvt.LTd.

Reference Books:
1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath& Co

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction and Classical Optimization Techniques

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and Classical Optimization Techniques	1	09-12-2024		TLM1	
2.	Statement of an Optimization problem, design vector, design constraints	2	11-12-2024 14-12-2024		TLM2	
3.	Constraint surface, objective function, objective function surfaces	1	16-12-2024		TLM1	
4.	Classification of Optimization problems. Single variable Optimization	2	18-12-2024 21-12-2024		TLM2	
5.	Multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum	2	23-12-2024 25-12-2024		TLM1	
6.	Multivariable Optimization with equality constraints.	1	28-12-2024		TLM1	
7.	Solution by method of Lagrange multipliers	1	30-12-2024		TLM1	
8.	multivariable Optimization with inequality constraints	1	01-01-2025		TLM1	
9.	Kuhn – Tucker conditions	1	04-01-2025		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Linear 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
10.	Standard form of a linear programming problem	2	06-01-2025 08-01-2025		TLM2	
11.	geometry of linear programming problems	2	11-01-2025 13-01-2025		TLM2	
12.	definitions and theorems	1	15-01-2025		TLM1	
13.	solution of a system of linear simultaneous equations	2	18-01-2025 20-01-2025		TLM1	
14.	pivotal reduction of a general system of equations	2	22-01-2025 25-01-2025		TLM1	
15.	motivation to the simplex method	2	03-02-2025 05-02-2025		TLM1	
16.	simplex algorithm.	2	08-02-2025 10-02-2025		TLM1	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

UNIT III: Transportation Problem

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Finding initial basic feasible solution by north – west corner rule	2	12-02-2025 15-02-2025		TLM2	
18.	least cost method and Vogel's approximation method	2	17-02-2025 19-02-2025		TLM1	
19.	testing for optimality of balanced transportation problems	2	22-02-2025 24-02-2025		TLM1	

20.	Special cases in transportation problem.	2	26-02-2025 01-03-2025		TLM2	
21.		1	03-03-2025		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Nonlinear 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.	Unconstrained cases, one – dimensional minimization methods: Classification, Fibonacci method	2	05-03-2025 08-03-2025		TLM1	
23.	Univariate method, steepest descent method.	2	10-03-2025 12-03-2025		TLM2	
24.	Constrained cases– Characteristics of a constrained problem	1	15-03-2025		TLM1	
25.	Classification, Basic approach of Penalty Function method	2	17-03-2025 19-03-2025		TLM1	
26.	Basic approaches of Interior penalty function methods.	1	22-03-2025		TLM2	
27.	Basic approaches of Exterior penalty function methods.	1	24-03-2025		TLM2	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: 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
28.	Dynamic programming multistage decision	1	26-03-2025		TLM1	
29.	Dynamic programming multistage decision types	1	29-03-2025		TLM2	
30.	Dynamic programming concept of sub optimization and the principle of optimality	1	31-03-2025		TLM1	
31.	Computational procedure in dynamic programming,	1	02-04-2025		TLM2	
32.	examples illustrating the calculus method of solution	1	05-04-2025		TLM1	
33.	Examples illustrating the tabular method of solution. Review of UNIT-III, IV & V	3	14-04-2025 To 19-04-2025		TLM1	
No. of classes required to complete UNIT-V: 08				**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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5

I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (UNIT-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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 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	Organize, Analyze and Interpret the data to extract meaningful conclusions.

PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

ACADEMIC CALENDAR: A.Y 2024-25

Description	From	To	Weeks
I Phase of Instructions	09-12-2024	25-01-2025	7W
I Mid Examinations	**27-01-2025**	**01-02-2025**	**1 W**
II Phase of Instructions	03-02-2025	05-04-2025	9W
II Mid Examinations	**07-04-2025**	**12-04-2025**	**1 W**
Preparation and Practical	14-04-2025	19-04-2025	1 W
Semester End Examinations	**21-04-2025**	**03-05-2025**	**2 W**

Signature				
Name of the Faculty	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.J.Sivavaraprasad**
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.M.S.Giridhar
Course Name   : Optimization Techniques   **Course Code :** 23HS01
Credits: 3   **L-T-P Structure:** 2-0-0
Program/Sem/Sec   : B.Tech/IV Semester – EEE Section-B   **A.Y.**   : 2024-25

PREREQUISITE: Linear Algebra, Vector Calculus

Course Objectives:
The course aims to equip students with the ability to define objective and constraint functions in terms of design variables for optimization problems, including both single and multi- variable problems with and without constraints. It covers the application of linear programming techniques, including the use of slack and surplus variables in the Simplex method, and the formulation of transportation and assignment problems as linear programming problems. Additionally, the course presents nonlinear programming techniques for both unconstrained and constrained problems, including the use of exterior and interior penalty functions

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

CO1: State and formulate optimization problems, with and without constraints, using design variables from an engineering design problem. **(Remember-L1)**

CO2: Apply classical optimization techniques to minimize or maximize a multi-variable objective function, with or without constraints, and arrive at an optimal solution. **(Understand- L2)**

CO3: Apply and solve transportation and assignment problems using the Linear Programming Simplex method. **(Apply-L3)**

CO4: Apply gradient and non-gradient methods to nonlinear optimization problems, using interior or exterior penalty functions for constraints, to derive optimal solutions. **(Apply-L3)**

CO5: Formulate and apply Dynamic Programming techniques to problems such as inventory control, production planning, and engineering design, to reach a final optimal solution from the current optimal solution. **(Analyse-L4)**

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

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

Textbooks:
1. "Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research", H.S. Kasene& K.D. Kumar, Springer (India), Pvt.LTd.

Reference Books:
1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath& Co

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction and Classical Optimization Techniques

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction and Classical Optimization Techniques	1	09-12-2024		TLM1	
2.	Statement of an Optimization problem, design vector, design constraints	2	10-12-2024 12-12-2024		TLM2	
3.	Constraint surface, objective function, objective function surfaces	1	16-12-2024		TLM1	
4.	Classification of Optimization problems. Single variable Optimization	2	17-12-2024 19-12-2024		TLM2	
5.	Multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum	2	23-12-2024 24-12-2024		TLM1	
6.	Multivariable Optimization with equality constraints.	1	26-12-2024		TLM1	
7.	Solution by method of Lagrange multipliers	1	30-12-2024		TLM1	
8.	multivariable Optimization with inequality constraints	1	31-12-2024		TLM1	
9.	Kuhn – Tucker conditions	1	02-01-2025		TLM1	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Linear 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
10.	Standard form of a linear programming problem	2	06-01-2025 07-01-2025		TLM2	
11.	geometry of linear programming problems	2	09-01-2025 13-01-2025		TLM2	
12.	definitions and theorems	1	14-01-2025		TLM1	
13.	solution of a system of linear simultaneous equations	2	16-01-2025 20-01-2025		TLM1	
14.	pivotal reduction of a general system of equations	2	21-01-2025 23-01-2025		TLM1	
15.	motivation to the simplex method	2	03-02-2025 04-02-2025		TLM1	
16.	Simplex algorithm.	2	06-02-2025 10-02-2025		TLM1	
No. of classes required to complete UNIT-II: 15				**No. of classes taken:**		

UNIT III: Transportation Problem

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
17.	Finding initial basic feasible solution by north – west corner rule	2	11-02-2025 13-02-2025		TLM2	
18.	least cost method and Vogel's approximation method	2	17-02-2025 18-02-2025		TLM1	

19.	testing for optimality of balanced transportation problems	2	20-02-2025 24-02-2025		TLM1	
20.	Special cases in transportation problem.	2	25-02-2025 27-02-2025		TLM2	
21.		1	03-03-2025		TLM2	
No. of classes required to complete UNIT-III: 09				**No. of classes taken:**		

UNIT-IV: Nonlinear 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.	Unconstrained cases, one – dimensional minimization methods: Classification, Fibonacci method	2	04-03-2025 06-03-2025		TLM1	
23.	Univariate method, steepest descent method.	2	10-03-2025 11-03-2025		TLM2	
24.	Constrained cases– Characteristics of a constrained problem	1	13-03-2025		TLM1	
25.	Classification, Basic approach of Penalty Function method	2	17-03-2025 18-03-2025		TLM1	
26.	Basic approaches of Interior penalty function methods.	1	20-03-2025		TLM2	
27.	Basic approaches of Exterior penalty function methods.	1	24-03-2025		TLM2	
No. of classes required to complete UNIT-IV: 09				**No. of classes taken:**		

UNIT-V: 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
28.	Dynamic programming multistage decision	1	25-03-2025		TLM1	
29.	Dynamic programming multistage decision types	1	27-03-2025		TLM2	
30.	Dynamic programming concept of sub optimization and the principle of optimality	1	31-03-2025		TLM1	
31.	Computational procedure in dynamic programming,	1	01-04-2025		TLM2	
32.	examples illustrating the calculus method of solution	1	03-04-2025		TLM1	
33.	Examples illustrating the tabular method of solution. Review of UNIT-III, IV & V	3	14-04-2025 To 17-04-2025		TLM1	
No. of classes required to complete UNIT-V: 08				**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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (UNIT-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

ACADEMIC CALENDAR: A.Y 2024-25

Description	From	To	Weeks
I Phase of Instructions	09-12-2024	25-01-2025	7W
I Mid Examinations	**27-01-2025**	**01-02-2025**	**1 W**
II Phase of Instructions	03-02-2025	05-04-2025	9W
II Mid Examinations	**07-04-2025**	**12-04-2025**	**1 W**
Preparation and Practical	14-04-2025	19-04-2025	1 W
Semester End Examinations	**21-04-2025**	**03-05-2025**	**2 W**

Signature				
Name of the Faculty	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.J.Sivavaraprasad**
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

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

FRESHMAN ENGINEERING DEPARTMENT

COURSE HANDOUT
Part-A

PROGRAM : II B. Tech., II-Sem., IT-A
ACADEMIC YEAR : 2024-25
COURSE NAME & CODE : PROBABILITY & STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr.K.Bhanu Lakshmi
COURSE COORDINATOR : Dr. M. Rami Reddy
PRE-REQUISITES : Basics of mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs):
- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

COURSE OUTCOMES (COs): Upon successful completion of this course, the student should be able to
CO1: Classify the concepts of data science and its importance (L2)
CO2: Interpret the association of characteristics and through correlation and regression tools (L3)
CO3: Apply discrete and continuous probability distributions (L3)
CO4: Design the components of a classical hypothesis test (L4)
CO5: Infer the statistical inferential methods based on small and large sampling tests (L4)

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	-	-	-	-	-	-	-	2
CO2	3	3	2	3	-	-	-	-	-	-	-	2
CO3	3	3	2	3	-	-	-	-	-	-	-	2
CO4	3	2	2	3	-	-	-	-	-	-	-	2
CO5	3	3	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 TEXT BOOKS:
1. **Miller and Freund's,** Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S. **C. Gupta and V.K. Kapoor,** Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

BOS APPROVED REFERENCE ROOKS:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics for Engineers and the Scientists, 8th Edition. Pearson 2007.
2. **Jay 1. Devore,** Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross,** Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg,** Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

Part-B
COURSE DELIVERY PLAN (LESSON PLAN)
UNIT-I: Descriptive statistics and methods for data science

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.	Syllabus Co's, PO's	1	10/12/2024		TLM1	CO1	T1, T2	
2.	Unit-1, Introduction to data science	1	11/12/2024		TLM1	CO1	T1, T2	
3.	Statistics- Population and sample, Collection of data,	1	12/12/2024		TLM3	CO1	T1, T2	
4.	Types of variables	1	17/12/2024		TLM1	CO1	T1, T2	
5.	Data visualization	1	18/12/2024		TLM1	CO1	T1, T2	
6.	Measures of central tendency, A.M	1	19/12/2024		TLM1	CO1	T1, T2	
7.	Median, mode problems	1	20/12/2024		TLM3	CO1	T1, T2	
8.	Measures of variability Range, Mean deviation	1	21/12/2024		TLM1	CO1	T1, T2	
9.	S.D. & Q D	1	24/12/2024		TLM1	CO1	T1, T2	
10.	Skewness	1	26/12/2024		TLM1	CO1	T1, T2	
11.	Kurtosis	1	28/12/2024		TLM1	CO1	T1, T2	
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II: Correlation and Regression

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
12.	Correlation, types	1	31/12/2024		TLM1	CO2	T1,T2	
13.	Coefficient of correlation	1	02/01/2025		TLM1	CO2	T1,T2	
14.	Rnak correlation	1	04/01/2025		TLM3	CO2	T1,T2	
15.	Linear regression (lines)	1	07/01/2025		TLM1	CO2	T1,T2	
16.	Multiple regression	1	08/01/2025		TLM1	CO2	T1,T2	
17.	Regression coefficients	1	09/01/2025		TLM1	CO2	T1,T2	
18.	Properties, problems	1	21/01/2025		TLM1	CO2	T1,T2	
19.	Fitting of parabola	1	22/01/2025		TLM1	CO2	T1,T2	
20.	Exponential curve	1	23/01/2025		TLM3	CO2	T1,T2	
21.	Fitting of power curve	1	25/01/2025		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-II		10			No. of classes taken:			

I MID EXAMINATIONS (26-01-2025 TO 01-02-2025)

UNIT-III: Probability and Distributions

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
22.	Probability, Introduction	1	04/02/2025		TLM1	CO3	T1,T2	
23.	Conditional probability	1	05/02/2025		TLM1	CO3	T1,T2	

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
24.	Bayes theorem	1	06/02/2025		TLM3	CO3	T1,T2	
25.	Random variables, Distribution function	1	11/02/2025		TLM1	CO3	T1,T2	
26.	Probability mass function	1	12/02/2025		TLM1	CO3	T1,T2	
27.	Probability density function	1	13/02/2025		TLM1	CO3	T1,T2	
28.	Mathematical expectation, variance	1	15/02/2025		TLM3	CO3	T1,T2	
29.	Binomial distribution	1	18/02/2025		TLM1	CO3	T1,T2	
30.	Poisson distribution	1	19/02/2025		TLM1	CO3	T1,T2	
31.	problems	1	20/02/2025		TLM1	CO3	T1,T2	
32.	Normal distribution	1	22/02/2025		TLM3	CO3	T1,T2	
33.	Problems	1	25/02/2025		TLM1	CO3	T1,T2	
34.	Uniform distribution	1	26/02/2025					
No. of classes required to complete UNIT-III		13			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
38.	Introduction: population & sample Sampling distribution	1	01/03/2025		TLM1	CO4	T1,T2	
39.	Sampling distribution of means & variance	1	04/03/2025		TLM1	CO4	T1,T2	
40.	problems	1	05/03/2025		TLM1	CO4	T1,T2	
41.	Central limit theorem	1	06/03/2025		TLM3	CO4	T1,T2	
42.	Estimation- point & interval, maximum error	1	11/03/2025		TLM1	CO4	T1, T2	
43.	Estimation using t-distribution	1	12/03/2025		TLM1	CO4	T1, T2	
44.	problems	1	13/03/2025		TLM3	CO4	T1, T2	
45.	Estimation using F-distribution	1	15/03/2025		TLM1	CO4	T1, T2	
46.	Estimation using χ^2 −distribution	1	18/03/2025		TLM1	CO4	T1, T2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V: Multiple Integrals (Multi variable Calculus)

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
47.	Hypothesis: introduction, Definitions	1	19/03/2025		TLM1	CO5	T1,T2	
48.	Z-test for single mean	1	20/03/2025		TLM1	CO5	T1,T2	
49.	Z-test for diff. of mean	1	22/03/2025		TLM3	CO5	T1,T2	
50.	Z-test for single proportion	1	25/03/2025		TLM1	CO5	T1,T2	
51.	Z-test for difference of proportion	1	26/03/2025		TLM1	CO5	T1,T2	

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
52.	t-test for single mean	1	27/03/2025		TLM1	CO5	T1,T2	
53.	t-test for diff. means,	1	29/03/2025		TLM1	CO5	T1,T2	
54.	F-test for variances	1	01/04/2025		TLM1	CO5	T1,T2	
55.	χ^2 −test for goodness of fit	1	02/04/2025		TLM1	CO5	T1,T2	
56.	χ^2 −test for independence	1	03/04/2025		TLM1	CO5	T1,T2	
57.	Revision	1	03/04/2025		TLM1		T1,T2	
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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
58.	Paired t-test	1	29/03/2025		TLM1	CO5	T1,T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (16-12-2024 TO 21-12-2024)								

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 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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):	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.

K.BHANULAKSHMI	**Dr. M. RAMI REDDY**	**Dr. A. RAMI REDDY**	**Dr. A. RAMI REDDY**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor: Mr. G. Rajendra

Course Name & Code : Operating Systems & 23CS06 **Section:** A

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

Program/Sem/Sec : B.Tech., IT., IV-Sem., **A.Y:** 2024-25

Pre-requisite: Computer Organization.

Course Objectives (COs):
The main objectives of the course is to make student
- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- Illustrate different conditions for deadlock and their possible solutions.

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

CO1: Understand the fundamental concepts, functions, and structures of operating systems, including their design, implementation, and the various types of system calls and services. **(Understand-L2)**

CO2: Understand process concepts, multithreading models, and CPU scheduling algorithms to effectively manage operations on processes, inter-process communication, and threading issues in operating systems. **(Understand-L2)**

CO3: Analyze synchronization tools, deadlock handling methods to solve critical section problems and ensure efficient process synchronization in operating systems. **(Apply-L3)**

CO4: Analyze different memory management techniques paging and segmentation to understand their suitability for various memory allocation scenarios. **(Apply-L3)**

CO5: Apply knowledge of file system structures and protection mechanisms to design and implement secure file management systems. **(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	1	1	2	3	-	-	-	-	1	-	3	2	2	2
CO2	2	2	1	-	-	-	-	-	-	-	-	-	2	3	2
CO3	1	2	1		-	-	-	-	-	-	-	-	2	3	2
CO4	2	1	1	-	-	-	-	-	-	-	-	-	2	2	-
CO5	2	2	2	-	3	-	-	-	-	-	-	-	-	3	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).

TEXTBOOKS:

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016

REFERENCE BOOKS:

1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw-Hill, 2013

Online Learning Resources:

1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

PART-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Operating Systems Overview

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 Course Outcomes and Program Outcomes Introduction to UNIT-I	1	09-12-2024		**TLM2**	
2.	Operating-System Functions	1	11-12-2024		**TLM2**	
3.	Operating System Operations, Computing Environments.	1	12-12-2024		**TLM2**	
4.	Free and Open-Source Operating Systems	1	13-12-2024		**TLM2**	
5.	System calls, Types of System Calls	1	16-12-2024		**TLM2**	
6.	**Tutorial-1**	1	18-12-2024		**TLM3**	
7.	System Programs, Operating System Design and Implementation.	1	19-12-2024		**TLM2**	
8.	Operating System Structure	1	20-12-2024		**TLM2**	
9.	Building and Booting an Operating System	1	21-12-2024		**TLM2**	
10.	Operating System debugging	1	23-12-2024		**TLM2**	
11.	**Tutorial-2**	1	26-12-2024		**TLM3**	
12.	**Assignment-1/ Quiz-1**	1	26-12-2024		**TLM6**	
No. of classes required to complete UNIT-I		12	No. of classes taken:			

UNIT-II: Processes, Threads and Concurrency, CPU Scheduling

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	**Processes:** Process Concept, Process Scheduling, Operations of Processes,	1	27-12-2024		**TLM2**	
14.	Inter-Process Communication	1	28-12-2024		**TLM2**	
15.	**Threads and Concurrency:** Multithreading Models, Thread libraries.	1	30-12-2024		**TLM2**	
16.	Threading issues.	1	02-01-2025		**TLM2**	
17.	**CPU Scheduling:** Basic Concepts, Scheduling Criteria.	1	03-01-2025		**TLM2**	
18.	Scheduling Algorithms (FCFS, SJF)	1	04-01-2025		**TLM2 TLM4**	
19.	Scheduling Algorithms (Priority)	1	06-01-2025		**TLM2 TLM4**	
20.	**Tutorial-3**	1	08-01-2025		**TLM3**	
21.	Scheduling Algorithms (Round Robin)	1	09-01-2025		**TLM2 TLM4**	
22.	Discuss various problems related to scheduling algorithms	1	10-01-2025		**TLM2 TLM4**	
23.	Multiple Processor Scheduling	1	20-01-2025		**TLM2**	
24.	**Tutorial-4**	1	22-01-2025		**TLM3**	
25.	**Assignment-2 / Quiz-2**	1	23-01-2025		**TLM6**	
No. of classes required to complete UNIT-II		13	No. of classes taken:			

(27-01-2025 TO 01-02-2025) I-MID EXAMS

UNIT-III: Synchronization Tools, Deadlocks

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.	The Critical-Section Problem	1	24-01-2025		**TLM2**	
27.	Peterson's Solution, Synchronization Hardware.	1	25-01-2025		**TLM2**	
28.	Mutex Locks, Semaphores.	1	03-02-2025		**TLM2**	
29.	Monitors, Classic Problems of Synchronization.	1	05-02-2025		**TLM2**	
30.	**Tutorial-5**	1	06-02-2025		**TLM3**	
31.	Deadlocks: System Model, Deadlock Characterization.	1	07-02-2025		**TLM2**	
32.	Methods for Handling Deadlocks.	1	10-02-2025		**TLM2**	
33.	Deadlock Prevention	1	12-02-2025		**TLM2**	
34.	Deadlock Avoidance, Deadlock Detection.	1	13-02-2025		**TLM2**	
35.	Recovery from Deadlock.	1	14-02-2025		**TLM2, TLM3**	
36.	**Tutorial-6**	1	17-02-2025		**TLM3 TLM6**	
37.	**Assignment-3 / Quiz-3**	1	19-02-2025		**TLM3 TLM6**	
No. of classes required to complete UNIT-III		11	No. of classes taken:			

UNIT-IV: Memory Management Strategies, Virtual Memory Management, Storage 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
38.	**Memory Management Strategies:** Introduction, Contiguous Memory Allocation.	1	20-02-2025		**TLM2**	
39.	Paging, Structure of the Page Table.	1	21-02-2025		**TLM2**	
40.	Swapping	1	24-02-2025		**TLM2**	
41.	**Tutorial-7**	1	27-02-2025		**TLM3**	
42.	**Virtual Memory Management:** Introduction	1	28-02-2025		**TLM2**	
43.	Demand Paging, Copy-on-Write	1	03-03-2025		**TLM2**	
44.	Page Replacement algorithms,	1	05-03-2025		**TLM2 TLM4**	
45.	Allocation of Frames, Thrashing.	1	06-03-2025		**TLM2**	
46.	Storage Management: Overview of Mass Storage Structure,	1	07-03-2025		**TLM2**	
47.	HDD Scheduling.	1	10-03-2025		**TLM2**	
48.	**Tutorial-8**	1	12-03-2025		**TLM3**	
49.	**Assignment-4 / Quiz-4**	1	13-03-2025		**TLM6**	
No. of classes required to complete UNIT-IV		12	No. of classes taken:			

UNIT-V: File System

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
50.	File System Interface: File Concept, Access methods	1	17-03-2025		**TLM2**	
51.	Directory Structure	1	19-03-2025		**TLM2**	
52.	File System Implementation: File-system structure, File-system Operations	1	20-03-2025		**TLM2**	
53.	Directory Implementation, Allocation Method	1	21-03-2025		**TLM2**	
54.	**Tutorial-9**	1	24-03-2025		**TLM3**	
55.	Free Space Management, File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.	1	26-03-2025		**TLM2**	
56.	Protection: Goals of protection, Principles of Protection	1	27-03-2025		**TLM2**	
57.	Protection Rings, Domain of Protection, Access matrix	1	28-03-2025		**TLM2**	
58.	**Tutorial-10 Assignment-4 / Quiz-4**	1	02-04-2025		**TLM3 TLM6**	
No. of classes required to complete UNIT-V		10	No. of classes taken:			

(07-04-2025 TO 12-04-2025) II-MID EXAMS

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	HOD Sign Weekly
59.	Multiprocessor Operating Systems	1	03-04-2025			
60.	Virtualization	1	04-04-2025			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Class Work	**09-12-2024**		
I Phase of Instructions	09-12-2024	25-01-2025	7 W
I Mid Examinations	**27-01-2025**	**01-02-2025**	**1 W**
II Phase of Instructions	03-02-205	05-04-2025	9 W
II Mid Examinations	**07-04-2025**	**12-04-2025**	1W
Preparation and Practical's	14-04-2025	19-04-2025	1W
Semester End Examinations	**21-04-2025**	**03-05-2025**	2W
Internship	05-05-2025	28-06-2025	6W

EVALUATION PROCESS:(R23 Regulations)

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III ,IV & V)	A2=5
II- Descriptive Examination (Unit-III ,IV & V)	M2=15
II-Quiz Examination (Unit-III ,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):

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.
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.
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.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1	Organize, Analyze, and interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs
PSO 3	Develop IT application services with the help of different current engineering tools.

Course Instructor	Module Coordinator	Course Coordinator	HOD
Mr. G. Rajendra	Mr. G. Rajendra		Dr. B. Srinivasa Rao

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor   **:** Mr Ch.sambasivarao
Course Name & Code   **:** Database Management Systems & 23CS03
L-T-P Structure   **: 3-0-0**   **Credits:** 3
Program/Sem/Sec   : B. Tech/IT/IV/A   **A.Y.:** 2024-25
PREREQUISITES   **:** Data Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

COURSE OUTCOMES (COs): After successful completion of the course the students are able to

CO1	**Understand the foundation of database management system and various data models. (Understand- L2)**
CO2	**Identify relational model concepts, implement various constraints, perform SQL queries and DML operations. (Understand-L2)**
CO3	**Apply SQL queries, functions, and work with nested queries, grouping, joins, views, and set operations. (Apply-L3)**
CO4	**Apply various normalization techniques for efficient data handling. (Apply-L3)**
CO5	**Understand Transaction management, recovery & indexing techniques. (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	2	-	-	-	-	-	-	-	-	2	3	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2	3	3	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	2	3	-
CO4	3	2	2	-	-	-	-	-	-	-	-	2	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	2	1	-	3
			1 - Low			**2 –**Medium				**3 -** High					

TEXTBOOKS:

T1	Database Management Systems, 3rd edition, Raghu Rama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
T2	Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

R1	Introduction to Database Systems, 8thedition, C J Date, Pearson.
R2	Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
R3	Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

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.	Database System characteristics	1	09-12-2024		TLM1,2	
2.	Database users	1	11-12-2024		TLM1,2	
3.	Advantages of database systems	1	13-12-2024		TLM1,2	
4.	Database applications	1	14-12-2024		TLM1,2	
5.	Data Models	2	16-12-2024 18-12-2024		TLM1,2	
6.	Schema	1	20-12-2024		TLM1,2	
7	Three tier schema architecture	2	21-12-2024 23-12-2024		TLM1,2	
8	Database structure	2	27-12-2024 28-12-2024		TLM1,2	
9	Centralized and Client server architecture for the database	2	30-12-2024 03-01-2025		TLM1,2	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Entity Relationship Model and Relational 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.	Introduction	1	04-01-2025		TLM1,2	
2.	Representation of entities	1	06-01-2025		TLM1,2	
3.	Attributes, Entity set, Relationship, Relationship set	2	08-01-2025 10-01-2025		TLM1,2	
4.	Constraints, Sub classes, Super class, Inheritance, Specialization	1	11-01-2025		TLM1,2	
5.	Generalization using ER Diagrams	1	20-01-2025		TLM1,2	
6.	Introduction to relational model	1	22-01-2025		TLM1,2	
7.	Concepts of domain, attribute, tuple, relation, importance of null values	1	24-01-2025		TLM1,2	
8.	Constraints (Domain, Key constraints, integrity constraints) and their importance	1	25-01-2025		TLM1,2	
9.	Relational Algebra Relational Calculus	3	01-02-2025 03-02-2025 05-02-2025		TLM1,2	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: 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
1.	BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update)	2	07-02-2025 08-02-2025		TLM1,2	
2.	SQL querying (select and project) using where clause, arithmetic & logical operations	2	10-02-2025 12-02-2025		TLM1,2	
3.	SQL functions (Date and Time, Numeric, String conversion)	2	14-02-2025 15-02-2025		TLM1,2	
4.	Creating tables with relationship, implementation of key and integrity constraints	2	17-02-2025 19-02-2025		TLM1,2	
5.	Nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.	4	21-02-2025 22-02-2025 24-02-2025 26-02-2025		TLM1,2	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Schema Refinement (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
1.	Purpose of Normalization or schema refinement	1	28-02-2025		TLM1,2	
2.	Concept of functional dependency	2	01-03-2025 03-03-2025		TLM1,2	
3.	Normal forms based on functional dependency Lossless join and dependency preserving decomposition	2	05-03-2025 07-03-2025		TLM1,2	
4.	1NF, 2NF and 3 NF, concept of surrogate key, Boyce- Codd normal form (BCNF)	2	08-03-2025 10-03-2025		TLM1,2	
5.	MVD, Fourth normal form(4NF)	2	12-03-2025 14-03-2025			
6.	Fifth Normal Form (5NF)	2	15-03-2025 17-03-2025			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Transaction Processing and Concurrency Control

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.	Transaction State, ACID properties	1	19-03-2025		TLM1,2	
2.	Concurrent Executions, Serializability, Recoverability	1	21-03-2025 22-03-2025		TLM1,2	
3.	Implementation of Isolation, Testing for Serializability	1	23-03-2025		TLM1,2	
4.	Two-Phase Locking Techniques for concurrency control: Types of Locks, Time stamp-based locking	2	24-03-2025 25-03-2025		TLM1,2	
5.	Recovery Concepts	1	26-03-2025		TLM1,2	
6.	No-UNDO/REDO Recovery Based on Deferred Update	1	28-03-2025		TLM1,2	
7.	Recovery Techniques Based on Immediate Update	1	29-03-2025		TLM1,2	

8.	Shadow Paging, ARIES	2	01-04-2025 02-04-2025		TLM1,2	
9.	Hash based Indexing	2	04-04-2025 05-04-2025		TLM1,2	

| **No. of classes required to complete UNIT-II: 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 (R20 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of 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 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.
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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. Ch.Sambasivarao	Dr. P.Bhagath	Dr K.Phaneendra	Dr. B.Srinivasa Rao
Signature				

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mr Ch.sambasivarao
Course Name & Code : Database Management Systems & 23CS03
L-T-P Structure : 3-0-0   **Credits:** 3
Program/Sem/Sec : B. Tech/IV/B   **A.Y.:** 2024-25
PREREQUISITES : Data Structures

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

COURSE OUTCOMES (COs): After successful completion of the course the students are able to

CO1	Understand the foundation of database management system and various data models. (Understand- L2)
CO2	Identify relational model concepts, implement various constraints, perform SQL queries and DML operations. (Understand-L2)
CO3	Apply SQL queries, functions, and work with nested queries, grouping, joins, views, and set operations. (Apply-L3)
CO4	Apply various normalization techniques for efficient data handling. (Apply-L3)
CO5	Understand Transaction management, recovery & indexing techniques. (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	2	-	-	-	-	-	-	-	-	2	3	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	2	3	3	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	2	3	-
CO4	3	2	2	-	-	-	-	-	-	-	-	2	2	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	2	1	-	3
	1 - Low				**2 –**Medium					**3 -** High					

TEXTBOOKS:

T1	Database Management Systems, 3rd edition, Raghu Rama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
T2	Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

REFERENCE BOOKS:

R1	Introduction to Database Systems, 8thedition, C J Date, Pearson.
R2	Database Management System, 6th edition, Ramez Elmasri, Shamkant B. Navathe, Pearson
R3	Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction

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.	Database System characteristics	1	10-12-2024		TLM1,2	
2.	Database users	1	11-12-2024		TLM1,2	
3.	Advantages of database systems	1	13-12-2024		TLM1,2	
4.	Database applications	1	14-12-2024		TLM1,2	
5.	Data Models	2	17-12-2024 18-12-2024		TLM1,2	
6.	Schema	1	20-12-2024		TLM1,2	
7	Three tier schema architecture	2	21-12-2024 24-12-2024		TLM1,2	
8	Database structure	2	27-12-2024 28-12-2024		TLM1,2	
9	Centralized and Client server architecture for the database	2	31-12-2024 03-01-2025		TLM1,2	
No. of classes required to complete UNIT-I: 13				**No. of classes taken:**		

UNIT-II: Entity Relationship Model and Relational 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.	Introduction	1	04-01-2025		TLM1,2	
2.	Representation of entities	1	07-01-2025		TLM1,2	
3.	Attributes, Entity set, Relationship, Relationship set	2	08-01-2025 10-01-2025		TLM1,2	
4.	Constraints, Sub classes, Super class, Inheritance, Specialization	1	11-01-2025		TLM1,2	
5.	Generalization using ER Diagrams	1	21-01-2025		TLM1,2	
6.	Introduction to relational model	1	22-01-2025		TLM1,2	
7.	Concepts of domain, attribute, tuple, relation, importance of null values	1	24-01-2025		TLM1,2	
8.	Constraints (Domain, Key constraints, integrity constraints) and their importance	1	25-01-2025		TLM1,2	
9.	Relational Algebra Relational Calculus	3	01-02-2025 04-02-2025 05-02-2025		TLM1,2	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		

UNIT-III: 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
1.	BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update)	2	07-02-2025 08-02-2025		TLM1,2	
2.	SQL querying (select and project) using where clause, arithmetic & logical operations	2	11-02-2025 12-02-2025		TLM1,2	
3.	SQL functions (Date and Time, Numeric, String conversion)	2	14-02-2025 15-02-2025		TLM1,2	
4.	Creating tables with relationship, implementation of key and integrity constraints	2	18-02-2025 19-02-2025		TLM1,2	
5.	Nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.	4	21-02-2025 22-02-2025 25-02-2025 26-02-2025		TLM1,2	
No. of classes required to complete UNIT-III: 12				**No. of classes taken:**		

UNIT-IV: Schema Refinement (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
1.	Purpose of Normalization or schema refinement	1	28-02-2025		TLM1,2	
2.	Concept of functional dependency	2	03-03-2025 04-03-2025		TLM1,2	
3.	Normal forms based on functional dependency Lossless join and dependency preserving decomposition	2	05-03-2025 07-03-2025		TLM1,2	
4.	1NF, 2NF and 3 NF, concept of surrogate key, Boyce- Codd normal form (BCNF)	2	08-03-2025 11-03-2025		TLM1,2	
5.	MVD, Fourth normal form(4NF)	2	12-03-2025 14-03-2025			
6.	Fifth Normal Form (5NF)	2	15-03-2025 18-03-2025			
No. of classes required to complete UNIT-IV: 11				**No. of classes taken:**		

UNIT-V: Transaction Processing and Concurrency Control

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.	Transaction State, ACID properties	1	19-03-2025		TLM1,2	
2.	Concurrent Executions, Serializability, Recoverability	1	21-03-2025 22-03-2025		TLM1,2	
3.	Implementation of Isolation, Testing for Serializability	1	25-03-2025		TLM1,2	
4.	Two-Phase Locking Techniques for concurrency control: Types of Locks, Time stamp-based locking	2	26-03-2025 28-03-2025		TLM1,2	
5.	Recovery Concepts	1	29-03-2025		TLM1,2	
6.	No-UNDO/REDO Recovery Based on Deferred Update	1	01-04-2025		TLM1,2	
7.	Recovery Techniques Based on Immediate Update	1	02-04-2025		TLM1,2	

8.	Shadow Paging, ARIES	1	03-04-2025		TLM1,2	
9.	Hash based Indexing	2	04-04-2025 05-04-2025		TLM1,2	
No. of classes required to complete UNIT-II: 11				**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)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO 7	**Environment and sustainability**: Understand the impact of 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 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.
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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. Ch.Sambasivarao	Dr. P.Bhagath	Dr K.Phaneendra	Dr. B.Srinivasa Rao
Signature				

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor   : CH SAMBASIVARAO
Course Name & Code   : Database Management Systems Lab (20CS56)
L-T-P Structure   : 0-0-3   Credits: 1.5
Program/Sem/Sec   : B.Tech., IT., IV-Sem., Sec-A   A.Y: 2024-25

Pre-Requisites   : Data Structures and Operating Systems

COURSE EDUCATIONAL OBJECTIVES (CEOs):: This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands

2. Declare and enforce integrity constraints on a database

3. Writing Queries using advanced concepts of SQL

4. Programming PL/SQL including procedures, functions, cursors and triggers

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

CO 1	Implement SQL queries using DDL/DML commands.(Apply-L3)
CO 2	Apply different Integrity constraints & Normalization techniques for effective database design. (Apply-L3)
CO 3	Implement PL/SQL including procedures, functions, cursors and triggers. .(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	PSO3
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
C04	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

PART-B
COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using the SELECT command	6	09-12-2024 16-12-2024		TLM4	
2	Queries (along with sub-Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example: - Select the roll number and name of the student who secured fourth rank in the class	6	23-12-2024 30-12-2024		TLM4	
3	Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views	3	06-01-2025		TLM4	
4	Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)	3	20-01-2025		TLM4	
5	Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception	3	3-02-2025		TLM4	

	can be raised if no records were found)						
6	Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block	3	10-02-2025			TLM4	
7	Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions	3	17-02-2025			TLM4	
8	Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT – IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR	3	24-02-2025			TLM4	
9	Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES	3	03-03-2025			TLM4	
10	Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions	3	10-03-2025			TLM4	
11	Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.	3	17-03-2025			TLM4	
12	Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers	3	24-03-2025			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

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 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 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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. Ch.Sambasivarao	Dr. P.Bhagath	Dr K.Phaneendra	Dr. B.Srinivasa Rao
Signature				

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor   : CH SAMBASIVARAO
Course Name & Code   : Database Management Systems Lab (20CS56)
L-T-P Structure   : 0-0-3   Credits: 1.5
Program/Sem/Sec   : B.Tech., IT., IV-Sem., Sec-B   A.Y: 2024-25

Pre-Requisites   **: Data Structures and Operating Systems**

COURSE EDUCATIONAL OBJECTIVES (CEOs):: This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands

2. Declare and enforce integrity constraints on a database

3. Writing Queries using advanced concepts of SQL

4. Programming PL/SQL including procedures, functions, cursors and triggers

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

CO 1	Implement SQL queries using DDL/DML commands.(Apply-L3)
CO 2	Apply different Integrity constraints & Normalization techniques for effective database design. (Apply-L3)
CO 3	Implement PL/SQL including procedures, functions, cursors and triggers. .(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	PSO3
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
C04	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

PART-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1	Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using the SELECT command	6	12-12-2024 19-12-2024		TLM4	
2	Queries (along with sub-Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example: - Select the roll number and name of the student who secured fourth rank in the class	6	26-12-2024 30-12-2024		TLM4	
3	Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views	3	02-01-2025		TLM4	
4	Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)	3	09-01-2025		TLM4	
5	Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception	3	23-01-2025		TLM4	

	can be raised if no records were found)					
6	Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block	3	06-03-2025		TLM4	
7	Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions	3	13-03-2025		TLM4	
8	Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT – IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR	3	20-03-2025		TLM4	
9	Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES	3	27-03-2025		TLM4	
10	Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions	3	06-04-2025		TLM4	
11	Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.	3	13-04-2025		TLM4	
12	Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers	3	20-04-2025 27-04-2025		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

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 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 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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. Ch.Sambasivarao	Dr. P.Bhagath	Dr K.Phaneendra	Dr. B.Srinivasa Rao
Signature				

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs.K.LAKSHMI DEVI
Course Name & Code : SOFTWARE ENGINEERING & 23IT02
L-T-P Structure : 3-0-0 **Credits:** 3
Program/Sem/Sec : B.Tech/IV SEM /A **A.Y.:** 2024-25
Regulations : R23

PREREQUISITE: Object Oriented Programming
COURSE EDUCATIONAL OBJECTIVES (CEOs):

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

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

CO1	Understanding the Evolution in Software Development and Implementation of Modern Software Development Practices (**Understand - L2**)
CO2	Understand Software Project Management and Requirements Analysis Techniques. **(Understand - L2)**
CO3	Demonstrate Effective Software Design and Agile Practices. **(Apply - L3)**
CO4	Apply Coding, Testing, and Quality Management Practices.**(Apply - L3)**
CO5	Apply the usage of CASE tools, Software Maintenance process and Software Reuse. **(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	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	-	3	-
CO3		2	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	2	2	-	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	3	3

TEXTBOOKS:

T1	Fundamentals of Software Engineering, Rajib Mall, 5th Edition
T2	Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition

REFERENCE BOOKS:

R1	Software Engineering, Ian Sommerville, 10thEdition, Pearson
R2	Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
R3	https://nptel.ac.in/courses/106/105/106105182/
R4	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
R5	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Introduction & Software Life Cycle Models

S. No.	Topics to be Covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Software Engineering & Evolving role of Software	2	10/12/24 11/12/24		TLM1, 2	
2.	Software Development projects	1	13/12/24		TLM1, 2	
3.	Exploratory style of software developments	1	14/12/24		TLM1, 2	
4.	Emergence of software engineering	1	17/12/24		TLM1, 2	
5.	Notable changes in software development practices	1	18/12/24		TLM1, 2	
6.	Computer system engineering.	1	20/12/24		TLM1, 2	
7.	Software Life Cycle Models. Basic concepts	1	21/12/24		TLM1, 2	
8.	Waterfall model and its extensions.	1	24/12/24		TLM1, 2	
9.	Rapid application development	1	27/12/24		TLM1, 2	
10.	**Tutorial:** Agile development model.	1	28/30/12		TLM3	
11.	Spiral Model.	1	31/12/24		TLM1, 2	
				No. of classes taken:		
No. of classes required to complete UNIT-I: 12				No of Tutorials Taken:		

UNIT-II: Software Project 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
12.	Software project management complexities	1	03/01/25		TLM1,2	
13.	Responsibilities of a software project manager	1	04/01/25		TLM1,2	
14.	Metrics for project size estimation Project estimation techniques	2	04/01/25 07/01/25		TLM1,2	
15.	Empirical Estimation techniques, COCOMO	1	08/01/25		TLM1,2	
16.	Halstead's software science, risk management.	2	10/01/25 11/01/25		TLM1,2	
17.	Requirements Analysis and Specification	1	17/01/25		TLM1,2	
18.	Software Requirements Specification (SRS)	1	18/01/25		TLM1,2	
19.	Axiomatic specification,	1	21/01/25		TLM1,2	
20.	Executable specification and 4GL.	1	22/01/25		TLM1,2	
21.	**Tutorial:** Algebraic specification	1	25/01/25		TLM3	
No. of classes required to complete UNIT-II: 12				**No. of classes taken:**		
				No of Tutorials Taken:		

UNIT-III: Software Design:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Software Design Overview of the design process	1	04/02/25		TLM1,2	
23.	How to characterize a good software design?	1	05/02/25		TLM1,2	
24.	Layered arrangement of modules, Cohesion and Coupling	1	07/02/25		TLM1,2	
25.	Approaches to software design	1	08/02/25		TLM1,2	
26.	Agility and the Cost of Change, Agile Process	1	11/02/25		TLM1,2	
27.	Extreme Programming (XP), Other Agile Process Models	1	12/02/25		TLM1,2	
28.	Tool Set for the Agile Process	1	14/02/25		TLM1,2	
29.	Function-Oriented Software Design: Overview of SA/SD methodology	1	15/02/25		TLM1,2	
30.	Structured analysis, Developing the DFD model of a system	1	18/02/25		TLM1,2	
31.	Structured design, Detailed design, and Design Review	1	19/02/25		TLM1,2	
32.	User Interface Design: Characteristics of a good user interface	1	21/02/25		TLM1,2	
33.	Basic concepts, Types of user interfaces	1	22/02/25		TLM1,2	
34.	Fundamentals of component-based GUI development	1	25/02/25		TLM1,2	
35.	user interface design methodology.	1	28/02/25		TLM1,2	
36.	ASSIGNMENT-3		28/02/25		TLM3	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Coding and Testing:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
37.	Coding, Code review	1	01/03/25		TLM1,2	
38.	Software documentation, Testing.	1	04/03/25		TLM1,2	
39.	Black-box testing	1	05/03/25		TLM1,2	
40.	White-Box testing	1	07/03/25		TLM1,2	
41.	Debugging, Program analysis tools	1	08/03/25		TLM1,2	
42.	Integration testing	1	11/03/25		TLM1,2	
43.	Testing object-oriented programs	1	12/03/25		TLM1,2	
44.	Smoke testing, and some general issues associated with testing.	1	15/03/25		TLM1,2	
45.	Software Reliability and Quality Management: Software reliability	1	18/03/25		TLM1,2	
46.	Software quality management system	1	19/03/25		TLM1,2	
47.	ISO 9000.SEI Capability maturity model	1	21/03/25		TLM1,2	
48.	**Tutorials:** Few other important quality standards, and Six Sigma.	1	22/03/25		TLM1,2	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		
				No of Tutorials Taken:		

UNIT-V: Computer-Aided Software Engineering(CASE)

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
49.	Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment.	1	25/3/25		TLM1,2	
50.	CASE support in the software life cycle and other characteristics of CASE tools	1	26/3/25		TLM1,2	
51.	Towards second generation CASE Tool, Architecture of a CASE Environment.	1	28/03/25		TLM1,2	
52.	Software Maintenance: Characteristics of software maintenance, Software reverse engineering	1	29/3/25		TLM1,2	
53.	Software maintenance process models and Estimation of maintenance cost.	1	01/04/25		TLM1,2	
54.	Software Reuse: reuse-definition, Introduction.	1	02/04/25		TLM1,2	
55.	Reason behind no reuse so far, Basic issues in any reuse program	1	04/04/25		TLM1,2	
56.	A reuse approach and Reuse at organization level.	1	05/04/25		TLM1,2	
57.	ASSIGNMENT-5		05/04/25		TLM3	
No. of classes required to complete UNIT-V: 08				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	HOD Sign Weekly
1.	Emerging Technologies in Software Engineering	1	29/03/25		TLM6	

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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I,II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (Unit-III, IV & V)	M2=15
II-Quiz Examination (Unit-III, 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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs..
PSO 3	Develop IT application services with the help of different current engineering tools..

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mrs.K.Lakshmi Devi	Dr. J.Nageswara Rao	Mr.G.Rajendra	Dr. B.Srinivasa Rao
Signature				

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, KRISHNA DIST., A.P.-521 230.
http://lbrce.ac.in/it/index.php, hodit@lbrce.ac.in , Phone: 08659-222933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor	: **Dr. B. SRINIVASA RAO**		
Course Name & Code	: **PYTHON PROGRAMMING & 23CSS1**		
L-T-P Structure	: **0-1-2**	Credits	: **2**
Program/Semester/Section	: **B.Tech / IT / III / A**	A.Y.	: **2024-25**

PREREQUISITE: INTRODUCTION TO PROGRAMMING

COURSE EDUCATIONAL OBJECTIVE:

The main objectives of the course are to

1. Introduce core programming concepts of Python programming language.

2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries

3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

COURSE OUTCOMES (CO):

CO1:	Implement the core programming concepts of Python programming language.	**(Apply-L3)**
CO2:	Demonstrate about Python data structures like Lists, Tuples, Sets and Dictionaries	**(Apply-L3)**
CO3:	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications.	**(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	3	2	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	-	1	1	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	2	2
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

PART-B:

COURSE DELIVERY PLAN (LESSON PLAN):

S.No.	Topic to be covered	Number of Hours	Tentative Date of Completion	Actual Date of Completion	HOD Signature
1.	**UNIT- I:** Introduction- Course Outcomes, History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution	1	10-12-2024		
2.	Installing and Using Jupiter Notebook. Introduction to Python, Variables, Data types, Reading Input, Print output, Comments, Types of operators	3	13-12-2024		
3.	Operators, Type Conversions	1	17-12-2024		
4.	Working on operators, Sample Programs, Type Conversion	3	20-12-2024		
5.	Control statements – if, else, nested if, elif	1	24-12-2024		
6.	Introduction to Loop Statements while and for, Programs on Conditional Control Structures and Iterative Control Structures.	3	27-12-2024		
7.	continue and break statements, Exception Handling	1	31-12-2024		
8.	Programs on exception Handling, Quiz on UNIT-I	3	03-01-2025		
9.	**UNIT-II:** Function Definition and Calling the function, return Statement	1	07-01-2025		
10.	Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments, Recursive Functions, Sample programs.	3	10-01-2025		
11.	Strings Introduction, Basic String Operations	1	21-01-2024		
12.	Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings., Sample Programs on strings	3	24-01-2024		
13.	List introduction, operations	1	04-02-2024		

#	Topic	Periods	Date		
14.	Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement., Programs on Lists, Quiz on UNIT-II	3	07-02-2025		
15.	**UNIT-III:** Introduction to Dictionaries, Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries	1	11-02-2025		
16.	Sample programs on dictionaries.	3	14-02-2025		
17.	Creating Tuples, Basic Tuple Operations, tuple() Function, Tuple Indexing and Slicing,	1	17-02-2025		
18.	Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset., Sample Programs on sets, tuples.	3	21-02-2025		
19.	**UNIT-IV** - Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files	1	25-02-2025		
20.	Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules , Sample Programs	3	28-02-2025		
21.	Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python	1	03-03-2025		
22.	Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation,	3	07-03-2025		
23.	Inheritance, Polymorphism.	1	11-03-2025		
24.	Sample Programs on Unit-IV	3	17-03-2025		
25.	**UNIT-V:** Introduction to Data Science: Functional Programming	1	21-03-2025		
26.	JSON and XML in Python	1	24-03-2025		
27.	NumPy with Python, Pandas. Sample Programs, QUIZ on UNIT-V	3	28-03-2025		
28.	Revision	1	01-04-2025		
29.	Internal Exam	3	04-04-2025		

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment (CIA)	30
Procedure	20
Execution & Results	30
Viva-voce	20
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

PART-D

PROGRAMME 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 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):

PSO1	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	**Dr. B. Srinivasa Rao**	**Dr. B. Srinivasa Rao**	**Dr. K. Phaneendra**	**Dr. B. Srinivasa Rao**
Signature				

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, KRISHNA DIST., A.P.-521 230.

PART-A

DEPARTMENT OF INFORMATION TECHNOLOGY

Name of Course Instructor   : **MRS J GEETHARENUKA**
Course Name & Code   : **23ME57-DESIGN THINKING & INNOVATION**
Regulation   : **R23**
L-T-P Structure   : **1-0-2**   Credits **: 2**
Program/Semester/Section   : **B.Tech.–IT/IV Semester A section**   A.Y.   **: 2024-25**
PRE-REQUISITE**: None**

COURSE EDUCATIONAL OBJECTIVE (CEO):

Bring awareness on innovative design and new product development.

- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

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

CO1:	Apply fundamental design components, principles, and new materials to create and improve design projects.	Applying-L3
CO2:	Apply the design thinking process to develop and present innovative product solutions.	Applying-L3
CO3:	Analyze the relationship between creativity and innovation, evaluate their roles in organizations, and develop strategic plans for transforming creative ideas into innovative solutions.	Analyzing-L4
CO4:	Analyze to work in a multidisciplinary environment.	Analyzing-L4
CO5:	Apply design thinking principles to address business challenges, develop and test business models and prototypes, and evaluate the value of creativity.	Evaluating-L5

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

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

TEXTBOOKS:

T1: Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
T2: Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

REFERENCE BOOKS:

R1: David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
R2: Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
R3: William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.

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.
	UNIT - I INTRODUCTION TO DESIGN THINKING					
1.	Introduction to elements and principles of Design, Fundamental design components. **Activity**: To understand the importance of design	3	12-12-2024		TLM2 TLM6	
2.	Basics of design-dot, line, shape, form as fundamental design components **Activity**: Developing sketches using dot, line and form	3	19-12-2024		TLM2 TLM6	
3.	History of Design Thinking, New materials in Industry. **Activity:** To understand the importance of team work	3	26-12-2024		TLM2 TLM6	
	UNIT - II DESIGN THINKING					
4.	Process Design thinking process (empathize, analyze, idea & prototype) Design thinking process: Empathy **Activity**: To understand the significance of Empathy	3	02-01-2025		TLM2 TLM6	
5.	Design thinking process: Define or Analyze **Activity:** To understand the significance of Define/analyze.	3	09-01-2025		TLM2 TLM6	
6.	Design thinking process: Ideate, prototype **Activity:** To understand the significance of Ideate ,Prototype.	3	23-01-2025		TLM2 TLM6	
7.	Tools of design thinking in social innovations **Activity:** Students should present their understanding of DTI elements using example	3	06-02-2025		TLM2 TLM6	
	UNIT - III INNOVATION					
8.	Art of innovation, Difference between innovation and creativity, Role of creativity and innovation in organizations. **Activity**: Debate on innovation and creativity ,Flow and planning from idea to innovation	3	13-02-2025		TLM2 TLM6	
8.	Teams for innovation, Measuring the impact and value of creativity. **Activity:** Debate on value-based innovation.	3	20-02-2025		TLM2 TLM6	
	UNIT - IV PRODUCT DESIGN					
9.	Problem formation, introduction to product design, Product strategies, Product value **Activity:** Importance of modeling, how to set specifications,	3	27-02-2025		TLM2 TLM6	

10.	Product planning, product specifications. Innovation towards product design Case studies. **Activity:** Explaining their own product design.	3	06-03-2025		TLM2 TLM6	

UNIT V DESIGN THINKING IN BUSINESS PROCESSES DESIGN

11.	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes **Activity:** Marketing strategies of our own product, its maintenance, Reliability and plan for startup	3	20-03-2025		TLM2 TLM6	
	Redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, **Activity:** How to market our own product, about maintenance, Reliability and plan for startup.	3	27-03-2025		TLM2 TLM6	
	Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes. **Activity:** How to market our own product, about maintenance, Reliability and plan for startup.	3	03-04-2025		TLM2 TLM6	

I Mid Exams: 27-01-2025 to 01-02-2025	
II Mid Exams: 07-04-2025 to 12-04-2025	
No. of classes required to complete: 36	**No. of classes taken:**

Delivery 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 (R23 Regulation):

Evaluation Task	Marks
Internal Examination	30
Semester End Examination	70
Total Marks:	**100**

ACADEMIC CALENDAR:-

Commencement of IV Semester Classwork	09-12-2024		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	09-12-2024	25-01-2025	7 W
I Mid Examinations	27-01-2025	01-02-2025	1 W
II Phase of Instructions	03-02-2025	05-04-2025	9 W
II Mid Examinations	07-04-2025	12-04-2025	1 W
Preparation and Practicals	14-04-2025	19-04-2025	1 W
Semester End Examinations	21-04-2025	03-05-2025	2 W
Internship	05-05-2025	28-06-2025	8 W
Commencement of V Semester Classwork	**30 –06–2025**		

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	Organize, Analyze and Interpret the data to extract meaningful conclusions.
PSO 2	Design, Implement and Evaluate a computer-based system to meet desired needs.
PSO 3	Develop IT application services with the help of different current engineering tools.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty				
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (Under Tier - I), ISO 21001:2018,50001:2018,14001:2015
Certified Institution
Approved by AICTE, New Delhi. and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
Phone: 08659-222933, Fax: 08659-222931

FRESHMAN ENGINEERING DEPARTMENT
COURSE HANDOUT
Part-A

PROGRAM	**:** II B. Tech., IV-Sem., IT-A
ACADEMIC YEAR	**:** 2024-25
COURSE NAME & CODE	**:** Environmental Science
L-T-P STRUCTURE	**:** 2-0-0
COURSE CREDITS	**:** 0
COURSE INSTRUCTOR	**:** Dr. Shaheda Niloufer
COURSE COORDINATOR	**:** Dr. Shaheda Niloufer
PRE-REQUISITES	**:** biology, chemistry, geology, mathematics or physics

Course Objectives:

1	To enlighten the learners in the concept of differential equations and multivariable calculus
2	To furnish the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real-world applications.

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

CO 1	The necessity of resources, their exploitation and sustainable management	L2
CO 2	The interactions of human and ecosystems and their role in the food web in the natural world and the global biodiversity, threats to biodiversity and its conservation.	L2
CO 3	Environmental problems like pollution, disasters and possible solutions.	L1
CO 4	The importance of environmental decision making in organizations through understanding the environmental law and environmental audits.	L2
CO 5	Environmental issues like over population, human health etc related to local, regional and global levels.	L2

Course Articulation Matrix - Correlation between COs, POs & PSOs

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

Correlation Levels: **1**-Slight (Low), **2**-Moderate (Medium), **3**-Substantial (High) and No correlation: **'-'**

Textbooks (T) and References (R):

T1: Erach Bharucha,Text book of Environmental Studies for Undergraduate Courses,Universities Press (India) Private Limited, 2019.

T2: Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.

T3: S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.

T4: K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

R1. KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.

R2. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.

R3. M.Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.

R4. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.

R5. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.

R6. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.

R7. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	11-12-2024		TLM2			
2.	Multidisciplinary Nature of Environmental Studies	1	12-12-2024		TLM2			

UNIT-I: Multidisciplinary Nature of Environmental Studies

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
3.	Natural Resources – Forest resources	1	18-12-2024		TLM1	CO1	T1,T2	
4.	Water resources	1	19-12-2024		TLM1	CO1	T1,T2	
5.	Mineral resources & Food resources	1	26-12-2024		TLM1	CO1	T1,T2	
6.	Energy resources	1	02-01-2025		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystem & Biodiversity

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
7.	Ecosystems – Structure & Functions	1	08-01-2025		TLM1	CO1	T1,T2	
8.	Ecological succession & Food chains, Food webs & Ecological Pyramids	1	09-01-2025		TLM1	CO1	T1,T2	
9.	Types of ecosystems	1	16-01-2025		TLM1	CO1	T1,T2	

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
10.	Biodiversity – introduction, levels, biogeographic classification,	1	22-01-2025		TLM1	CO1	T1,T2	
11.	Values of Biodiversity, India as mega diversity nation		23-01-2025					
12.	I MID		29-01-2025					
13.	I MID	1	30-01-2025		TLM1	CO1	T1,T2	
14.	Threats to biodiversity & Conservation of biodiversity	1	05-02-2025		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-II		06			No. of classes taken:			

I MID EXAMINATIONS (27-01-2025 TO 01-02-2025)

UNIT-III: Environmental pollution

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
15.	Environmental pollution -Air pollution	1	06-02-2025		TLM1	CO2	T1,T2	
16.	Water pollution, Marine pollution, Thermal pollution	1	12-02-2025		TLM1	CO2	T1,T2	
17.	Soil pollution	1	13-02-2025		TLM1	CO2	T1,T2	
18.	Noise pollution & Nuclear Hazards	1	19-02-2025		TLM1	CO2	T1,T2	
19.	Solid waste management. Disaster Management	1	20-02-2025		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-III		05			No. of classes taken:			

UNIT-IV: Social issues & Environment

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
20.	From Unsustainable to Sustainable development	1	27-02-2025		TLM1	CO3	T1,T2	
21.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	05-03-2025		TLM1	CO3	T1,T2	
22.	Environmental ethics, Climate change	1	06-03-2025		TLM1	CO3	T1,T2	
23.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	12-03-2025		TLM1	CO3	T1,T2	
24.	Environmental Acts	1	19-03-2025		TLM1	CO3	T1,T2	

No. of classes required to complete UNIT-IV	05	No. of classes taken:

UNIT-V: Human population & Environment

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
25.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	20-03-2025		TLM1	CO4	T1,T2	
26.	Environment and human health –Human Rights – Value Education	1	26-03-2025		TLM1	CO4	T1,T2	
27.	HIV/AIDS – Women and Child Welfare	1	27-03-2025		TLM1	CO4	T1,T2	
28.	Role of information Technology in Environment and human health	1	02-04-2025		TLM1	CO4	T1,T2	
29.	Revision	1	03-04-2025		TLM1	CO4	T1,T2	
30.	II MID	1	09-04-2025					
31.	II MID	1	10-04-2025					
No. of classes required to complete UNIT-V		05		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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
32.	Case studies	2	08-02-2025 13-03-2025		TLM2	CO2	T1,T2	
No. of classes		2		No. of classes taken:				
II MID EXAMINATIONS (07-04-2025 TO 12-04-2025)								

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 (R23 Regulation):

Evaluation Task	Marks
Assignment-I (Units-I, II)	A1=5
I-Descriptive Examination (Units-I, II)	M1=15
I-Quiz Examination (Units-I, II)	Q1=10
Assignment-II (Unit-III, IV & V)	A2=5
II- Descriptive Examination (UNIT-III, IV & V)	M2=15
II-Quiz Examination (UNIT-III, 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):	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.

Dr. Shaheda Niloufer	Dr. Shaheda Niloufer	**Dr. Shaheda Niloufer**	**Dr. A. RAMI REDDY**
Course Instructor	Course Coordinator	Module Coordinator	HOD