LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAAC with 'A' Grade& NBA (Under Tier - I)
An ISO 21001:2018,14001:2015,50001:2018 Certified Institution
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B. REDDY NAGAR, MYLAVARAM, NTR DIST., A.P.-521 230.
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.M.S.Giridhar
Course Name : Optimization Techniques **Course Code :** 23ME09
Credits: 3 **L-T-P Structure:** 2-0-0
Program/Sem/Sec : B.Tech/IV Semester – IT Section-A **A.Y.** : 2025-26

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	2	1									1				
CO2	3	2	2									1				
CO3	3	2										1				
CO4	3	2										1				
CO5	3	2										1				

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	01-12-2025		TLM1	
2.	Statement of an Optimization problem, design vector, design constraints	2	04-12-2025, 04-12-2025		TLM2	
3.	Constraint surface, objective function, objective function surfaces	1	08-12-2025		TLM1	
4.	Classification of Optimization problems. Single variable Optimization	2	11-12-2025 11-12-2025		TLM2	
5.	Multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum	2	15-12-2025 18-12-2025		TLM1	
6.	Multivariable Optimization with equality constraints.	1	18-12-2025		TLM1	
7.	Solution by method of Lagrange multipliers	1	22-12-2025		TLM1	
8.	multivariable Optimization with inequality constraints	1	29-12-2025		TLM1	
9.	Kuhn – Tucker conditions	1	01-01-2026		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	01-01-2026 05-01-2026		TLM2	
11.	geometry of linear programming problems	2	08-01-2026 08-01-2026		TLM2	
12.	definitions and theorems	1	12-01-2026		TLM1	
13.	solution of a system of linear simultaneous equations	2	19-01-2026 22-01-2026		TLM1	
14.	pivotal reduction of a general system of equations	2	22-01-2026 02-02-2026		TLM1	
15.	motivation to the simplex method	2	05-02-2026 05-02-2026		TLM1	
16.	simplex algorithm.	2	09-02-2026 12-02-2026		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	12-02-2026 16-02-2026		TLM2	
18.	least cost method and Vogel's approximation method	2	19-02-2026 19-02-2026		TLM1	
19.	testing for optimality of balanced transportation problems	2	23-02-2026 26-02-2026		TLM1	

20.	Special cases in transportation problem.	2	26-02-2026 02-03-2026		TLM2	
21.		1	05-03-2026		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	09-03-2026 12-03-2026		TLM1	
23.	Univariate method, steepest descent method.	2	12-03-2026 16-03-2026		TLM2	
24.	Constrained cases– Characteristics of a constrained problem	1	19-03-2026		TLM1	
25.	Classification, Basic approach of Penalty Function method	2	19-03-2026 23-03-2026		TLM1	
26.	Basic approaches of Interior penalty function methods.	1	26-03-2026		TLM2	
27.	Basic approaches of Exterior penalty function methods.	1	26-03-2026		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	30-03-2026		TLM1	
29.	Dynamic programming multistage decision types	1	02-04-2026		TLM2	
30.	Dynamic programming concept of sub optimization and the principle of optimality	1	02-04-2026		TLM1	
31.	Computational procedure in dynamic programming,	1	13-04-2026		TLM2	
32.	examples illustrating the calculus method of solution	2	16-04-2026 16-04-2026		TLM1	
No. of classes required to complete UNIT-V: 06				**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 2025-26

Description	From	To	Weeks
I Phase of Instructions	01-12-2025	24-01-2026	7W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1 W**
II Phase of Instructions	02-02-2026	04-04-2026	9W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1 W**
Preparation and Practical	13-04-2026	18-04-2026	1 W
Semester End Examinations	**20-04-2026**	**02-05-2026**	**2 W**
Internship	**04-05-2026**	**27-06-2026**	**8 W**

Signature				
Name of the Faculty	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.G.Nageswara Rao**	**Dr.P.Sobharani**
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., II-Sem., IT A
ACADEMIC YEAR : 2025 - 26
COURSE NAME & CODE : PROBABILITY & STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr. D. Vijay Kumar
COURSE COORDINATOR: Dr. D. Vijay Kumar
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.	Introduction class	1	1/12/2025		TLM1	CO1	T1,T2	
2.	Syllabus Co's, PO's	1	3/12/2025		TLM1	CO1	T1,T2	
3.	Unit-1, Introduction to data science	1	6/12/2025		TLM2	CO1	T1,T2	
4.	Statistics- Population and sample, Collection of data	1	8/12/2025		TLM1	CO1	T1,T2	
5.	Types of variables, Data Visualization	1	10/12/2025		TLM1	CO1	T1,T2	
6.	Measures of central tendency, A.M	1	13/12/2025		TLM1	CO1	T1,T2	
7.	Median, Mode problems	1	15/12/2025		TLM1	CO1	T1,T2	
8.	Measures of variability Range, Mean deviation	1	17/12/2025		TLM3	CO1	T1,T2	
9.	S.D. & Q D	1	20/12/2025		TLM1	CO1	T1,T2	
10.	Skewness, Kurtosis	1	22/12/2025		TLM1	CO1	T1,T2	
11.	TUTORIAL - I	1	24/12/2025		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
1.	Correlation, types	1	27/12/2025		TLM1	CO2	T1,T2	
2.	Coefficient of correlation	1	29/12/2025		TLM1	CO2	T1,T2	
3.	Problems	1	31/12/2025		TLM1	CO2	T1,T2	
4.	Rank correlation	1	03/01/2026		TLM3	CO2	T1,T2	
5.	Linear regression (lines)	1	05/01/2026		TLM1	CO2	T1,T2	
6.	Multiple regression	1	07/01/2026		TLM1	CO2	T1,T2	
7.	Regression coefficients	1	10/01/2026		TLM1	CO2	T1,T2	
8.	Properties, problems	1	19/01/2026		TLM1	CO2	T1,T2	
9.	Fitting of parabola	1	21/01/202		TLM1	CO2	T1,T2	
10.	Fitting of power curve, Exponential curve	1	24/01/2026		TLM1	CO2	T1,T2	
11.	TUTORIAL - II	1	23/01/2026		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-II		11			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

UNIT-III: Probability and Distributions

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	Text Book	HOD Sign

		Required	Completion	Completion	Methods	COs	followed	Weekly
1.	Probability, Introduction	1	03/02/2026		TLM1	CO3	T1,T2	
2.	Conditional probability	1	02/02/2026		TLM1	CO3	T1,T2	
3.	Bayes' theorem	1	04/02/2026		TLM1	CO3	T1,T2	
4.	Random variables, Expectations	1	07/02/2026		TLM1	CO3	T1,T2	
5.	Problems on PMF, PDF	1	09/02/2026		TLM1	CO3	T1,T2	
6.	Mathematical Expectations and Variance	1	11/02/2026		TLM1	CO3	T1,T2	
7.	Binomial distribution	1	14/02/2026		TLM1	CO3	T1,T2	
8.	Poisson distribution	1	16/02/2026		TLM1	CO3	T1,T2	
9.	Uniform distribution	1	18/02/2026		TLM1	CO3	T1,T2	
10.	Normal distribution	1	21/02/2026		TLM1	CO3	T1,T2	
11.	TUTORIAL - III	1	20/02/2026		TLM3	CO3	T1,T2	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: Sampling Theory

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	1	23/02/2026		TLM1	CO4	T1,T2	
2.	Sampling distribution, definitions	1	25/02/2026		TLM1	CO4	T1,T2	
3.	Sampling distribution of mean, variance	1	28/02/2026		TLM1	CO4	T1,T2	
4.	Problems	1	24/02/2026		TLM1	CO4	T1,T2	
5.	Problems on central limit theorem	1	02/03/2026		TLM1	CO4	T1,T2	
6.	Estimation	1	07/03/2026		TLM1	CO4	T1,T2	
7.	Normal theory distributions	1	09/03/2026		TLM1	CO4	T1,T2	
8.	Estimation using t distribution	1	11/03/2026		TLM1	CO4	T1,T2	
9.	Estimation using χ^2 distribution	1	14/03/2026		TLM1	CO4	T1,T2	
10.	Estimation using F-distributions	1	16/03/2026		TLM1	CO4	T1,T2	
11.	TUTORIAL - IV	1	13/03/2026		TLM3			
No. of classes required to complete UNIT-IV		11			No. of classes taken:			

UNIT-V: Tests of Hypothesis

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.	Testing of Hypothesis definitions	1	18/03/2026		TLM1	CO5	T1,T2	
2.	Z-test for means	1	23/03/2026		TLM1	CO5	T1,T2	

3.	Z-test for means	1	25/03/2026		TLM1	CO5	T1,T2	
4.	Z-test for proportions	1	28/03/2026		TLM1	CO5	T1,T2	
5.	Z-test for proportions	1	28/03/2026		TLM1	CO5	T1,T2	
6.	t-test for means	1	30/03/2026		TLM1	CO5	T1,T2	
7.	t-test for means	1	30/03/2026		TLM1	CO5	T1,T2	
8.	F-test for variances	1	01/04/2026		TLM3	CO5	T1,T2	
9.	χ^2-test for goodness of fit	1	01/04/2026		TLM1	CO5	T1,T2	
10.	χ^2-test for independence of attributes	1	04/04/2026		TLM1	CO5	T1,T2	
11.	TUTORIAL - V	1	03/04/2026		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)

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):	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	**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.

Dr. D. Vijay Kumar	Dr. D. Vijay Kumar	**Dr. A. Rami Raddy**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor: Mrs. M.Hemalatha

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:** 2025-26

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:

CO	Description	BL
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	02-12-2025		**TLM2**	
2.	Operating-System Functions	1	03-12-2025		**TLM2**	
3.	Operating System Operations	1	04-12-2025		**TLM2**	
4.	Computing Environments, Free and Open-Source Operating Systems	1	05-12-2025		**TLM2**	
5.	Operating System Services, user and OS Interface,	1	09-12-2025		**TLM2**	
6.	**Tutorial on OS functions, Operations , Services**	1	10-12-2025		**TLM3**	
7.	System calls, Types of System Calls	1	11-12-2025		**TLM2**	
8.	System Programs, Operating System Design and Implementation.	1	12-12-2025		**TLM2**	
9.	**Tutorial on System Calls**	1	16-12-2025		**TLM3**	
10.	Operating System Structure	1	17-12-2025		**TLM2**	
11.	Building and Booting an Operating System	1	18-12-2025		**TLM2**	
12.	Operating System debugging	1	19-12-2025		**TLM2**	
13.	**Tutorial on OS Structure Assignment-1/ Quiz-1**	1	23-12-2025		**TLM3**	
No. of classes required to complete UNIT-I		13	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
14.	Process Concept, Process Scheduling, Operations of Processes.	1	24-12-2025		**TLM2**	
15.	Inter-Process Communication	1	25-12-2025		**TLM2**	
16.	Multithreading Models, Thread libraries, Threading issues.	1	26-12-2025		**TLM2**	
17.	**Tutorial on IPC**	1	30-12-2025		**TLM3**	
18.	CPU Scheduling Basic Concepts, Scheduling Criteria. FCFS	1	31-12-2025		**TLM2**	
19.	Scheduling Algorithms SJF , Priority	1	02-01-2026		**TLM2 TLM4**	
20.	**Tutorial on Non Preemptive scheduling Algorithms**	1	06-01-2026		**TLM3**	
21.	Scheduling Algorithms Priority , Round Robin	1	07-01-2026		**TLM2 TLM4**	
22.	Discuss various problems related to scheduling algorithms	1	08-01-2026		**TLM2 TLM4**	
23.	Multiple Processor Scheduling	1	09-01-2026		**TLM2**	
24.	**Tutorial-4 preemptive scheduling Algorithms**	1	20-01-2026		**TLM3**	
25.	**Assignment-2 / Quiz-2**	1	21-01-2026		**TLM3**	
No. of classes required to complete UNIT-II		12	No. of classes taken:			

(26-01-2026 TO 31-01-2026) 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	03-02-2026		**TLM2**	
27.	Peterson's Solution, Synchronization Hardware.	1	04-02-2026		**TLM2**	
28.	Mutex Locks, Semaphores.	1	05-02-2026		**TLM2**	
29.	Monitors, Classic Problems of Synchronization.	1	06-02-2026		**TLM2**	
30.	**Tutorial - On Critical Section Problems.**	1	10-02-2026		**TLM3**	
31.	Deadlocks: System Model, Deadlock Characterization.	1	11-02-2026		**TLM2**	
32.	Methods for Handling Deadlocks.	1	12-02-2026		**TLM2**	
33.	Deadlock Prevention	1	13-02-2026		**TLM2**	
34.	Deadlock Avoidance, Deadlock Detection.	1	17-02-2026		**TLM2**	
35.	Recovery from Deadlock.	1	18-02-2026		**TLM2, TLM3**	
36.	**Tutorial - On Deadlocks Assignment-3 / Quiz-3**	1	19-02-2026		**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
37.	Memory Management Strategies Introduction, Contiguous Memory Allocation.	1	20-02-2026		**TLM2**	
38.	Paging, Structure of the Page Table.	1	24-02-2026		**TLM2**	
39.	Swapping	1	25-02-2026		**TLM2**	
40.	Virtual Memory Management Introduction, Demand Paging, Copy-on-Write	1	26-02-2026		**TLM2**	
41.	Page Replacement algorithms,	1	27-02-2026		**TLM2 TLM4**	
42.	Allocation of Frames, Thrashing.	1	04-03-2026		**TLM2**	
43.	**Tutorial on Page replacement Algorithms**	1	05-03-2026		**TLM3**	
44.	Storage Management: Overview of Mass Storage Structure,	1	06-03-2026		**TLM2**	
45.	HDD Scheduling.	1	10-03-2026		**TLM2 TLM4**	
46.	**Tutorial on Disk Scheduling Algorithms. Assignment-4 / Quiz-4**	1	11-03-2026		**TLM3 TLM6**	
No. of classes required to complete UNIT-IV		10	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
47.	File System Interface: File Concept, Access methods	1	12-03-2026		**TLM2**	
48.	Directory Structure	1	13-03-2026		**TLM2**	
49.	File System Implementation: File-system structure, File-system Operations	1	17-03-2026		**TLM2**	
50.	Directory Implementation, Allocation Method	1	18-03-2026		**TLM2**	
51.	**Tutorial- File Allocation Methods**	1	19-03-2026		**TLM3**	
52.	Free Space Management, File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.	1	24-03-2026		**TLM2**	
53.	Protection: Goals of protection, Principles of Protection	1	25-03-2026		**TLM2**	
54.	Protection Rings, Domain of Protection, Access matrix	1	26-03-2026		**TLM2**	
55.	**Tutorial-on Free space Management & Protection Assignment-4 / Quiz-4**	1	31-03-2026		**TLM3 TLM6**	
No. of classes required to complete UNIT-V		9	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
56.	NPTEL Quiz's & Problems on CPU Scheduling	2	22-01-2026 23-01-2026			
57.	OS Applications Case Study	1	01-04-2026			

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	**01-12-2025**		
I Phase of Instructions	01-12-2025	24-01-2026	8 W
I Mid Examinations	26-01-2026	31-01-2026	1W
II Phase of Instructions	02-02-2026	04-04-2026	9 W
II Mid Examinations	06-04-2026	11-04-2026	1W
Preparation and Practical's	13-04-2026	18-04-2026	1W
Semester End Examinations	20-04-2026	02-05-2026	2W
Internship	04-05-2026	27-06-2026	8W

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
Mrs M Hemalatha	Dr G Rjendra	Dr Ch.Venkata Narayana	Dr D Ratna kishor

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy
Course Name & Code : DATABASE MANAGEMENT SYSTEMS, 23CS03
L-T-P Structure : **3-0-0** **Credits:** 03
Program/Sem/Sec : B.Tech-IT / IV SEM / A
A.Y. : 2025-26

PREREQUISITE : **Data Structures**

COURSE EDUCATIONAL OBJECTIVES (CEO):

The main objectives of the course is to:

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

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

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	01-12-2025		TLM1,2	
2.	Database users	1	03-12-2025		TLM1,2	
3.	Advantages of database systems, Database applications	1	04-12-2025		TLM1,2	
4.	Tutorial-1	1	06-12-2025		TLM 3	
5.	Data Models	2	08-12-2025 10-12-2025		TLM1,2	
6.	Concepts of Schema, Instance and data independence;	1	11-12-2025		TLM1,2	
7	Tutorial-2	1	13-12-2025		TLM 3	
8	Three tier schema architecture	1	15-12-2025			
9	Database structure	2	17-12-2025 18-12-2025		TLM1,2	
10	Tutorial-3	1	20-12-2025		TLM 3	
11	Centralized and Client server architecture for the database	1	22-12-2025		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: Representation of entities	1	24-12-2025		TLM1,2	
2.	Tutorial-4	1	27-12-2025		TLM 3	
3.	Attributes, Entity set, Relationship, Relationship set	1	29-12-2025		TLM1,2	
4.	Constraints, Sub classes, Super class, Inheritance, Specialization	1	31-12-2025		TLM1,2	
5.	Generalization using ER Diagrams	1	05-01-2026		TLM1,2	
6.	Introduction to relational model	1	07-01-2026		TLM1,2	
7.	Concepts of domain, attribute, tuple, relation, importance of null values, Constraints	1	08-01-2026		TLM1,2	
8.	Tutorial-5	1	10-01-2026		TLM 3	
9.	Relational Algebra Relational Calculus	3	19-01-2026 21-01-2026 22-01-2026		TLM1,2	
10.	Tutorial-6	1	24-01-2026		TLM 3	
No. of classes required to complete UNIT-II: 13				**No. of classes taken:**		
I Mid Examinations: 26-01-2026 to 31-01-2026						

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	02-02-2026 04-02-2026		TLM1,2	
2.	SQL querying (select and project) using where clause, arithmetic & logical operations	2	05-02-2026 09-02-2026		TLM1,2	

3.	SQL functions (Date and Time, Numeric, String conversion)	2	11-02-2026 12-02-2026		TLM1,2	
4.	Tutorial-7	1	14-02-2026		TLM 3	
5.	Creating tables with relationship, implementation of key and integrity constraints	1	16-02-2026		TLM1,2	
6.	Nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.	2	18-02-2026 19-02-2026		TLM1,2,3	
7.	Tutorial-8	1	21-02-2026		TLM 3	
8.	Revision on Unit-3	1	23-02-2026			
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	25-02-2026		TLM1,2	
2.	Concept of functional dependency	1	26-02-2026		TLM1,2	
3.	Tutorial-9	1	28-02-2026		TLM 3	
4.	Normal forms based on functional dependency Lossless join and dependency preserving decomposition	2	02-03-2026 05-03-2026		TLM1,2	
5.	Tutorial-10	1	07-03-2026		TLM 3	
6.	1NF, 2NF and 3 NF	1	09-03-2026		TLM1,2	
7.	concept of surrogate key, Boyce- Codd normal form (BCNF)MVD, Fourth normal form(4NF), Fifth Normal Form (5NF)	2	11-03-2026 12-03-2026		TLM1,2	
8.	Tutorial-11	1	14-03-2026		TLM 3	
No. of classes required to complete UNIT-IV: 10				**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	16-03-2026		TLM1,2	
2.	Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability	2	18-03-2026 19-03-2026		TLM1,2	
3.	Tutorial-12	1	21-03-2026		TLM 3	
4.	Two-Phase Locking Techniques for concurrency control: Types of Locks, Time stamp-based locking	2	23-03-2026 25-03-2026		TLM1,2	
5.	Recovery Concepts No-UNDO/REDO Recovery Based on Deferred Update,	1	26-03-2026		TLM1,2	
6.	Tutorial-13	1	28-03-2026		TLM 3	
7.	Recovery Techniques Based on Immediate Update	1	30-03-2026		TLM1,2	
8.	Shadow Paging, ARIES	1	01-04-2026		TLM1,2	
9.	Hash based Indexing, Revision on Unit-5	1	02-04-2026		TLM1,2	
No. of classes required to complete UNIT-V: 11				**No. of classes taken:**		

Content Beyond 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
1.	Indexing using B+ Trees	1	04-04-2026		TLM1&2			
No. of classes required to complete - 1					No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

Teaching Learning Methods

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

ACADEMIC CALENDAR: A.Y 2025-26- IV Sem

Description	From	To	Weeks
I Phase of Instructions	01-12-2025	24-01-2026	8W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1 W**
II Phase of Instructions	02-02-2026	04-04-2026	9W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1 W**
Preparation and Practical	13-04-2026	18-04-2026	1 W
Semester End Examinations	**20-04-2026**	**02-05-2026**	**2 W**

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 engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments
PO 12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage 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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**M. Rajesh Reddy**	**Dr. M. Srinivasa Rao**	**Mrs. M. Hemalatha**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.Ch.Malathi
Course Name & Code : Software Engineering, 23IT02
L-T-P Structure : **3-0-0** **Credits:** 3
Program/Sem/Sec : B.Tech, IV,Sec-A **A.Y.:** 2025-26

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of this course are to introduce Software life cycle models, Software requirements and SRS document, Project Planning, quality control and ensuring good quality software, Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

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	1	1	3	--	--	--	--	--	--	2	--	--	3	2	--
CO2	1	2	3	2	--	--	--	--	1	2	--	--	--	3	2
CO3		1	3	--	3	--	--	--	3	1	--	--	1	3	3
CO4		1	3	--	3	--	--	--	3	1	--	--	1	3	3
CO5	1			2	--	--	--	--	--	--	--	--	--	--	2
1 - Low **2** –Medium **3 -** High															

TEXTBOOKS:

T1 Roger S. Pressman, "Software engineering- A Practitioner 's Approach", TMH International Edition, 6th edition, 2005.

T2 Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modelling Language User Guide", PEARSON, 4th Impression, 2012.

REFERENCE BOOKS:

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

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

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

R4 https://nptel.ac.in/courses/106/105/106105182/[1,2,3]

R5 https://onlinecourses.nptel.ac.in/noc20_cs68 [1,2,3,4,5]

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, CO's and PO's	1	2/12/25		TLM-1	
2.	**Introduction:** Evolution	1	4/12/25		TLM-1	
3.	Software development projects	1	5/12/25		TLM-2	
4.	Exploratory style of software developments	1	6/12/25		TLM-2	
5.	Emergence of software engineering	1	9/12/25		TLM-2	
6.	Notable changes in software development practices	1	11/12/25		TLM-1	
7.	Computer system engineering	1	12/12/25		TLM-1	
8.	**Software Life Cycle Models:** Basic concepts	1	13/12/25		TLM-1	
9.	Waterfall model and its extensions	1	16/12/25		TLM-2	
10.	Rapid application development	1	18/12/25		TLM-2	
11.	Agile development model	1	19/12/25		TLM-2	
12.	Spiral model	1	20/12/25		TLM-2	
No. of classes required to complete UNIT-I: 12				**No. of classes taken:**		

UNIT-II: Software Project Management-Requirements Analysis And Specification

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.	**Software Project Management:** Software project management complexities	1	23/12/25		TLM-1	
14.	Responsibilities of a software project manager	1	26/12/25		TLM-2	
15.	Metrics for project size estimation	1	27/12/25		TLM-2	
16.	Project estimation techniques	1	30/12/25		TLM-2	
17.	COCOMO	2	2/01/26 3/01/26		TLM-2	
18.	Halstead's software science	1	6/01/26		TLM-2	
19.	Risk management	1	8/01/26		TLM-2	
20.	**Requirements Analysis and Specification:** Requirements gathering and analysis	1	9/01/26		TLM-2	
21.	Software Requirements Specification (SRS)	1	10/01/26		TLM-2	
22.	Formal system specification	1	20/01/26		TLM-2	
23.	Axiomatic specification	1	22/01/26		TLM-2	
24.	Algebraic specification,	1	23/01/26		TLM-2	
25	Executable specification and 4GL	1	24/01/26		TLM-2	
No. of classes required to complete UNIT-II: 14				**No. of classes taken:**		

UNIT-III: Software Design- Function-Oriented 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
26.	**Software Design:** Overview of the design process, How to characterize a good software design?	1	03/02/26		TLM-1	
27.	Layered arrangement of modules,	1	05/02/26		TLM-1	
28.	Cohesion and Coupling	1	06/02/26		TLM-1	
29	Approaches to software design	1	07/02/26		TLM-1	
30.	Agility: Agility and the Cost of Change	1	10/02/26		TLM-2	
31.	Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process	1	12/02/26		TLM-2	
32.	**Function-Oriented Software Design:** Overview of SA/SD methodology	1	13/02/26		TLM-2	
33.	Structured analysis	1	14/02/26		TLM-2	
34.	Developing the DFD model of a system	1	17/02/26		TLM-2	
35.	Structured design, Detailed design, and Design Review	1	19/02/26		TLM-2	
36.	User Interface Design: Characteristics of a good user interface	1	20/02/26		TLM-2	
37.	Basic concepts, Types of user interfaces	1	21/02/26		TLM-2	
38.	Fundamentals of component-based GUI development	1	24/02/26		TLM-2	
39.	User interface design methodology.	1	26/02/26		TLM-2	
No. of classes required to complete UNIT-III: 14				**No. of classes taken:**		

UNIT-IV: Coding And Testing-Software Reliability And Quality Management:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40	Coding And Testing: Coding, Code review,	1	27/02/26		TLM-2	
41	Software documentation	1	28/02/26		TLM-2	
42.	Testing, Black-box testing	1	03/03/26		TLM-2	
43.	White-Box testing, Debugging	1	05/03/26		TLM-1	
44	Program analysis tools	1	06/03/26		TLM-1	
45	Integration testing, Testing object- oriented programs	1	07/03/26		TLM-1	
46.	Smoke testing, and Some general issues associated with testing	1	10/03/26		TLM-1	
47	State chart diagrams	1	12/03/26		TLM-2	
48	**Software Reliability and Quality Management:** Software reliability	1	13/03/26		TLM-2	
49	Statistical testing, Software quality	1	14/03/26		TLM-2	
50	Software quality management system	1	17/03/26		TLM-2	
51	ISO 9000.SEI Capability maturity model	1	21/03/26		TLM-2	
52	Few other important quality standards, and Six Sigma	1	21/03/26		TLM-2	
No. of classes required to complete UNIT-IV: 13				**No. of classes taken:**		

UNIT-V: Computer-Aided Software Engineering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
53	CASE and its scope, CASE environment	1	24/03/26		TLM-2	
54	CASE support in the software life cycle	1	25/03/26		TLM-1	
55	Other characteristics of CASE tools	1	27/04/26		TLM-1	
56	Towards second generation CASE Tool and Architecture of a CASE Environment.	1	28/04/26		TLM-1	
57	**Software Maintenance:** Characteristics of software maintenance	1	31/04/26		TLM-1	
58	Software reverse engineering,	1	31/04/26		TLM-1	
59	Software maintenance process models and Estimation of maintenance cost	1	02/04/26		TLM-1	
60	**Software Reuse**: reuse-definition, introduction, reason	1	02/04/26		TLM-1	

	behind no reuse so far					
61	Basic issues in any reuse program	1	04/04/26		TLM-1	
62	A reuse approach, and Reuse at organization level.	1	04/04/26		TLM-1	
No. of classes required to complete UNIT-V: 10				**No. of classes taken:**		

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

PART-C

EVALUATION PROCESS (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 (IV & V)	A2=5
II- Descriptive Examination (IV & V)	M2=15
II-Quiz Examination (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	**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.
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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

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Dr. Ch. Malathi	Dr. J. Nageswara Rao	Dr. G. Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Mrs M. Hemalatha
Course Name & Code : Operating Systems & Software Engineering Lab
L-T-P Structure : 0-0-3 Credits : 1.5
Program/Sem/Sec : B.Tech., IT., IV-Sem.,-A A.Y : 2025-26

Course Objectives:
The main objectives of the course are to

- Provide insights into system calls, file systems, semaphores,
- Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
- Implement Bankers Algorithms to Avoid the Dead Lock
- Acquire the generic software development skill through various stages of software life cycle
- Generate test cases for software testing

Course Outcomes (COs):

CO1: Implement and evaluate fundamental operating system concepts through programming exercises, including UNIX commands, system calls, and simulations of CPU scheduling algorithms. **(L3)**
CO2: Analyze synchronization mechanisms (semaphores and monitors) and memory allocation algorithms (first-fit, worst-fit, best-fit) through writing concurrent programs using the pthreads library. **(L4)**
CO3: Design, develop, and test real-world software using methodologies, UML, and testing principles. **(L3)**
CO4: Improve individual/ Teamwork skills, communication and report writing skills with ethical values.

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

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

Sample Experiments in Operating Systems	
LAB CYCLES	
CYCLE-1	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Practicing of Basic UNIX Commands.
Exp-2	Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
Exp-3	Simulate UNIX commands like cp, ls, grep, etc.,
CYCLE-2	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Simulate the following CPU scheduling algorithms a) FCFS b) SJF
Exp-2	Simulate the following CPU scheduling algorithms a) Priority b) Round Robin
Exp-3	Control the number of ports opened by the operating system with a) Semaphore b) Monitors.
Exp-4	Write a program to illustrate concurrent execution of threads using pthreads library.
CYCLE-3	
S.No	**LIST OF EXPERIMENTS**
Exp-1	Write a program to solve producer-consumer problem using Semaphores.
Exp-2	Implement the following memory allocation methods for fixed partition a) First fit b) Worst fit c) Best fit
Exp-3	Simulate the following page replacement algorithms a) FIFO b) LRU c) LFU
Exp-4	Simulate Paging Technique of memory management.
CYCLE-4	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Implement Bankers Algorithm for Dead Lock avoidance and prevention
Exp-2	Simulate the following file allocation strategies a) Sequential b) Indexed c) Linked
Exp-3	Download and install nachos operating system and experiment with it

Sample Experiments in Software Engineering:	
LAB CYCLES	
CYCLE-1	
S.No	**LIST OF EXPERIMENTS**
Exp-1	Perform the following, for the following experiments: i. Do the Requirement Analysis and Prepare SRS ii. Draw E-R diagrams, DFD, CFD and structured charts for the project. a. Course Registration System b. Students Marks Analyzing System c. Online Ticket Reservation System d. Stock Maintenance
Exp-2	Consider any application, using COCOMO model, estimate the effort
Exp-3	Consider any application, calculate effort using FP oriented estimation model.
Exp-4	Draw the UML Diagrams for the problem a, b, c, d.
CYCLE-2	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Design the test cases for e-Commerce application (Flipcart, Amazon)
CYCLE-3	
S.No	**LIST OF EXPERIMENTS**
Exp-1	Design the test cases for a Mobile Application (Consider any example from Appstore)
CYCLE-4	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Design and Implement ATM system through UML Diagrams.

PART-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
Sample Experiments in Operating Systems						
Cycle-1						
1.	Exp-1	2	01-12-2025 & 08-12-2025		**TLM4**	
2.	Exp-2	2			**TLM4**	
3.	Exp-3	2			**TLM4**	
Cycle-2						
4.	Exp-1	3	15-12-2025		**TLM4**	
5.	Exp-2	3	22-12-2025		**TLM4**	
6.	Exp-3	2	29-12-2025		**TLM4**	
7.	Exp-4	1			**TLM4**	
Cycle-3						
8.	Exp-1	1	05-01-2026		**TLM4**	
9.	Exp-2	2			**TLM4**	
10.	Exp-3	2	19-01-2026		**TLM4**	
11.	Exp-4	1			**TLM4**	
Cycle-4						
12.	Exp-1	3	02-02-2026		**TLM4**	
13.	Exp-2	2	09-02-2026		**TLM4**	
14.	Exp-3	1			**TLM4**	
15.	OS Lab Internal Exam		16-02-2026			
Sample Experiments in Software Engineering						
CYCLE-1						
16.	Exp-1	3	23-02-2026		**TLM4**	
17.	Exp-2				**TLM4**	
18.	Exp-3	3	02-03-2026		**TLM4**	
19.	Exp-4				**TLM4**	
CYCLE-2						
20.	Exp-1	3	09-03-2026		**TLM4**	
Cycle-3						
21.	Exp-1	3	16-03-2026		**TLM4**	
Cycle-4						
22.	Exp-1	3	23-03-2026		**TLM4**	
23.	SE Lab Internal Exam		30-03-2026			

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

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	**Marks**
Day-to-day Work	A1=10
Record & Observation	B1=5
Internal Exam	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	**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.
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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
Mrs M Hemalatha	Dr G Rjendra	Dr Ch.Venkata Narayana	Dr D Ratna kishor

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr. M. Rajesh Reddy
Course Name & Code : DATABASE MANAGEMENT SYSTEMS LAB, 23CS56
L-T-P Structure : **0-0-3** **Credits:** 1.5
Program/Sem/Sec : B.Tech-IT / IV SEM / A
A.Y. : 2025-26

PREREQUISITE : **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	05-12-2025 12-12-2025		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	19-12-2025 26-12-2025		TLM4	
3	Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views	3	02-01-2026		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	09-01-2026		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 can be raised if no records were found)	3	23-01-2026		TLM4	
6	Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block	3	06-02-2026		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	13-02-2026		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	20-02-2026		TLM4	
9	Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES	3	27-02-2026		TLM4	
10	Program development using creation of stored functions, invoke functions in SQL Statements and	3	06-03-2026		TLM4	

	write complex functions					
11	Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.	3	13-03-2026		TLM4	
12	Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers	3	20-03-2026		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.**

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	**M. Rajesh Reddy**	**Dr. M. Srinivasa Rao**	**Mrs. M. Hemalatha**	**Dr. D. Ratna Kishore**
Signature				

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hodit@lbrce.ac.in, Phone: 08659-222 933, Fax: 08659-222931

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mr.V. V. Krishna Reddy
Course Name & Code : PYTHON PROGRAMMING **(SEC-1)** & 23CSS1
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech/IT/IV/A **A.Y.:** 2025-26

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-1:** Introduction, Course Outcomes Introduction to Python, Installation, Variables, Data types, Reading Input, Print output, Comments	3	02-12-2025		
2.	Types of operators, Working on Operators, Sample Programs, Type Conversion, Control stmts if, else, nested-if, elif.	3	09-12-2025		
3.	Loop statements, Programs on Loop statements, pass, continue and break	3	16-12-2025		
4.	Exception Handling, Programs on exception handling.	3	23-12-2025		
5.	**UNIT-2:** Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments, sample programs.	3			
6.	Strings Introduction, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings., Sample Programs on strings	3	06-01-2026		
7.	Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement., Programs on Lists	3	20-01-2026		
8.	**Unit-3:** Introduction to Dictionaries, Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Sample programs on dictionaries.	3	03-02-2026		
9.	Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Sample Programs 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	10-02-2026		

10.	**Unit-4**: Introduction to files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, sample programs on files.	3	17-02-2026		
11.	Pickle Module, Reading and Writing CSV Files, Python os and os. path Modules. Sample programs.	3	24-02-2026		
12.	**Object-Oriented Programming**: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, sample programs.	3	03-03-2026		
13.	Encapsulation, Inheritance, Polymorphism, Sample Python programs on object-oriented programming.	3	10-03-2026		
14.	**Unit 5: Introduction to Data Science**: Functional Programming, JSON and XML in Python, NumPy with Python, Example Programs on NumPy	3	17-03-2026		
15.	Pandas, Example Programs on pandas.	3	24-03-2026		
16.	**Internal Exam**	3	31-03-2025		

PART-C

EVALUATION PROCESS (R23 Regulation):

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

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.
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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.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Signature				
Name of the Faculty	**V. V. Krishna Reddy**	**Dr. K. Phaneendra**	**Dr. K. Phaneendra**	**Dr. D. Ratna Kishore**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Mrs. P.Padmini, Mrs. J.Geetha renuka
Course Name & Code : Design Thinking & Innovation (23ME57)
Regulation : R23
L-T-P Structure **:** 1-0-2 **Credits:** 02
Program/Sem/Sec : B.Tech – IV Semester – A Section **A.Y.:** 2025-26

PREREQUISITE: None
COURSE OBJECTIVES:
The objectives of the course are to

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

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

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	UNIT–I: INTRODUCTION TO DESIGN THINKING					
1	Introduction to elements and principles of Design	1	03-12-2025		TLM2	
	Activity: To understand the importance of design	2	03.12.2025		TLM6	
2	History of Design Thinking, New materials in Industry	1	10.12.2025		TLM2	
	Activity: To understand the importance of team work	2	10.12.2025		TLM6	
3	Basics of design-dot, line, shape, form as fundamental design components	1	17.12.2025		TLM2	
	Activity: Developing sketches using dot, line and form	2	17.12.2025		TLM6	
	UNIT–II: DESIGN THINKING PROCESS					
4	Design thinking process: Empathy	1	24.12.2025		TLM2	
	Activity: To understand the significance of Empathy	2	24.12.2025		TLM6	
5	Design thinking process: Define or Analyze	1	07.01.2025		TLM2	
	Activity: To understand the significance of Define/analyze	2	07.01.2025		TLM6	
6	Design thinking process: Ideate	1	21.01.2025		TLM2	
	Activity: To understand the significance of Ideate	2	21.01.2025		TLM6	
7	Design thinking process: Prototype	1	04.02.2026		TLM2	

	Activity: To understand the significance of Prototype	2	04.02.2026		TLM6	
8	Tools of design thinking in social innovations	1	11.02.2026		TLM2	
	Activity: Students should present their understanding of DTI elements using example	2	11.02.2026		TLM6	
	UNIT – III: INNOVATION					
9	Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations	1	18.02.2026		TLM2	
	Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation	2	18.02.2026		TLM6	
	UNIT – IV: PRODUCT DESIGN					
10	Problem formation, introduction to product design, Product strategies, Product value	1	25.02.2026		TLM2	
	Activity: Development of Business models, setting of specifications	2	25.02.2026		TLM6	
11	Product planning, product specifications. Innovation towards product design Case studies.	1	11.03.2026		TLM2	
	Activity: Explaining their own product and model design, case studies	2	11.03.2026		TLM6	
	UNIT – V: DESIGN THINKING IN BUSINESS PROCESSES					
12	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes	1	18.03.2026		TLM2	
	Activity: Marketing strategies of our own product, its maintenance, Reliability and plan for startup	2	18.03.2026		TLM6	
13	**Practice Session 1**	3	25.03.2025		TLM6	
14	**Practice Session 2**	3	01.04.2025		TLM6	
I Mid Exams: 26-01-2026 to 31-01-2026						
II Mid Exams: 06-04-2026 to 11-04-2026						
No. of classes required to complete: 36				**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-B

EVALUATION PROCESS (R23 Regulation):

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

ACADEMIC CALENDAR

Commencement of IV Semester Classwork	01-12-2025		
Description	**From**	**To**	**Weeks**
I Phase of Instructions	01-12-2025	24-01-2026	7 W
I Mid Examinations	**26-01-2026**	**31-01-2026**	1 W
II Phase of Instructions	02-02-2026	04-04-2026	9 W
II Mid Examinations	**06-04-2026**	**11-04-2026**	1 W
Preparation and Practicals	13-04-2026	18-04-2026	1 W
Semester End Examinations	**20-04-2026**	**02-05-2026**	2 W
Internship	04-05-2026	27-06-2026	8 W
Commencement of V Semester Classwork	**29 –06–2026**		

PART-C

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1	To possess knowledge in both fundamental and application aspects of mathematical, scientific, engineering principles to analyze complex engineering problems for meeting the national and international requirements and demonstrating the need for sustainable development.
PEO 2	To adapt to the modern engineering tools for planning, analysis, design, implementation of analytical data and assess their relevant significance in societal and legal issues necessary in their professional career.
PEO 3	To exhibit professionalism, ethical attitude, communication, managerial skills, team work and social responsibility in their profession and adapt to current trends by engaging in continuous learning.

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.
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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	Possesses necessary skill set to analyze and design various systems using analytical and software tools related to civil engineering
PSO 2	Possesses ability to plan, examine and analyze the various laboratory test required for the professional demands
PSO 3	Possesses basic technical skills to pursue higher studies and professional practice in civil engineering domain

Signature				
Name of the Faculty	Mrs. P.Padmini Mrs. J.Geetha renuka	Dr V. Ramakrishna	J. Rangaiah	Dr. D. Ratna kishore
Designation	**Course Instructors**	**Course Coordinator**	**Module Coordinator**	**HoD**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM	**:** II B. Tech., IV-Sem., IT-A
ACADEMIC YEAR	**:** 2025-26
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	-	-	-

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

BOS APPROVED TEXT BOOKS:

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

T2. Palaniswamy,EnvironmentalStudies,2/e,Pearsoneducation,2014.

T3.S.AzeemUnnisa,EnvironmentalStudies,AcademicPublishingCompany,2021.

T4.K.RaghavanNambiar,"TextbookofEnvironmentalStudiesforUndergraduate Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

ReferenceBooks:

R1.KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.
R2. DeekshaDaveandE.SaiBabaReddy,TextbookofEnvironmentalScience,2/e, Cengage Publications, 2012.
R3.M.AnjiReddy,"TextbookofEnvironmentalSciencesandTechnology",BSPublication, 2014.
R4.J.P.Sharma,ComprehensiveEnvironmentalstudies,Laxmipublications,2006.
R5.J.GlynnHenryandGaryW.Heinke,EnvironmentalSciencesandEngineering, Prentice Hall of India Private limited, 1988.
R6.G.R.Chatwal,ATextBookofEnvironmentalStudies,HimalayaPublishingHouse, 2018.
R7. GilbertM.MastersandWendellP.Ela,IntroductiontoEnvironmentalEngineering 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	04-12-2025		TLM2			
2.	Multidisciplinary Nature ofEnvironmental Studies	1	06-12-2025		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	11-12-2025		TLM1	CO1	T1,T2	
4.	Water resources	1	18-12-2025		TLM1	CO1	T1,T2	
5.	Mineral resources & Energy resources	1	20-12-2025		TLM1	CO1	T1,T2	
6.	Food resources	1	27-12-2025		TLM1	CO1	T1,T2	
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and 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	03-01-2026		TLM1	CO2	T1,T2	
8.	Ecological succession &	1	08-01-2026		TLM1	CO2	T1,T2	
9.	Food chains, Food webs & Ecological Pyramids	1	17-01-2026		TLM1	CO2	T1,T2	
10.	Types of ecosystems	1	22-01-2026		TLM1	CO2	T1,T2	
11.	Biodiversity – introduction, levels, bio geographic classification	1	22-01-2026		TLM1	CO2	T1,T2	

12.	Values of Biodiversity, India as mega diversity nation. Threats to biodiversity and Conservation of biodiversity	1	24-01-2026		TLM1	CO2	T1,T2	
No. of classes required to complete UNIT-II		05			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

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
13.	Environmental pollution -Air pollution	1	05-02-2026		TLM1	CO3	T1,T2	
14.	Water pollution, Marine pollution, Thermal pollution	1	07-02-2026		TLM1	CO3	T1,T2	
15.	Soil pollution	1	12-02-2026		TLM1	CO3	T1,T2	
16.	Noise pollution & Nuclear Hazards	1	19-02-2026		TLM1	CO3	T1,T2	
17.	Solid waste management	1	21-02-2026		TLM1	CO3	T1,T2	
18.	Disaster management	1	26-02-2026		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and 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
19.	From Unsustainable to Sustainable development	1	28-02-2026		TLM1	CO4	T1,T2	
20.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	28-02-2026		TLM1	CO4	T1,T2	
21.	Environmental ethics, Climate change. Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	05-03-2026		TLM1	CO4	T1,T2	
22.	Environmental Acts	1	07-03-2026		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		04			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
23.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	12-03-2026		TLM1	CO5	T1,T2	
24.	Environment and human health –Human Rights – Value Education. HIV/AIDS	1	28-03-2026		TLM1	CO5	T1,T2	
25.	Women and Child Welfare	1	02-04-2026		TLM1	CO5	T1,T2	
26.	Role of information Technology in Environment and human health	1	04-04-2026		TLM1	CO5	T1,T2	
No. of classes required to complete UNIT-V		04			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
27.	Case studies	2	22-01-2026 02-04-2026		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

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	**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.

Dr. Shaheda Niloufer	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor: Dr.M.S.Giridhar
Course Name : Optimization Techniques **Course Code :** 23ME09
Credits: 3 **L-T-P Structure:** 2-0-0
Program/Sem/Sec : B.Tech/IV Semester – IT Section-B **A.Y.** **:** 2025-26

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	2	1									1				
CO2	3	2	2									1				
CO3	3	2										1				
CO4	3	2										1				
CO5	3	2										1				

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	01-12-2025		TLM1	
2.	Statement of an Optimization problem, design vector, design constraints	2	01-12-2025 06-12-2025		TLM2	
3.	Constraint surface, objective function, objective function surfaces	1	08-12-2025		TLM1	
4.	Classification of Optimization problems. Single variable Optimization	2	08-12-2025 13-12-2025		TLM2	
5.	Multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum	2	15-12-2025 15-12-2025		TLM1	
6.	Multivariable Optimization with equality constraints.	1	20-12-2025		TLM1	
7.	Solution by method of Lagrange multipliers	1	22-12-2025		TLM1	
8.	multivariable Optimization with inequality constraints	1	22-12-2025		TLM1	
9.	Kuhn – Tucker conditions	1	27-12-2025		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	29-12-2025 29-12-2025		TLM2	
11.	geometry of linear programming problems	2	03-01-2026 05-01-2026		TLM2	
12.	definitions and theorems	1	05-01-2026		TLM1	
13.	solution of a system of linear simultaneous equations	2	10-01-2026		TLM1	
14.	pivotal reduction of a general system of equations	2	12-01-2026 12-01-2026		TLM1	
15.	motivation to the simplex method	2	17-01-2026 19-01-2026		TLM1	
16.	Simplex algorithm.	2	19-01-2026		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	24-01-2026 02-02-2026		TLM2	
18.	least cost method and Vogel's approximation method	2	02-02-2026 07-02-2026		TLM1	
19.	testing for optimality of balanced	2	09-02-2026		TLM1	

	transportation problems		09-02-2026			
20.	Special cases in transportation problem.	2	14-02-2026 16-02-2026		TLM2	
21.		1	16-02-2026		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	21-02-2026 23-02-2026		TLM1	
23.	Univariate method, steepest descent method.	2	23-02-2026 28-02-2026		TLM2	
24.	Constrained cases– Characteristics of a constrained problem	1	02-03-2026		TLM1	
25.	Classification, Basic approach of Penalty Function method	2	02-03-2026 07-03-2026		TLM1	
26.	Basic approaches of Interior penalty function methods.	1	09-03-2026		TLM2	
27.	Basic approaches of Exterior penalty function methods.	1	09-03-2026		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	2	14-03-2026 16-03-2026		TLM1	
29.	Dynamic programming multistage decision types	2	16-03-2026 21-03-2026		TLM2	
30.	Dynamic programming concept of sub optimization and the principle of optimality	1	23-03-2026		TLM1	
31.	Computational procedure in dynamic programming,	1	23-03-2026		TLM2	
32.	examples illustrating the calculus method of solution	1	28-03-2026		TLM1	
33.	Examples illustrating the tabular method of solution. Review of UNIT-III, IV & V	3	30-03-2026 04-04-2026 04-04-2026		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 2025-26

Description	From	To	Weeks
I Phase of Instructions	01-12-2025	24-01-2026	7W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1 W**
II Phase of Instructions	02-02-2026	04-04-2026	9W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1 W**
Preparation and Practical	13-04-2026	18-04-2026	1 W
Semester End Examinations	**20-04-2026**	**02-05-2026**	**2 W**
Internship	**04-05-2026**	**27-06-2026**	**8 W**

Signature				
Name of the Faculty	**Dr.M.S.Giridhar**	**Dr.M.S.Giridhar**	**Dr.G.Nageswara Rao**	**Dr.P.Sobharani**
Title	**Course Instructor**	**Course Coordinator**	**Module Coordinator**	**Head of the Department**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

Part-A

PROGRAM : II B. Tech., II-Sem., IT-B
ACADEMIC YEAR : 2025-26
COURSE NAME & CODE : PROBABILITY & STATISTICS
L-T-P STRUCTURE : 3-0-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mrs. Sk.Haseena Begum
COURSE COORDINATOR : Dr. D. Vijay Kumar
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.	Introduction class	1	03/12/2025		TLM1	CO1	T1, T2	
2.	Syllabus Co's, PO's	1	04/12/2025		TLM1	CO1	T1, T2	
3.	Unit-1, Introduction to data science	1	05/12/2025		TLM1	CO1	T1, T2	
4.	Statistics- Population and sample, Collection of data,	1	06/12/2025		TLM1	CO1	T1, T2	
5.	Types of variables	1	10/12/2025		TLM1	CO1	T1, T2	
6.	Data visualization	1	11/12/2025		TLM1	CO1	T1, T2	
7.	Measures of central tendency, A.M	1	12/12/2025		TLM1	CO1	T1, T2	
8.	Median, mode problems	1	13/12/2025		TLM1	CO1	T1, T2	
9.	Measures of variability Range, Mean deviation	1	17/12/2025		TLM1	CO1	T1, T2	
10.	S.D. & Q D	1	18/12/2025		TLM1	CO1	T1, T2	
11.	Skewness	1	19/12/2025		TLM1	CO1	T1, T2	
12.	Kurtosis	1	20/12/2025		TLM1	CO1	T1, T2	
13.	Tutorial	1	24/12/2025		TLM3	CO1	T1, T2	
No. of classes required to complete UNIT-I		13			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
14.	Correlation, types	1	26/12/2025		TLM1	CO2	T1, T2	
15.	Coefficient of correlation	1	27/12/2025		TLM1	CO2	T1, T2	
16.	Rnak correlation	1	31/12/2025		TLM1	CO2	T1, T2	
17.	Linear regression (lines)	1	02/12/2025		TLM1	CO2	T1, T2	
18.	Problems	1	03/01/2026		TLM1	CO2	T1, T2	
19.	Multiple regression	1	07/01/2026		TLM1	CO2	T1, T2	
20.	Regression coefficients	1	08/01/2026		TLM1	CO2	T1, T2	
21.	Properties, problems	1	09/01/2026		TLM1	CO2	T1, T2	
22.	Fitting of parabola	1	10/01/2026		TLM1	CO2	T1, T2	
23.	Exponential curve	1	21/01/2026		TLM1	CO2	T1, T2	
24.	Fitting of power curve	1	22/01/2026		TLM1	CO2	T1, T2	
25.	Tutorial II	1	23/01/2026		TLM3	CO2	T1, T2	
26.	Problems Revision	1	24/01/2026		TLM1	CO2	T1, T2	
No. of classes required to complete UNIT-II		13			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

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
27.	Probability, Introduction	1	04/02/2026		TLM1	CO3	T1, T2	
28.	Conditional probability	1	05/02/2026		TLM1	CO3	T1, T2	
29.	Bayes theorem	1	06/02/2026		TLM3	CO3	T1, T2	
30.	Problems	1	07/02/2026		TLM1	CO3	T1, T2	
31.	Random variables, Distribution function	1	11/02/2026		TLM1	CO3	T1, T2	
32.	Probability mass function	1	12/02/2026		TLM1	CO3	T1, T2	
33.	Probability density function	1	13/02/2026		TLM1	CO3	T1, T2	
34.	Mathematical expectation, variance	1	14/02/2026		TLM3	CO3	T1, T2	
35.	Binomial distribution	1	18/02/2026		TLM1	CO3	T1, T2	
36.	Poisson distribution	1	19/02/2026		TLM1	CO3	T1, T2	
37.	Normal distribution	1	20/02/2026		TLM1	CO3	T1, T2	
38.	Uniform distribution	1	21/02/2026		TLM3	CO3	T1, T2	
No. of classes required to complete UNIT-III		12			No. of classes taken:			

UNIT-IV: Sampling Theory

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
40.	Introduction: population & sample Sampling distribution	1	25/02/2026		TLM1	CO4	T1, T2	
41.	Sampling distribution of means & variance	1	26/02/2026		TLM1	CO4	T1, T2	
42.	problems	1	27/02/2026		TLM1	CO4	T1, T2	
43.	Central limit theorem	1	28/02/2026		TLM3	CO4	T1, T2	
44.	Estimation- point & interval, maximum error	1	05/03/2026		TLM1	CO4	T1, T2	
45.	Estimation using t-distribution	1	06/03/2026		TLM1	CO4	T1, T2	
46.	problems	1	07/03/2026		TLM3	CO4	T1, T2	
47.	Estimation using F-distribution	1	11/03/2026		TLM1	CO4	T1, T2	
48.	Estimation using χ^2 −distribution	1	12/03/2026		TLM1	CO4	T1, T2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V: Tests of Hypothesis

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
49.	Hypothesis: introduction, Definitions	1	13/03/2026		TLM1	CO5	T1, T2	
50.	Z-test for single mean	1	14/03/2026		TLM1	CO5	T1, T2	

51.	Z-test for diff. of mean	1	18/03/2026		TLM3	CO5	T1, T2	
52.	Z-test for single proportion	1	20/03/2026		TLM1	CO5	T1, T2	
53.	Z-test for difference of proportion	1	25/03/2026		TLM1	CO5	T1, T2	
54.	t-test for single mean	1	27/03/2026		TLM1	CO5	T1, T2	
55.	t-test for diff. means,	1	28/03/2026		TLM1	CO5	T1, T2	
56.	F-test for variances	1	01/04/2026		TLM1	CO5	T1, T2	
57.	χ^2 −test for goodness of fit	1	02/04/2026		TLM1	CO5	T1, T2	
58.	χ^2 −test for independence	1	04/04/2026		TLM1	CO5	T1, T2	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Content beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
59.	Paired t-test	1	2/04/2026		TLM1	CO5	T1, T2	
No. of classes		1			No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

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	**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.

Sk. Haseena Begum	**Dr. D. Vijay Kumar**	**Dr. A. Rami Reddy**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor: Dr. G. Rajendra

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

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

Program/Sem/Sec : B.Tech., IT., IV-Sem., **A.Y:** 2025-26

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	01-12-2025		**TLM2**	
2.	Operating-System Functions	1	04-12-2025		**TLM2**	
3.	Operating System Operations, Computing Environments.	1	05-12-2025		**TLM2**	
4.	Free and Open-Source Operating Systems	1	06-12-2025		**TLM2**	
5.	System calls, Types of System Calls	1	08-12-2025		**TLM2**	
6.	**Tutorial-1**	1	11-12-2025		**TLM3**	
7.	System Programs, Operating System Design and Implementation.	1	12-12-2025		**TLM2**	
8.	Operating System Structure	1	13-12-2025		**TLM2**	
9.	Building and Booting an Operating System	1	15-12-2025		**TLM2**	
10.	Operating System debugging	1	18-12-2025		**TLM2**	
11.	**Activity Based Learning**	1	19-12-2025		**TLM3 TLM7**	
12.	**Assignment-1/ Quiz-1**	1	20-12-2025		**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,	2	22-12-2025 26-12-2025		**TLM2**	
14.	Inter-Process Communication	1	27-12-2025		**TLM2**	
15.	**Threads and Concurrency:** Multithreading Models, Thread libraries.	1	29-12-2025		**TLM2**	
16.	Threading issues.	1	02-01-2026		**TLM2**	
17.	**CPU Scheduling:** Basic Concepts, Scheduling Criteria.	1	03-01-2026		**TLM2**	
18.	Scheduling Algorithms (FCFS, SJF)	1	05-01-2026		**TLM2 TLM4**	
19.	Scheduling Algorithms (Priority)	1	08-01-2026		**TLM2 TLM4**	
20.	**Tutorial-2**	1	09-01-2026		**TLM3**	
21.	Scheduling Algorithms (Round Robin)	1	17-01-2026		**TLM2 TLM4**	
22.	Discuss various problems related to scheduling algorithms	1	19-01-2026		**TLM2 TLM4**	
23.	Multiple Processor Scheduling	1	22-01-2026		**TLM2**	
24.	Activity Based Learning	1	23-01-2026		**TLM3 TLM7**	
25.	**Assignment-2 / Quiz-2**	1	24-01-2026		**TLM6**	
No. of classes required to complete UNIT-II		14	No. of classes taken:			

(26-01-2026 TO 31-06-2026) 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	04-02-2026		**TLM2**	
27.	Peterson's Solution, Synchronization Hardware.	1	05-02-2026		**TLM2**	
28.	Mutex Locks, Semaphores.	1	06-02-2026		**TLM2**	
29.	Monitors, Classic Problems of Synchronization.	1	08-02-2026		**TLM2**	
30.	**Tutorial-3**	1	11-02-2026		**TLM3**	
31.	Deadlocks: System Model, Deadlock Characterization.	1	12-02-2026		**TLM2**	
32.	Methods for Handling Deadlocks.	1	13-02-2026		**TLM2**	
33.	Deadlock Prevention	1	15-02-2026		**TLM2**	
34.	Deadlock Avoidance, Deadlock Detection.	1	18-02-2026		**TLM2**	
35.	Recovery from Deadlock.	1	19-02-2026		**TLM2, TLM3**	
36.	Activity Based Learning	1	20-02-2026		**TLM6 TLM7**	
37.	**Assignment-3 / Quiz-3**	1	22-02-2026		**TLM3 TLM6**	
No. of classes required to complete UNIT-III		12	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	25-02-2026		**TLM2**	
39.	Paging, Structure of the Page Table.	1	26-02-2026		**TLM2**	
40.	Swapping	1	27-02-2026		**TLM2**	
41.	**Tutorial-4**	1	29-02-2026		**TLM3**	
42.	**Virtual Memory Management:** Introduction	1	02-03-2026		**TLM2**	
43.	Demand Paging, Copy-on-Write	1	05-03-2026		**TLM2**	
44.	Page Replacement algorithms, Allocation of Frames, Thrashing	1	06-03-2026		**TLM1 TLM2 TLM4**	
45.	Storage Management: Overview of Mass Storage Structure, HDD Scheduling.	1	07-03-2026		**TLM2**	
46.	Activity Based Learning	1	09-03-2026		**TLM7 TLM3**	
47.	**Assignment-4 / Quiz-4**	1	12-03-2026		**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
48.	File System Interface: File Concept, Access methods	1	13-03-2026		**TLM2**	
49.	Directory Structure, Directory Implementation, Allocation Method	1	14-03-2026		**TLM2**	
50.	File System Implementation: File-system structure, File-system Operations	1	16-03-2026		**TLM2**	
51.	**Tutorial-5**	1	20-03-2026		**TLM3**	
52.	Free Space Management, File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.	1	23-03-2026		**TLM2**	
53.	Protection: Goals of protection, Principles of Protection	1	27-03-2026		**TLM2**	
54.	Protection Rings, Domain of Protection, Access matrix	1	28-03-2026		**TLM2**	
55.	Tutorial-10 Assignment-4 / Quiz-4/Activity Based Learning	1	30-03-2026		**TLM3 TLM6 TLM7**	
No. of classes required to complete UNIT-V		10	No. of classes taken:			

(06-04-2026 TO 11-04-2026) 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
56.	Multiprocessor Operating Systems	1	02-04-2026		**TLM2**	
57.	Virtualization	1	04-05-2026		**TLM2**	

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	**01-12-2025**		
I Phase of Instructions	01-12-2025	24-01-2026	8 W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1 W**
II Phase of Instructions	02-02-2026	04-04-2026	9 W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1W**
Preparation and Practical's	13-04-2026	18-04-2026	1W
Semester End Examinations	**20-04-2026**	**02-05-2026**	**2W**
Internship	04-05-2026	27-06-2026	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
Dr. G. Rajendra	Dr. G. Rajendra	Dr.Ch. Venkata Narayana	Dr. D. Ratna Kishore

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Sambasivarao ch
Course Name & Code : Database Management Systems (23CS03)
L-T-P Structure : 3-0-0 Credits: 3
Program/Sem/Sec : B.Tech. – IT / IV Sem / B A.Y. : 2025-26

PRE-REQUISITE: 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	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
CO 1	3	2	2	-	-	-	-	-	-	-	-	2	3	-	2
CO 2	3	2	2	-	-	-	-	-	-	-	-	2	3	3	-
CO 3	3	2	2	-	-	-	-	-	-	-	-	2	2	3	-
CO 4	3	2	2	-	-	-	-	-	-	-	-	2	2	-	-
CO 5	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.

NPTEL Course :

Introduction to Database Systems,: https://nptel.ac.in/courses/106106220

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	1-12-2025		TLM1,2	
2.	Tutorial-1	1	3-12-2025		TLM3	
3.	Database Users	1	4-12-2025		TLM1,2	
4.	Database applications and Advantages	1	5-12-2025		TLM1,2	
5.	Data Models	1	8-12-2025		TLM1,2	
6.	Tutorial-2	1	10-12-2025		TLM3	
7.	Schema	1	11-12-2025		TLM1,2	
8	Three tier schema architecture	2	12-12-2025 15-12-2025		TLM1,2	
9	Tutorial-3	1	17-12-2025		TLM3	
10	Database structure	1	18-12-2025		TLM1,2	
11	Client server architecture	1	19-12-2025		TLM1,2	
No. of classes required to complete UNIT-I: 12				**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 to ER diagram	1	22-12-2025		TLM1,2	
2.	Tutorial-4	1	24-12-2025		TLM3	
3.	Attributes, Entity set, Relationship,	1	26-12-2025		TLM1,2	
4.	Generalization using ER Diagrams	1	29-12-2026		TLM1,2	
5.	Tutorial-5	1	31-12-2025		TLM3	
6.	Introduction to relational model	1	02-01-2026		TLM1,2	
7	Concepts of domain, attribute, tuple, relation,	1	05-01-2026		TLM1,2	
8	Tutorial-6	1	07-01-2026		TLM1,2	
9	Relational Algebra	1	08-01-2026		TLM1,2	
10	Key Constraints	1	09-01-2026		TLM3	
11	Relational Calculus	1	19-01-2026		TLM1,2	
No. of classes required to complete UNIT-I: 11				**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	1	21-01-2026		TLM1,2	
2.	Tutorial-7	1	22-01-2026		TLM3	
3.	SQL querying	2	02-02-2026 04-02-2026		TLM1,2	
4.	SQL functions	1	05-02-2026		TLM1,2	
5.	key and integrity constraints	1	06-02-2026		TLM3	
6.	Nested queries, sub queries, aggregation	1	09-02-2026 11-02-2026		TLM1,2	
7.	Tutorial-8	1	11-02-2026		TLM1,2	
8.	Joins	2	12-02-2026 13-02-2026		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.	Concept of functional dependency	2	16-02-2026 18-02-2026		TLM3	
2.	Tutorial-10	1	18-02-2026		TLM1,2	
3.	1NF, 2NF	1	19-02-2026 23-02-2026		TLM1,2	
4.	Tutorial-11	1	25-02-2026		TLM3	
5.	3NF and BCNF	2	27-02-2026 02-03-2026		TLM1,2	
6.	MVD, Fourth normal form(4NF)	1	05-03-2026		TLM3	
7.	Fifth Normal Form (5NF)	1	06-03-2026		TLM1,2	
8.	Fifth Normal Form (5NF)	1	09-03-2026		TLM1,2	
9.	Tutorial-12	1	11-03-2026		TLM3	
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	12-03-2026		TLM1,2	
2.	Concurrent Executions, Serializability, Recoverability	2	13-03-2026 16-03-2026		TLM1,2	
3.	Tutorial-14	1	18-03-2026		TLM3	
4.	Implementation of Isolation	1	20-03-2026		TLM1,2	
5.	Concurrency control	1	23-03-2026		TLM1,2	
6.	Tutorial-15	1	25-03-2026		TLM3	
7.	Transaction recovery Shadow Paging, ARIES	1	27-03-2026		TLM1,2	
8.	Hash based Indexing	1	30-03-2026		TLM1,2	
9.	Tutorial-16	1	01-04-2026		TLM3	
10.	Hash based Indexing	1	02-04-2026		TLM1,2	
No. of classes required to complete UNIT-V: 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 (R23 Regulation):

Evaluation Task	Marks
Assignmenton Cycle – I(Units-I, II)	A1=5
MID – IDescriptiveExamination (Units-I, II)	M1=15
MID – I Objective /QuizExamination (Units-I, II)	Q1=10
Mid – I Total Marks: A1 + M1 + Q1	MT1 = 30
Assignment on Cycle – II(Unit-III, IV & V)	A2=5
MID – II Descriptive Examination (UNIT-III, IV & V)	M2=15
MID – II Objective / Quiz Examination (UNIT-III, IV & V)	Q2=10
Mid – II Total Marks: A2 + M2 + Q2	MT2 = 30
ContinuousInternal Evaluation (CIE): 80% of Max (MT1, MT2) + 20% of Min (MT1, MT2)	C = 30
Semester End Examination (SEE): S	S = 70
Total Marks (T) = C + S	T = 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 modelling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**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):

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	**Mr. Ch.Sambasivarao**	**Dr. M. Srinivasa Rao**	**Mrs. M.Hema Latha**	**Dr.D.Ratna Kishore**
Signature				

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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,Sec-B **A.Y.:** 2025-26

COURSE EDUCATIONAL OBJECTIVES (CEOs): The objectives of this course are to introduce Software life cycle models, Software requirements and SRS document, Project Planning, quality control and ensuring good quality software, Software Testing strategies, use of CASE tools, Implementation issues, validation &verification procedures.

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	1	1	3	--	--	--	--	--	--	2	--	--	3	2	--
CO2	1	2	3	2	--	--	--	--	1	2	--	--	--	3	2
CO3		1	3	--	3	--	--	--	3	1	--	--	1	3	3
CO4		1	3	--	3	--	--	--	3	1	--	--	1	3	3
CO5	1			2	--	--	--	--	--	--	--	--	--	--	2
1 - Low						**2** –Medium							**3** - High		

TEXTBOOKS:

T1 Roger S. Pressman, "Software engineering- A Practitioner 's Approach", TMH International Edition, 6th edition, 2005.

T2 Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modelling Language User Guide", PEARSON, 4th Impression, 2012.

REFERENCE BOOKS:

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

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

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

R4 https://nptel.ac.in/courses/106/105/106105182/[1,2,3]

R5 https://onlinecourses.nptel.ac.in/noc20_cs68 [1,2,3,4,5]

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, CO's and PO's	1	02/12/25		TLM-1	
2.	**Introduction:** Evolution	1	05/12/25		TLM-1	
3.	Software development projects	1	06/12/25		TLM-2	
4.	Exploratory style of software developments	1	09/12/25		TLM-2	
5.	Emergence of software engineering	1	12/12/25		TLM-2	
6.	Notable changes in software development practices	1	13/12/25		TLM-1	
7.	Computer system engineering	1	16/12/25		TLM-1	
8.	**Software Life Cycle Models:** Basic concepts	1	19/12/25		TLM-1	
9.	Waterfall model and its extensions	1	20/12/25		TLM-2	
10.	Rapid application development	1	23/12/25		TLM-2	
11.	Agile development model	1	26/12/25		TLM-2	
12.	Spiral model	1			TLM-2	
No. of classes required to complete UNIT-I: 11				**No. of classes taken:**		

UNIT-II: Software Project Management-Requirements Analysis And Specification

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.	**Software Project Management:** Software project management complexities	1	27/12/25		TLM-1	
14.	Responsibilities of a software project manager	1	30/12/25		TLM-2	
15.	Metrics for project size estimation	1	02/01/26		TLM-2	
16.	Project estimation techniques	1	03/01/26		TLM-2	
17.	COCOMO	1	06/01/26		TLM-2	
18.	Halstead's software science	1	09/01/26		TLM-2	
19.	Risk management	1	10/01/26		TLM-2	
20.	**Requirements Analysis and Specification:** Requirements gathering and analysis	1	13/01/26		TLM-2	
21.	Software Requirements Specification (SRS)	1	20/01/26		TLM-2	
22.	Formal system specification	1	23/01/26		TLM-2	
23.	Axiomatic specification	1			TLM-2	
24.	Algebraic specification,	1	24/01/26		TLM-2	
25	Executable specification and 4GL	1			TLM-2	
No. of classes required to complete UNIT-II: 11				**No. of classes taken:**		

UNIT-III: Software Design- Function-Oriented 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
26.	**Software Design:** Overview of the design process, How to characterize a good software design?	1	03/02/26		TLM-1	
27.	Layered arrangement of modules,	1	06/02/26		TLM-1	
28.	Cohesion and Coupling	1	07/02/26		TLM-1	
29	Approaches to software design	1	10/02/26		TLM-1	
30.	Agility: Agility and the Cost of Change	1			TLM-2	
31.	Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process	1	13/02/26		TLM-2	
32.	**Function-Oriented Software Design:** Overview of SA/SD methodology	1			TLM-2	
33.	Structured analysis	1	14/02/26		TLM-2	
34.	Developing the DFD model of a system	1	17/02/26		TLM-2	
35.	Structured design, Detailed design, and Design Review	1			TLM-2	
36.	User Interface Design: Characteristics of a good user interface	1	20/02/26		TLM-2	
37.	Basic concepts, Types of user interfaces	1			TLM-2	
38.	Fundamentals of component-based GUI development	1	21/02/26		TLM-2	
39.	User interface design methodology.	1			TLM-2	
No. of classes required to complete UNIT-III: 9				**No. of classes taken:**		

UNIT-IV: Coding And Testing-Software Reliability And Quality Management:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
40	Coding And Testing: Coding, Code review,	1	24/02/26		TLM-2	
41	Software documentation	1	27/02/26		TLM-2	
42.	Testing, Black-box testing	1	28/02/26		TLM-2	
43.	White-Box testing, Debugging	1			TLM-1	
44	Program analysis tools	1	06/03/26		TLM-1	
45	Integration testing, Testing object- oriented programs	1			TLM-1	
46.	Smoke testing, and Some general issues associated with testing	1	07/03/26		TLM-1	
47	State chart diagrams	1	10/03/26		TLM-2	
48	**Software Reliability and**	1	13/03/26		TLM-2	

	Quality Management: Software reliability					
49	Statistical testing, Software quality	1	14/03/26		TLM-2	
50	Software quality management system	1			TLM-2	
51	ISO 9000.SEI Capability maturity model	1	17/03/26		TLM-2	
52	Few other important quality standards, and Six Sigma	1			TLM-2	
No. of classes required to complete UNIT-IV: 9				**No. of classes taken:**		

UNIT-V: Computer-Aided Software Engineering

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
53	CASE and its scope, CASE environment	1	20/03/26		TLM-2	
54	CASE support in the software life cycle	1	21/03/26		TLM-1	
55	Other characteristics of CASE tools	1	24/03/26		TLM-1	
56	Towards second generation CASE Tool and Architecture of a CASE Environment.	1	27/03/26		TLM-1	
57	**Software Maintenance:** Characteristics of software maintenance	1	28/03/26		TLM-1	
58	Software reverse engineering,	1	31/03/26		TLM-1	
59	Software maintenance process models and Estimation of maintenance cost	1	03/04/26		TLM-1	
60	**Software Reuse**: reuse-definition, introduction, reason behind no reuse so far	1			TLM-1	
61	Basic issues in any reuse program	1	04/04/26		TLM-1	
62	A reuse approach, and Reuse at organization level.	1			TLM-1	
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 (III, IV & V)	A2=5
II- Descriptive Examination (III, IV & V)	M2=15
II-Quiz Examination (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.

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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mrs.K.Lakshmi Devi	Dr J.Nageswara Rao	G.Rajendra	Dr. D. Ratna Kishore
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.G. Rajendra
Course Name & Code : Operating Systems & Software Engineering Lab
L-T-P Structure : 0-0-3 Credits : 1.5
Program/Sem/Sec : B.Tech., IT., IV-Sem.,-B A.Y: 2025-26

Course Objectives:
The main objectives of the course are to

- Provide insights into system calls, file systems, semaphores,
- Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
- Implement Bankers Algorithms to Avoid the Dead Lock
- Acquire the generic software development skill through various stages of software life cycle
- Generate test cases for software testing

Course Outcomes (COs):

CO1: Implement and evaluate fundamental operating system concepts through programming exercises, including UNIX commands, system calls, and simulations of CPU scheduling algorithms. **(L3)**
CO2: Analyze synchronization mechanisms (semaphores and monitors) and memory allocation algorithms (first-fit, worst-fit, best-fit) through writing concurrent programs using the pthreads library. **(L4)**
CO3: Design, develop, and test real-world software using methodologies, UML, and testing principles. **(L3)**
CO4: Improve individual/ Teamwork skills, communication and report writing skills with ethical values.

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

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

Sample Experiments in Operating Systems	
LAB CYCLES	
CYCLE-1	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Practicing of Basic UNIX Commands.
Exp-2	Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
Exp-3	Simulate UNIX commands like cp, ls, grep, etc.,
CYCLE-2	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Simulate the following CPU scheduling algorithms a) FCFS b) SJF
Exp-2	Simulate the following CPU scheduling algorithms a) Priority b) Round Robin
Exp-3	Control the number of ports opened by the operating system with a) Semaphore b) Monitors.
Exp-4	Write a program to illustrate concurrent execution of threads using pthreads library.
CYCLE-3	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Write a program to solve producer-consumer problem using Semaphores.
Exp-2	Implement the following memory allocation methods for fixed partition a) First fit b) Worst fit c) Best fit
Exp-3	Simulate the following page replacement algorithms a) FIFO b) LRU c) LFU
Exp-4	Simulate Paging Technique of memory management.
CYCLE-4	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Implement Bankers Algorithm for Dead Lock avoidance and prevention
Exp-2	Simulate the following file allocation strategies a) Sequential b) Indexed c) Linked
Exp-3	Download and install nachos operating system and experiment with it

Sample Experiments in Software Engineering:	
LAB CYCLES	
CYCLE-1	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Perform the following, for the following experiments: i. Do the Requirement Analysis and Prepare SRS ii. Draw E-R diagrams, DFD, CFD and structured charts for the project. a. Course Registration System b. Students Marks Analyzing System c. Online Ticket Reservation System d. Stock Maintenance
Exp-2	Consider any application, using COCOMO model, estimate the effort
Exp-3	Consider any application, calculate effort using FP oriented estimation model.
Exp-4	Draw the UML Diagrams for the problem a, b, c, d.
CYCLE-2	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Design the test cases for e-Commerce application (Flipcart, Amazon)
CYCLE-3	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Design the test cases for a Mobile Application (Consider any example from Appstore)
CYCLE-4	
S. No	**LIST OF EXPERIMENTS**
Exp-1	Design and Implement ATM system through UML Diagrams.

PART-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
List of Experiments in Operating Systems						
Cycle-1						
1.	Exp-1	1	03-12-2025		**TLM4**	
2.	Exp-2	1			**TLM4**	
3.	Exp-3	1			**TLM4**	
Cycle-2						
4.	Exp-1	1	10-12-2025		**TLM4**	
5.	Exp-2	2			**TLM4**	
6.	Exp-3	1	17-12-2025		**TLM4**	
7.	Exp-4	2			**TLM4**	
Cycle-3						
8.	Exp-1	2	24-12-2025		**TLM4**	
9.	Exp-2	1			**TLM4**	
10.	Exp-3	2	31-12-2025		**TLM4**	
11.	Exp-4	1			**TLM4**	
Cycle-4						
12.	Exp-1	1	07-01-2026		**TLM4**	
13.	Exp-2	2			**TLM4**	
14.	Exp-3	3	21-01-2026		**TLM4**	
List of Experiments in Software Engineering						
CYCLE-1						
15.	Exp-1	3	28-01-2026		**TLM4**	
16.	Exp-2	3	04-02-2026		**TLM4**	
17.	Exp-3	3	11-02-2026		**TLM4**	
18.	Exp-4	3	18-02-2026		**TLM4**	
CYCLE-2						
19.	Exp-1	3	25-02-2026		**TLM4**	
Cycle-3						
20.	Exp-1	3	04-03-2026		**TLM4**	
Cycle-4						
21.	Exp-1	3	11-04-2026		**TLM4**	
22.	Revision		18-04-2026		**TLM1**	
23.	Lab Internal Exam		25-04-2026			

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

PART-C

EVALUATION PROCESS (R23 Regulations):

Evaluation Task	Marks
Day-to-day Work	A1=10
Record & Observation	B1=5
Internal Exam	C1=15
Cumulative Internal Examination (CIE):(A1+B1+C1)	**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.

Course Instructor	Module Coordinator	Course Coordinator	HOD
Dr. G. RAJENDRA	Dr. G. RAJENDRA	Dr. G. RAJENDRA	Dr. D. Ratna Kishore

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor : Sambasivarao Ch
Course Name & Code : Data Base Management System lab(23CS56)
L-T-P Structure : 0-0-3 Credits: 1.5
Program/Sem/Sec : B.Tech. – IT / IV Sem / B A.Y. : 2025-26

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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO 2	3	2	2	-	2	-	-	-	-	-	-	-	-	3	-
CO 3	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	6	02-12-2025 09-12-2025		TLM4	
2	Queries (along with sub-Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.	6	16-12-2025 23-12-2025		TLM4	
3	Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views	3	30-12-2025		TLM4	
4	Queries using Conversion functions, string functions date functions	3	06-01-2026		TLM4	
5	Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section	3	20-01-2026		TLM4	
6	Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block	3	03-02-2026		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	10-02-2026		TLM4	
8	Program development using Loops and ERROR Handling	3	17-02-2026		TLM4	

9	Programs development using creation of procedures,	3	24-02-2026		TLM4	
10	Program development using creation of stored functions	3	10-03-2026		TLM4	
11	Develop programs using features parameters in a CURSOR	3	17-03-2026		TLM4	
12	Develop Programs using Triggers	3	24-03-2026		TLM4	
13	Internal Lab exam		31-03-2026		TLM4	

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

PART-C

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 modelling to complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**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):

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	**Mr.Ch.Sambasivarao**	**Dr. M. Srinivasa Rao**	**Mrs. M.Hema Latha**	**Dr. D. Ratna Kishore**
Signature				

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT

PART-A

Name of Course Instructor : Dr.S.Naganjaneyulu
Course Name & Code : PYTHON PROGRAMMING **(SEC-B)** & 23CSS1
L-T-P Structure : **0-1-2** **Credits:** 2
Program/Sem/Sec : B.Tech/IT/IV/B **A.Y.:** 2025-26

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-1:** Introduction, Course Outcomes Introduction to Python, Installation, Variables, Data types, Reading Input, Print output, Comments	3	04-12-2025		
2.	Types of operators, Working on Operators, Sample Programs, Type Conversion, Control stmts if, else, nested-if, elif.	3	11-12-2025		
3.	Loop statements, Programs on Loop statements, pass, continue and break	3	18-12-2025		
4.	Exception Handling, Programs on exception handling.	3	23-12-2025		
5.	**UNIT-2:** Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments, sample programs.	3	08-01-2026		
6.	Strings Introduction, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings., Sample Programs on strings	3	22-01-2026		
7.	Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement., Programs on Lists	3	29-01-2026		
8.	**Unit-3:** Introduction to Dictionaries, Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Sample programs on dictionaries.	3	05-02-2026		
9.	Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Sample Programs 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	12-02-2026		

10.	**Unit-4**: Introduction to files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, sample programs on files.	3	19-02-2026		
11.	Pickle Module, Reading and Writing CSV Files, Python os and os. path Modules. Sample programs.	3	26-02-2026		
12.	**Object-Oriented Programming**: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, sample programs.	3	05-03-2026		
13.	Encapsulation, Inheritance, Polymorphism, Sample Python programs on object-oriented programming.	3	05-03-2026 12-03-2026		
14.	**Unit 5: Introduction to Data Science**: Functional Programming, JSON and XML in Python, NumPy with Python, Example Programs on NumPy Pandas, Example Programs on pandas.	3	12-03-2026		
16.	**Internal Exam**	3	02-04-2025		

PART-C

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

ACADEMIC CALENDAR

Description	From	To	Weeks
Commencement of Class Work	01-12-2025		
I Phase of Instructions	01-12-2025	24-01-2025	8W
I Mid Examinations	**26-01-2026**	**31-01-2026**	**1W**
II Phase of Instructions	02-02-2026	04-04-2026	9W
II Mid Examinations	**06-04-2026**	**11-04-2026**	**1W**
Preparation and Practical's	13-04-2026	18-04-2026	1W
Semester End Examinations	20-04-2026	02-05-2026	2W

EVALUATION PROCESS (R23 Regulation):

Evaluation Task	Marks
Day to Day Work:	15
Internal Test	15
Continuous Internal Assessment	30
Procedure	20
Execution & Results	30
Viva-voce	20
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.
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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	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Signature				
Name of the Faculty	**Dr.S.Naganjaneyulu**	**Dr. K. Phaneendra**	**Dr. K. Phaneendra**	**Dr. D. Ratna Kishore**

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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
PART-A

Name of Course Instructor : J.Geetharenuka
Course Name & Code : Design Thinking & Innovation (23ME57)
Regulation : R23
L-T-P Structure : 1-0-2 **Credits:** 02
Program/Sem/Sec : B.Tech – IV Semester – B Section **A.Y.:** 2025-26

PREREQUISITE: None

COURSE OBJECTIVES:

The objectives of the course are to

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

Textbooks:

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

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

PART-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered (Experiment Name)	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
	UNIT–I: INTRODUCTION TO DESIGN THINKING					
1	Introduction to elements and principles of Design	1	08/12/2025		TLM2	
	Activity: To understand the importance of design	2	08/12/2025		TLM6	
2	History of Design Thinking, New materials in Industry	1	22/12/2025		TLM2	
	Activity: To understand the importance of team work	2	22/12/2025		TLM6	
3	Basics of design-dot, line, shape, form as fundamental design components	1	29/12/2025		TLM2	
	Activity: Developing sketches using dot, line and form	2	29/12/2025		TLM6	
	UNIT–II: DESIGN THINKING PROCESS					
4	Design thinking process: Empathy	1	05/01/2026		TLM2	
	Activity: To understand the significance of Empathy	2	05/01/2026		TLM6	
5	Design thinking process: Define or Analyze	1	19/01/2026		TLM2	
	Activity: To understand the significance of Define/analyze	2	19/01/2026		TLM6	
6	Design thinking process: Ideate	1	02/02/2026		TLM2	
	Activity: To understand the significance of Ideate	2	02/02/2026		TLM6	

7	Design thinking process: Prototype	1	09/02/2026		TLM2	
	Activity: To understand the significance of Prototype	2	09/02/2026		TLM6	
8	Tools of design thinking in social innovations	1	16/02/2026		TLM2	
	Activity: Students should present their understanding of DTI elements using example	2	16/02/2026		TLM6	
	UNIT – III: INNOVATION					
9	Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations	1	23/02/2026		TLM2	
	Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation	2	23/02/2026		TLM6	
	UNIT – IV: PRODUCT DESIGN					
10	Problem formation, introduction to product design, Product strategies, Product value	1	02/03/2026		TLM2	
	Activity: Development of Business models, setting of specifications	2	02/03/2026		TLM6	
11	Product planning, product specifications. Innovation towards product design Case studies.	1	09/03/2026		TLM2	
	Activity: Explaining their own product and model design, case studies	2	09/03/2026		TLM6	
	UNIT – V: DESIGN THINKING IN BUSINESS PROCESSES					
12	Business & Strategic Innovation, Business challenges, Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes	1	16/03/2026		TLM2	
	Activity: Marketing strategies of our own product, its maintenance,	2	16/03/2026		TLM6	

	Reliability and plan for startup					
I Mid Exams: 26-01-2026 to 31-01-2026						
II Mid Exams: 06-04-2026 11-04-2026						
No. of classes required to complete: 36				**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

ACADEMIC CALENDAR:

Description	**From**	**To**	**Weeks**
I Phase of Instructions	01-12-2025	24-01-2026	8 W
I Mid Examinations	26-01-2026	31-01-2026	1 W
II Phase of Instructions	02-02-2026	04-04-2026	8 W
II Mid Examinations	06-04-2026	11-04-2026	1 W
Preparation and Practical's	13-04-2026	18-04-2026	1 W
Semester End Examinations	20-04-2026	02-05-2026	2 W

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+Q	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.
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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.

Signature				

Name of the Faculty	J.GeethaRenuka	Dr V. Ramakrishna	Dr.G.Rajendra	Dr. D.Rathna Kishore
Designation	**Course Instructors**	**Course Coordinator**	**Module Coordinator**	**HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)
Accredited by NAACwith'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.
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE HANDOUT
Part-A

PROGRAM	**:** II B. Tech., IV-Sem., IT-B
ACADEMIC YEAR	**:** 2025-26
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	-	-	-

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

BOS APPROVED TEXT BOOKS:

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

T2. Palaniswamy,EnvironmentalStudies,2/e,Pearsoneducation,2014.

T3.S.AzeemUnnisa,EnvironmentalStudies,AcademicPublishingCompany,2021.

T4.K.RaghavanNambiar,"TextbookofEnvironmentalStudiesforUndergraduate

Courses as per UGC model syllabus", SciTech Publications (India), Pvt. Ltd, 2010.

ReferenceBooks:

R1.KVSG Murali Krishna, The Book of Environmental Studies, 2/e, VGS Publishers, 2011.
R2. DeekshaDaveandE.SaiBabaReddy,TextbookofEnvironmentalScience,2/e, Cengage Publications, 2012.
R3.M.AnjiReddy,"TextbookofEnvironmentalSciencesandTechnology",BSPublication, 2014.
R4.J.P.Sharma,ComprehensiveEnvironmentalstudies,Laxmipublications,2006.
R5.J.GlynnHenryandGaryW.Heinke,EnvironmentalSciencesandEngineering, Prentice Hall of India Private limited, 1988.
R6.G.R.Chatwal,ATextBookofEnvironmentalStudies,HimalayaPublishingHouse, 2018.
R7. GilbertM.MastersandWendellP.Ela,IntroductiontoEnvironmentalEngineering 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	02-12-2025		TLM2			
2.	Multidisciplinary Nature ofEnvironmental Studies	1	05-12-2025		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	09-12-2025		TLM1	CO1	T1,T2	
4.	Water resources	1	12-12-2025		TLM1	CO1	T1,T2	
5.	Mineral resources	1	16-12-2025		TLM1	CO1	T1,T2	
6.	Food resources	1	19-12-2025		TLM1	CO1	T1,T2	
7.	Energy resources	1	23-12-2025					
No. of classes required to complete UNIT-I		06			No. of classes taken:			

UNIT-II: Ecosystems and 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
8.	Ecosystems – Structure & Functions	1	26-12-2025		TLM1	CO2	T1,T2	
9.	Ecological succession &	1	30-12-2025		TLM1	CO2	T1,T2	
10.	Food chains, Food webs & Ecological Pyramids	1	02-01-2026		TLM1	CO2	T1,T2	
11.	Types of ecosystems	1	06-01-2026		TLM1	CO2	T1,T2	
12.	Biodiversity – introduction, levels, bio geographic classification	1	09-01-2026		TLM1	CO2	T1,T2	
13.	Values of Biodiversity, India as mega diversity nation	1	16-01-2026		TLM1	CO2	T1,T2	
14.	Threats to biodiversity and Conservation of biodiversity	1	20-01-2026		TLM1	CO2	T1,T2	

15.	Revision	1	23-01-2026		TLM3	CO2	T1,T2	
No. of classes required to complete UNIT-II		06			No. of classes taken:			

I MID EXAMINATIONS (26-01-2026 TO 31-01-2026)

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
16.	Environmental pollution -Air pollution	1	03-02-2026		TLM1	CO3	T1,T2	
17.	Water pollution, Marine pollution, Thermal pollution	1	06-02-2026		TLM1	CO3	T1,T2	
18.	Soil pollution	1	10-02-2026		TLM1	CO3	T1,T2	
19.	Noise pollution & Nuclear Hazards	1	13-02-2026		TLM1	CO3	T1,T2	
20.	Solid waste management	1	17-02-2026		TLM1	CO3	T1,T2	
21.	Disaster management	1	20-02-2026		TLM1	CO3	T1,T2	
No. of classes required to complete UNIT-III		06			No. of classes taken:			

UNIT-IV: Social Issues and 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
22.	From Unsustainable to Sustainable development	1	24-02-2026		TLM1	CO4	T1,T2	
23.	Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns	1	27-02-2026		TLM1	CO4	T1,T2	
24.	Environmental ethics, Climate change	1	03-03-2026		TLM1	CO4	T1,T2	
25.	Carbon credits & Mission LiFE - Wasteland reclamation. – Consumerism and waste products	1	06-03-2026		TLM1	CO4	T1,T2	
26.	Environmental Acts	1	10-03-2026		TLM1	CO4	T1,T2	
27.	Environmental Acts	1	13-03-2026		TLM1	CO4	T1,T2	
No. of classes required to complete UNIT-IV		06			No. of classes taken:			

UNIT-V: Human Population & Environment

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	Text Book	HOD Sign

		Required	Completion	Completion	Methods	COs	followed	Weekly
28.	Population growth, variation among nations. Population explosion – Family Welfare Programmes.	1	17-03-2026		TLM1	CO5	T1,T2	
29.	Environment and human health –Human Rights – Value Education	1	20-03-2026		TLM1	CO5	T1,T2	
30.	HIV/AIDS – Women and Child Welfare	1	24-03-2026		TLM1	CO5	T1,T2	
31.	Role of information Technology in Environment and human health	1	27-03-2026		TLM1	CO5	T1,T2	
32.	Revision	1	31-03-2026		TLM3	CO5	T1,T2	
33.	Revision	1	03-04-2026		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		06			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
34.	Case studies	2	16-01-2026 13-03-2026		TLM2	CO2	T1,T2	
No. of classes		2			No. of classes taken:			
II MID EXAMINATIONS (06-04-2026 TO 11-04-2026)								

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.
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Dr. Shaheda Niloufer	**Dr. Shaheda Niloufer**	**Dr. Shaheda Niloufer**	**Dr. T. Satyanarayana**
Course Instructor	Course Coordinator	Module Coordinator	HOD