



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)  
 An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution  
 Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada  
 L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

<http://lbrce.ac.in/it/index.php>, [hodit@lbrce.ac.in](mailto:hodit@lbrce.ac.in), Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mr. G. Rajendra

**Course Name & Code** : Operating Systems & 20CS11

**Section:** A

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

**Credits:** 3

**Program/Sem/Sec** : B.Tech., IT., IV-Sem.,

**A.Y:** 2023-24

**Pre-requisite:** Knowledge of Computer fundamentals & Data structures & Algorithms.

**Course Educational Objectives (CEOs):** The objective of the course is to provide basic knowledge of computer operating system structure and functioning, understand how Operating Systems evolved with advent of computer architecture, and comprehend the different CPU scheduling algorithms, page replacement algorithms, disk scheduling and identify best one.

#### **COURSE OUTCOMES (CO):**

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

<b>CO1</b>	Demonstrate the underlying principles and techniques of operating system <b>(Understand-L2)</b>
<b>CO2</b>	Interpret scheduling and communication methods of processes handled by operating systems <b>(Understand-L2)</b> .
<b>CO3</b>	Distinguish the process synchronization methods and deadlock handling approaches employed in operating systems <b>(Understand-L2)</b> .
<b>CO4</b>	Classify memory management techniques and virtual memory mechanisms <b>(Understand-L2)</b> .
<b>CO5</b>	Interpret the strategies of disk scheduling algorithms and file system architecture <b>(Understand-L2)</b> .

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>C01</b>	2	1	2	-	-	-	-	-	-	-	-	1	3	1	1
<b>C02</b>	1	2	2	-	-	-	-	-	-	-	-	1	3	1	2
<b>C03</b>	2	1	2	-	-	-	-	-	-	-	-	1	2	3	3
<b>C04</b>	-	2	2	-	-	-	-	-	-	-	-	1	2	3	3
<b>C05</b>	-	1	2	-	-	-	-	-	-	-	-	1	1	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).

**TEXTBOOKS:**

1. Silberschatz & Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

**REFERENCE BOOKS:**

1. William Stallings, "Operating Systems", PHI, 5th Edition, 2004.

2. B.A. Forouzan & R.F. Giberg, —Unix and shell Programming||, Thomson, First Edition, New Delhi, 2003.

3. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html>

4. [https://swayam.gov.in/nd1\\_noc19\\_cs50/preview](https://swayam.gov.in/nd1_noc19_cs50/preview)

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN)****UNIT-I: Introduction to Operating 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
1.	Introduction to Course Outcomes and Program Outcomes	1	04-01-2024		<b>TLM2</b>	
2.	Operating-System Services	1	05-01-2024		<b>TLM2</b>	
3.	User Operating-System Interface.	1	06-01-2024		<b>TLM2</b>	
4.	System Calls, Types of System Calls,	1	08-01-2024		<b>TLM2</b>	
5.	System Programs, Operating-System Design and Implementation	1	11-01-2024		<b>TLM2</b>	
6.	<b>Tutorial-1</b>	1	12-01-2024		<b>TLM3</b>	
7.	Operating-System Structure	1	18-01-2024		<b>TLM2</b>	
8.	Virtual Machines.	1	19-01-2024		<b>TLM2</b>	
9.	Operating-System Generation, System Boot	1	20-01-2024		<b>TLM2</b>	
10.	<b>Tutorial-2</b>	1	22-01-2024		<b>TLM3</b>	
11.	<b>Assignment-1/ Quiz-1</b>	1	25-01-2024		<b>TLM6</b>	
No. of classes required to complete UNIT-I		11	No. of classes taken:			

**UNIT-II: Process Management & Process 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
12.	Process Concept, IPC.	1	27-01-2024		TLM2	
13.	Communication in Client-Server Systems.	1	29-01-2024		TLM2	
14.	Threads: Overview,	1	01-02-2024		TLM2	
15.	Multithreading Models	1	02-02-2024		TLM2	
16.	Process Scheduling: Scheduling Criteria.	1	03-02-2024		TLM2	
17.	Scheduling Algorithms (FCFS, SJF)	1	05-02-2024		TLM2	
18.	Scheduling Algorithms (Priority)	1	08-02-2024		TLM2	
19.	<b>Tutorial-3</b>	1	09-02-2024		TLM3	
20.	Scheduling Algorithms (Round Robin)	1	12-02-2024		TLM2	
21.	Discuss various problems related to scheduling algorithms	1	15-02-2024		TLM2	
22.	Discuss various problems related to scheduling algorithms	1	16-02-2024		TLM2	
23.	<b>Tutorial-4</b>	1	17-02-2024		TLM3	
24.	<b>Assignment-2 / Quiz-2</b>	1	19-02-2024		TLM6	
No. of classes required to complete UNIT-II		14	No. of classes taken:			

**UNIT-III: Synchronization and 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
25.	The Critical-Section Problem	1	22-02-2024		TLM2	
26.	Peterson's Solution, Synchronization Hardware.	1	23-02-2024		TLM2	
27.	Semaphores, Classic Problems of Synchronization.	1	24-02-2024		TLM2	
28.	Monitors <b>Tutorial-5</b>	1	04-03-2024		TLM2 TLM3	
29.	Deadlocks: System Model, Deadlock Characterization.	1	07-03-2024		TLM2	
30.	Methods for Handling Deadlocks.	1	09-03-2024		TLM2	
31.	Deadlock Prevention	1	11-03-2024		TLM2	
32.	Deadlock Avoidance, Deadlock Detection.	1	14-03-2024		TLM2	
33.	Recovery from Deadlock.	1	15-03-2024		TLM2, TLM3	
34.	<b>Tutorial-6 Assignment-3 / Quiz-3</b>	1	16-03-2024		TLM3 TLM6	
No. of classes required to complete UNIT-III		11	No. of classes taken:			

**(26-02-2024 TO 02-03-2024) I-MID EXAMS**

**UNIT-IV: Memory Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Memory Management Strategies: Swapping, Contiguous Memory Allocation.	1	18-03-2024		TLM2	
36.	Paging, Structure of the Page Table.	1	21-03-2024		TLM2	
37.	Segmentation	1	22-03-2024		TLM2	
38.	<b>Tutorial-7</b>	1	23-03-2024		TLM3	
39.	Virtual Memory Management:	1	28-03-2024		TLM2	
40.	Demand Paging	1	30-03-2024		TLM2	
41.	Page Replacement,	1	01-04-2024		TLM2	
42.	Allocation of Frames, Thrashing.	1	04-04-2024		TLM2	
43.	<b>Tutorial-8</b>	1	06-04-2024		TLM3	
44.	<b>Assignment-4 / Quiz-4</b>	1	08-04-2024		TLM6	
No. of classes required to complete UNIT-IV		10	No. of classes taken:			

**UNIT-V: File System Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Overview of Mass-Storage Structure, Disk Structure.	1	11-04-2024		TLM2	
46.	Disk Attachment, Disk Scheduling.	1	12-04-2024		TLM2	
47.	Disk Management	1	13-04-2024		TLM2	
48.	<b>Tutorial-9</b>	1	15-04-2024		TLM3	
49.	File-System Structure, File-System Implementation	1	18-04-2024		TLM2	
50.	Directory Implementation, Allocation Methods	1	19-04-2024		TLM2	
51.	Free-space Management	1	20-04-2024		TLM2	
52.	Efficiency and Performance, Recovery.	1	22-04-2024		TLM2	
53.	<b>Tutorial-10 Assignment-4 / Quiz-4</b>	1	25-04-2024		TLM3 TLM6	
No. of classes required to complete UNIT-V		11	No. of classes taken:			

**(29-04-2024 TO 04-05-2024) 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
54.	Multiprocessor Operating Systems	1	26-04-2024			
55.	Virtualization	1	27-04-2024			

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

### ACADEMIC CALENDAR:

Description	From	To	Weeks
<b>Commencement of Class Work</b>	<b>01-01-2024</b>		
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	<b>26-02-2024</b>	<b>02-03-2024</b>	1W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	<b>29-04-2024</b>	<b>04-05-2024</b>	1W
Preparation and Practical	06-05-2024	11-05-2024	1W
Semester End Examinations	<b>13-05-2024</b>	<b>25-05-2024</b>	2W
Internship	27-05-2024	06-07-2024	6W

### EVALUATION PROCESS:(R20 Regulations)

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

## PART-D

### PROGRAMME OUTCOMES (POs):

PO1	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/Development of Solutions:</b> 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	<b>Conduct Investigations of Complex Problems:</b> 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	<b>Modern Tool Usage:</b> 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	<b>The Engineer and Society:</b> 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	<b>Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of the project 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	<b>Life-long Learning:</b> 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):

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

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



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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : Mr. M. Rajesh Reddy  
 Course Name & Code : Data Mining using Python Lab & 20CS58  
 L-T-P Structure : 0-0-3 Credits : 1.5  
 Program/Sem/Sec : B.Tech., IT., IV-Sem., A section A.Y : 2023-24

#### PRE-REQUISITE : Python Programming

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The objective of this lab is to Practical exposure on implementation of well-known data mining algorithms and Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

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

CO#	Description	Target
CO 1	Apply preprocessing techniques on real world datasets.(Apply-L3)	65
CO 2	Apply apriori algorithm to generate frequent itemsets.(Apply L3)	65
CO 3	Apply Classification and clustering algorithms on different datasets.(Apply L3)	65
CO 4	Improve individual / teamwork skills, communication & report writing skills with ethical values.	67

#### 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	PS O3
CO1	-	-	2	-	1	-	-	-	-	-	-	-	3	1	
CO2	-	-	-	2	1	-	-	-	-	-	-	-	-	3	1
CO3	-	-	-	2	1	-	-	-	-	-	-	-	-	3	2
CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-

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

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

#### Web Resources:

- <https://analyticsindiamag.com/data-pre-processing-in-python/>
- <https://towardsdatascience.com/decision-tree-in-python-b433ae57fb93>
- <https://towardsdatascience.com/calculate-similarity-the-most-relevant-metrics-in-a-nutshell-9a43564f533e>
- <https://www.springboard.com/blog/data-mining-python-tutorial/>
- <https://medium.com/analytics-vidhya/association-analysis-in-python-2b955d0180c>
- <https://www.datacamp.com/community/tutorials/naive-bayes-scikit-learn>
- <https://www.analyticsvidhya.com/blog/2019/05/beginners-guide-hierarchical-clustering/>
- <https://towardsdatascience.com/dbscan-algorithm-complete-guide-and-application-with-python-scikit-learn-d690cbae4c5d>

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

S NO	Date (Tentative)	Actual Date	Topics to be covered	Teaching Learning Methods	HOD Signature
1	05.01.2024		Demonstrate the following data preprocessing tasks using python libraries. a) Loading the dataset b) Identifying the dependent and independent variables. c) Dealing with missing data	TLM4	
2	12.01.2024		Demonstrate the following data preprocessing tasks using python libraries. a) Dealing with categorical data. b) Scaling the features. c) Splitting dataset into Training and Testing Sets	TLM4	
3	19.01.2024		Demonstrate the following Similarity and Dissimilarity Measures using python a) Pearson's Correlation b) Cosine Similarity c) Jaccard Similarity d) Euclidean Distance e) Manhattan Distance	TLM4	
4	02.02.2024		Build a model using a linear regression algorithm on any dataset.	TLM4	
5	09.02.2024		Build a classification model using Decision Tree algorithm on iris dataset	TLM4	
6	16.02.2024		Apply Naïve Bayes Classification algorithm on any dataset	TLM4	
7	23.02.2024		Revision of Cycle-1 to 6		
<b>Mid - I Examinations 26.02.2024 to 02.03.2024</b>					
8	15.03.2024		Generate frequent item sets using Apriori Algorithm in python and also generate association rules for any market basket data	TLM4	
8	22.03.2024		Apply the K- Means clustering algorithm on any dataset	TLM4	
9	12.04.2024		Apply Hierarchical Clustering algorithms on any dataset.	TLM4	
10	12.04.2024		Apply the DBSCAN clustering algorithm on any dataset	TLM4	
<b><u>Additional Programs</u></b>					
11	19.04.2024		Build a model using a polynomial regression algorithm on any dataset.	TLM4	
12	19.04.2024		Build a model using a logistic regression algorithm on any dataset.	TLM4	
13	26.04.2024		<b>Internal Exam</b>	TLM4	



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

## ACADEMIC CALENDAR

<b>B.Tech (IV Semester)</b>			
Commencement of Class Work	01-01-2024		
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I MID Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II MID Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practicals	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W
Internship	27-05-2024	06-07-2024	6 W
Commencement of Next Semester Class Work	08-07-2024		

## PART-C

### EVALUATION PROCESS (R17 Regulations):

<b>Evaluation Task</b>	<b>Marks</b>
<b>Day-to-day work</b>	<b>D1=05</b>
<b>Record</b>	<b>R1=05</b>
<b>Internal Test</b>	<b>IT1=05</b>
<b>Continuous Internal Evaluation (CIE)=D1+R1+IT1</b>	<b>15</b>
<b>Procedure/Algorithm</b>	<b>P1=05</b>
<b>Experimentation/Program execution</b>	<b>E1=10</b>
<b>Observations/Calculations/Validation</b>	<b>O1=10</b>
<b>Result/Inference</b>	<b>R1=05</b>
<b>Viva voce</b>	<b>V1=05</b>
<b>Semester End Examination (SEE)= P1+ E1+ O1+ V1</b>	<b>35</b>
<b>Total Marks = CIE+SEE</b>	<b>50</b>

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
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<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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):

<b>PSO 1</b>	Organize, Analyze and interpret the data to extract meaningful conclusions.
<b>PSO 2</b>	Design, Implement and Evaluate a computer-based system to meet desired needs
<b>PSO 3</b>	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. M. Rajesh Reddy	Dr. K. Naga Prasanthi	Mrs. M. Hemalatha	Dr. B. Srinivasa Rao
Signature				



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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** M. Rajesh Reddy

**Course Name & Code** : Data Warehousing and Data mining & 20CS10

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

**Credits:** 3

**Program/Sem/Sec** : B.Tech/IV/A

**A.Y.:** 2023-24

**PREREQUISITE** : **DBMS and Probability and Statistics**

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The Objective of the course is to introduce the concepts of data warehouse and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data warehousing concepts.

CO	Description
CO1	Summarize the architecture of data warehouse.( <b>Understand- L2</b> )
CO2	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data.( <b>Apply - L3</b> )
CO3	Construct a decision tree and resolve the problem of model over fitting. ( <b>Analyze- L4</b> )
CO4	Compare Apriori and FP-growth association rule mining algorithms for frequent itemset generation.( <b>Apply - L3</b> )
CO5	Apply suitable clustering algorithm for the given data set.( <b>Apply - L3</b> )

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

**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	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	3	2	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	2	-	-	-	-	-	-	-	-	-	-	2
CO5	-	-	3	2	-	-	-	-	-	-	-	-	-	2	-
			<b>1 - Low</b>			<b>2 -Medium</b>			<b>3 - High</b>						

#### **TEXTBOOKS:**

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

#### **REFERENCE BOOKS:**

- R1** Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning, 2010.  
**R2** Data Mining : Introductory and Advanced topics : Dunham, First Edition, Pearson, 2020  
**R3** Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH, 2008.

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Data Warehouse and OLAP Technology

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Course and COs	1	02.01.2024		TLM1,2	
2.	Introduction to Unit-I	1	04.01.2024			
3.	<b>Data Warehouse and OLAP Technology:</b> An Overview: Data Warehouse	1	05.01.2024		TLM1,2	
4.	<b>Data Warehouse and OLAP Technology:</b> Data Warehouse Architecture	1	06.01.2024		TLM1,2	
5.	<b>Data Warehouse and OLAP Technology:</b> A Multidimensional Data Model	1	09.01.2024		TLM1,2	
6.	<b>Data Warehouse and OLAP Technology:</b> Data Warehouse Implementation	4	19.01.2024		TLM1,2	
7.	<b>Data Warehouse and OLAP Technology:</b> From Data Warehousing to Data Mining.	2	23.01.2024		TLM1,2	
8.	<b>Revision</b>	1	25.01.2024		TLM1,2	
9.	<b>Assignment on Unit-1</b>	1	27.01.2024			
<b>No. of classes required to complete UNIT-I: 13</b>				<b>No. of classes taken:</b>		

#### UNIT-II: Data Mining & Data Preprocessing

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	<b>Data Mining:</b> Introduction to Data Mining	1	30.01.2024		TLM1,2	
2.	Motivating challenges, The origins of Data Mining,	1	01.02.2024		TLM1,2	
3.	Data Mining Tasks, Types of Data, Data Quality.	2	03.02.2024		TLM1,2	
4.	<b>Data Preprocessing:</b> Aggregation	1	06.02.2024		TLM1,2	
5.	<b>Data Preprocessing:</b> Sampling, Dimensionality Reduction, Feature Subset Selection	2	09.02.2024		TLM1,2	
6.	<b>Data Preprocessing:</b> Feature creation	1	10.02.2024		TLM1,2	
7.	<b>Data Preprocessing:</b> Discretization and Binarization Variable Transformation	1	13.02.2024		TLM1,2	
8.	<b>Data Preprocessing:</b> Measures of Similarity and Dissimilarity	1	15.02.2024		TLM1,2	
9.	<b>Revision</b>	1	16.02.2024		TLM1,2	
10.	<b>Assignment on Unit-2</b>	1	17.02.2024			
<b>No. of classes required to complete UNIT-II: 12</b>				<b>No. of classes taken:</b>		

### UNIT-III: Classification & Model Over fitting

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.	<b>Classification:</b> Basic Concepts, General Approach to solving a classification problem	1	20.02.2024		TLM1,2	
2.	<b>Decision Tree Induction:</b> Working of Decision Tree, building a decision tree	1	22.02.2024		TLM1,2	
3.	methods for expressing an attribute test conditions, measures for selecting the best split	1	23.02.2024		TLM1,2	
4.	Algorithm for decision tree Induction.	1	24.02.2024		TLM1,2	
<b>Mid - I Examinations from 26.02.2024 to 02.03.2024</b>						
5.	<b>Model Overfitting:</b> Due to presence of noise, due to lack of representation samples	1	05.03.2024		TLM1,2	
6.	<b>Evaluating the performance of classifier:</b> holdout method, random sub sampling, cross-validation, bootstrap.	2	12.03.2024		TLM1,2	
7.	BayesTheorem	1	14.03.2024		TLM1,2	
8.	Naïve Bayes Classifier	1	15.03.2024		TLM1,2	
9.	<b>Assignment on Unit-3</b>	1	16.03.2024			
<b>No. of classes required to complete UNIT-III: 10</b>				<b>No. of classes taken:</b>		

### UNIT-IV: Association Analysis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	<b>Association Analysis:</b> Basic Concepts	1	19.03.2024		TLM1,2	
2.	Algorithms: Problem Definition, Frequent Item Set Generation	2	22.03.2024		TLM1,2	
3.	Apriori Principle, Apriori Algorithm	2	26.03.2024		TLM1,2	
4.	Rule Generation, Compact Representation of Frequent Itemsets	2	30.03.2024		TLM1,2	
5.	FPGrowth Algorithm	2	04.04.2024		TLM1,2	
6.	<b>Assignment on Unit-4</b>	1	06.04.2024			
<b>No. of classes required to complete UNIT-IV: 10</b>				<b>No. of classes taken:</b>		

### UNIT-V: Cluster Analysis

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	<b>Cluster Analysis:</b> Basic Concepts and Algorithms: Preliminaries	1	12.04.2024		TLM1,2	
2.	Different Types of Clustering, Different Types of Clusters;	1	13.04.2024		TLM1,2	
3.	<b>K-means:</b> The Basic K-means Algorithm	1	16.04.2024		TLM1,2	
4.	K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses;	1	18.04.2024		TLM1,2	
5.	Exercise problems on K-means	1	19.04.2024		TLM1,2	
6.	<b>Agglomerative Hierarchical Clustering:</b> Basic Agglomerative Hierarchical Clustering Algorithm	1	20.04.2024		TLM1,2	
7.	Exercise problems on Agglomerative Hierarchical Clustering Algorithm	1	23.04.2024		TLM1,2	
8.	DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. Exercise problems on DBSCAN Algorithm	1	25.04.2024		TLM1,2	
9.	<b>Assignment on Unit-5</b>	1	26.04.2024			
<b>No. of classes required to complete UNIT-V:09</b>				<b>No. of classes taken:</b>		

### CONTENT BEYOND THE SYLLABUS:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Regression Analysis - I (Linear Regression)	1	27.04.2024		TLM1,2	
2.	Regression Analysis - II (Logistic Regression)	1	27.04.2024		TLM1,2	

### Teaching Learning Methods

<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

## ACADEMIC CALENDAR

B.Tech (IV Semester)			
Commencement of Class Work	01-01-2024		
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I MID Examinations	26-02-2024	02-03-2024	1 W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II MID Examinations	29-04-2024	04-05-2024	1 W
Preparation and Practicals	06-05-2024	11-05-2024	1 W
Semester End Examinations	13-05-2024	25-05-2024	2 W
Internship	27-05-2024	06-07-2024	6 W
Commencement of Next Semester Class Work	08-07-2024		

### PART-C

#### EVALUATION PROCESS (R20 Regulation):

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

## PART-D

### PROGRAMME OUTCOMES (POs):

PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis:</b> 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	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> 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	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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	<b>Project management and finance:</b> 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	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

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

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. M. Rajesh Reddy	Dr. K. Naga Prasanthi	Mrs. M. Hema Latha	Dr. B. Srinivasa Rao
Signature				





# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : Dr. Shaheda Niloufer  
Course Name & Code : Environmental Science & 20MC03  
L-T-P Structure : 2-0-0 Credits : 0  
Program/Sem/Sec : B.Tech., IT-A., IV-Sem., SEC-A A.Y : 2023-24

#### PRE-REQUISITE:

**COURSE EDUCATIONAL OBJECTIVES (CEOs):** The purpose of this course is to provide a general background on developing an understanding of systems and cycles on the earth and how individual organisms live together in complex communities and how human activities influence our air, water and soil. It also helps in developing an understanding about our use of fossil fuels and effect on climate and sustainable management of natural resources.

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

CO 1	Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO 2	Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO 3	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 4	Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5	Identify the significance of implementing environmental laws and abatement devices for environmental management.

**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).

#### TEXT BOOKS:

**T1** Anubha Kaushik, C.P.Kaushik, "Perspectives in Environmental Studies", New age international publishers, 5<sup>th</sup> Edition, Delhi, 2016.

**T2** Mahua Basu, S. Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 1<sup>st</sup> Edition, Delhi, 2016.

#### REFERENCE BOOKS:

**R1** S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2<sup>nd</sup> Edition, Delhi, 2014.

**R2** R. Rajagopalan, "Environmental Studies (From Crisis to Cure)", Oxford University Press,

2<sup>nd</sup> Edition, New Delhi, 2012.

- R3** De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5<sup>th</sup> Edition, New Delhi, 2003.
- R4** Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1<sup>st</sup> Edition, Vijayawada, 2010.
- R5** G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13<sup>th</sup> Edition, New Delhi, 2009.

### **PART-B**

#### **COURSE DELIVERY PLAN (LESSON PLAN):**

##### **UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS**

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 of course and course objectives. Introduction of components of Environment	1	02-01-2024		2	
2.	Population explosion and variations among Nations.	1	06-01-2024		2	
3.	Resettlement and Rehabilitation - Issues and possible solutions	1	09-01-2024		2	
4.	Environmental Hazards	1	20-01-2024		2	
5.	Role of Information Technology in environmental management and human health.	1	23-01-2024		2	
No. of classes required to complete UNIT-I: 5				No. of classes taken:		

##### **UNIT-II: NATURAL RESOURCES AND CONSERVATION**

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 classification of Natural resources, Forest Resources,	1	27-01-2024		2	
2.	Water Resources	1	30-01-2024		2	
3.	Mineral Resources	1	03-02-2024		2	
4.	Food Resources	1	06-02-2024		2	
5.	Energy Resources	1	13-02-2024		2	
6.	Food Resources	1	17-02-2024		2	
No. of classes required to complete UNIT-II: 6				No. of classes taken:		

##### **UNIT-III: ECOLOGY AND BIODIVERSITY**

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.	Definition, structure and functions of an ecosystem	1	20-02-2024		2	
2.	Food chains and Food webs, Ecological succession, Ecological pyramids, Bio-geo-chemical cycles	1	24-02-2024		2	
3.	<b>I MID EXAMINATION</b>	1	27-02-2024			
4.	<b>I MID EXAMINATION</b>	1	02-03-2024			
5.	Values of biodiversity- Direct and Indirect values. Threats to	1	05-03-2024			

	biodiversity; Assignment in Unit II				2	
6.	Man and wild life conflicts. Endangered and endemic species of India	1	12-03-2024		2,3	
7.	Conservation of biodiversity: In- situ and Ex-situ conservation methods	1	16-03-2024		2	
No. of classes required to complete UNIT-III: 6				No. of classes taken:		

#### UNIT-IV : ENVIRONMENTAL POLLUTION

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.	Air Pollution	1	19-03-2024		2	
2.	Causes, effects and control measures of: Water Pollution	1	23-03-2024		2	
3.	Causes, effects and control measures of: Soil Pollution,	1	26-03-2024			
4.	Noise Pollution		30-03-2024			
5.	Solid Waste Management	1	02-04-2024		2,3	
6.	Disaster Management- Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	06-04-2024		2	
No. of classes required to complete UNIT-IV: 6				No. of classes taken:		

#### UNIT-V : ENVIRONMENTAL 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
1.	Sustainable Development	1	08-04-2024		2	
2.	Climate disruption- Greenhouse effect, ozone layer depletion and acid rain. Stockholm conference	1	16-04-2024		2,3	
3.	Environmental Impact Assessment (EIA),	1	20-04-2024		2	
4.	Environmental Law		23-04-2024		2	
5.	Green building		27-04-2024			
6.	II MID EXAMINATIONS	1	30-04-2024		2	
7.	II MID EXAMINATIONS	1	04-05-2024		2	
No. of classes required to complete UNIT-V: 05				No. of classes taken:		

#### Teaching Learning Methods

<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

## PART-C

### EVALUATION PROCESS (R17 Regulation):

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

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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.
<b>PO 6</b>	<b>The engineer and society:</b> 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.
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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.

<b>Title</b>	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	<b>Dr. Shaheda Niloufer</b>	<b>Dr. Shaheda Niloufer</b>	<b>Dr. Shaheda Niloufer</b>	<b>Dr. A. Rami Reddy</b>
<b>Signature</b>				



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)  
An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution  
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada  
L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

<http://lbrce.ac.in/it/index.php>, [hodit@lbrce.ac.in](mailto:hodit@lbrce.ac.in), Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mrs. T. Karuna Lathe

**Course Name & Code** : Operating Systems & 20CS11

**Section:** B

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

**Credits:** 3

**Program/Sem/Sec** : B.Tech., IT., IV-Sem.,

**A.Y:** 2023-24

**Pre-requisite:** Knowledge of Computer fundamentals & Data structures & Algorithms.

**Course Educational Objectives (CEOs):** The objective of the course is to provide basic knowledge of computer operating system structure and functioning, understand how Operating Systems evolved with advent of computer architecture, and comprehend the different CPU scheduling algorithms, page replacement algorithms, disk scheduling and identify best one.

#### **COURSE OUTCOMES (CO):**

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

<b>CO1</b>	Demonstrate the underlying principles and techniques of operating system <b>(Understand-L2)</b>
<b>CO2</b>	Interpret scheduling and communication methods of processes handled by operating systems <b>(Understand-L2)</b> .
<b>CO3</b>	Distinguish the process synchronization methods and deadlock handling approaches employed in operating systems <b>(Understand-L2)</b> .
<b>CO4</b>	Classify memory management techniques and virtual memory mechanisms <b>(Understand-L2)</b> .
<b>CO5</b>	Interpret the strategies of disk scheduling algorithms and file system architecture <b>(Understand-L2)</b> .

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>C01</b>	2	1	2	-	-	-	-	-	-	-	-	1	3	1	1
<b>C02</b>	1	2	2	-	-	-	-	-	-	-	-	1	3	1	2
<b>C03</b>	2	1	2	-	-	-	-	-	-	-	-	1	2	3	3
<b>C04</b>	-	2	2	-	-	-	-	-	-	-	-	1	2	3	3
<b>C05</b>	-	1	2	-	-	-	-	-	-	-	-	1	1	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).

**TEXTBOOKS:**

1. Silberschatz & Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

**REFERENCE BOOKS:**

1. William Stallings, "Operating Systems", PHI, 5th Edition, 2004.

2. B.A. Forouzan & R.F. Giberg, —Unix and shell Programming||, Thomson, First Edition, New Delhi, 2003.

3. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html>

4. [https://swayam.gov.in/nd1\\_noc19\\_cs50/preview](https://swayam.gov.in/nd1_noc19_cs50/preview)

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN)****UNIT-I: Introduction to Operating 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
1.	Introduction to Course Outcomes and Program Outcomes	1	03-01-2024		<b>TLM2</b>	
2.	Operating-System Services	1	04-01-2024		<b>TLM2</b>	
3.	User Operating-System Interface.	1	06-01-2024		<b>TLM2</b>	
4.	System Calls, Types of System Calls,	1	08-01-2024		<b>TLM2</b>	
5.	System Programs, Operating-System Design and Implementation	1	10-01-2024		<b>TLM2</b>	
6.	<b>Tutorial-1</b>	1	11-01-2024		<b>TLM3</b>	
7.	Operating-System Structure	1	12-01-2024		<b>TLM2</b>	
8.	Virtual Machines.	1	18-01-2024		<b>TLM2</b>	
9.	Operating-System Generation, System Boot	1	20-01-2024		<b>TLM2</b>	
10.	<b>Tutorial-2</b>	1	22-01-2024		<b>TLM3</b>	
11.	<b>Assignment-1/ Quiz-1</b>	1	24-01-2024		<b>TLM6</b>	
No. of classes required to complete UNIT-I		11	No. of classes taken:			

**UNIT-II: Process Management & Process 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
12.	Process Concept, IPC.	1	25-01-2024		TLM2	
13.	Communication in Client-Server Systems.	1	27-01-2024		TLM2	
14.	Threads: Overview,	1	29-01-2024		TLM2	
15.	Multithreading Models	1	31-01-2024		TLM2	
16.	Process Scheduling: Scheduling Criteria.	1	01-02-2024		TLM2	
17.	Scheduling Algorithms (FCFS, SJF)	1	03-02-2024		TLM2	
18.	Scheduling Algorithms (Priority)	1	05-02-2024		TLM2	
19.	<b>Tutorial-3</b>	1	07-02-2024		TLM3	
20.	Scheduling Algorithms (Round Robin)	1	08-02-2024		TLM2	
21.	Discuss various problems related to scheduling algorithms	1	12-02-2024		TLM2	
22.	Discuss various problems related to scheduling algorithms	1	14-02-2024		TLM2	
23.	<b>Tutorial-4</b>	1	15-02-2024		TLM3	
24.	<b>Assignment-2 / Quiz-2</b>	1	17-02-2024		TLM6	
No. of classes required to complete UNIT-II		14	No. of classes taken:			

**UNIT-III: Synchronization and 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
25.	The Critical-Section Problem	1	19-02-2024		TLM2	
26.	Peterson's Solution, Synchronization Hardware.	1	21-02-2024		TLM2	
27.	Semaphores, Classic Problems of Synchronization.	1	22-02-2024		TLM2	
28.	Monitors <b>Tutorial-5</b>	1	04-03-2024		TLM2 TLM3	
29.	Deadlocks: System Model, Deadlock Characterization.	1	06-03-2024		TLM2	
30.	Methods for Handling Deadlocks.	1	07-03-2024		TLM2	
31.	Deadlock Prevention	1	11-03-2024		TLM2	
32.	Deadlock Avoidance, Deadlock Detection.	1	13-03-2024		TLM2	
33.	Recovery from Deadlock.	1	14-03-2024		TLM2, TLM3	
34.	<b>Tutorial-6 Assignment-3 / Quiz-3</b>	1	16-03-2024		TLM3 TLM6	
No. of classes required to complete UNIT-III		11	No. of classes taken:			

**(26-02-2024 TO 02-03-2024) I-MID EXAMS**



**UNIT-IV: Memory Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Memory Management Strategies: Swapping, Contiguous Memory Allocation.	1	18-03-2024		TLM2	
36.	Paging, Structure of the Page Table.	1	20-03-2024		TLM2	
37.	Segmentation	1	21-03-2024		TLM2	
38.	<b>Tutorial-7</b>	1	23-03-2024		TLM3	
39.	Virtual Memory Management:	1	27-03-2024		TLM2	
40.	Demand Paging	1	28-03-2024		TLM2	
41.	Page Replacement,	1	30-04-2024		TLM2	
42.	Allocation of Frames, Thrashing.	1	01-04-2024		TLM2	
43.	<b>Tutorial-8</b>	1	03-04-2024		TLM3	
44.	<b>Assignment-4 / Quiz-4</b>	1	04-04-2024		TLM6	
No. of classes required to complete UNIT-IV		10	No. of classes taken:			

**UNIT-V: File System Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Overview of Mass-Storage Structure, Disk Structure.	1	06-04-2024		TLM2	
46.	Disk Attachment, Disk Scheduling.	1	08-04-2024		TLM2	
47.	Disk Management	1	10-04-2024		TLM2	
48.	<b>Tutorial-9</b>	1	15-04-2024		TLM3	
49.	File-System Structure, File-System Implementation	1	18-04-2024		TLM2	
50.	Directory Implementation, Allocation Methods	1	19-04-2024		TLM2	
51.	Free-space Management	1	20-04-2024		TLM2	
52.	Efficiency and Performance, Recovery.	1	22-04-2024		TLM2	
53.	<b>Tutorial-10 Assignment-4 / Quiz-4</b>	1	24-04-2024		TLM3 TLM6	
No. of classes required to complete UNIT-V		11	No. of classes taken:			

**(29-04-2024 TO 04-05-2024) 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
54.	Multiprocessor Operating Systems	1	25-04-2024			
55.	Virtualization	1	27-04-2024			

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

### ACADEMIC CALENDAR:

Description	From	To	Weeks
<b>Commencement of Class Work</b>	<b>01-01-2024</b>		
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	<b>26-02-2024</b>	<b>02-03-2024</b>	1W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	<b>29-04-2024</b>	<b>04-05-2024</b>	1W
Preparation and Practical	06-05-2024	11-05-2024	1W
Semester End Examinations	<b>13-05-2024</b>	<b>25-05-2024</b>	2W
Internship	27-05-2024	06-07-2024	6W

### EVALUATION PROCESS:(R20 Regulations)

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

## PART-D

### PROGRAMME OUTCOMES (POs):

PO1	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/Development of Solutions:</b> 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	<b>Conduct Investigations of Complex Problems:</b> 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	<b>Modern Tool Usage:</b> 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	<b>The Engineer and Society:</b> 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	<b>Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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	<b>Project Management and Finance:</b> 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	<b>Life-long Learning:</b> 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):

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

Course Instructor	Module Coordinator	Course Coordinator	HOD
Mrs. T. karuna Latha	Dr. O. Rama Devi	Mrs. T. Karuna Latha	Dr. B. Srinivasa Rao



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)  
 An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution  
 Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada  
 L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

<http://lbrce.ac.in/it/index.php>, [hodit@lbrce.ac.in](mailto:hodit@lbrce.ac.in), Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mrs. T. Karuna Lathe

**Course Name & Code** : Operating Systems & 20CS11

**Section:** B

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

**Credits:** 3

**Program/Sem/Sec** : B.Tech., IT., IV-Sem.,

**A.Y:** 2023-24

**Pre-requisite:** Knowledge of Computer fundamentals & Data structures & Algorithms.

**Course Educational Objectives (CEOs):** The objective of the course is to provide basic knowledge of computer operating system structure and functioning, understand how Operating Systems evolved with advent of computer architecture, and comprehend the different CPU scheduling algorithms, page replacement algorithms, disk scheduling and identify best one.

#### **COURSE OUTCOMES (CO):**

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

<b>CO1</b>	Demonstrate the underlying principles and techniques of operating system (Understand-L2)
<b>CO2</b>	Interpret scheduling and communication methods of processes handled by operating systems (Understand-L2).
<b>CO3</b>	Distinguish the process synchronization methods and deadlock handling approaches employed in operating systems (Understand-L2).
<b>CO4</b>	Classify memory management techniques and virtual memory mechanisms (Understand-L2).
<b>CO5</b>	Interpret the strategies of disk scheduling algorithms and file system architecture (Understand-L2).

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	2	1	2	-	-	-	-	-	-	-	-	1	3	1	1
C02	1	2	2	-	-	-	-	-	-	-	-	1	3	1	2
C03	2	1	2	-	-	-	-	-	-	-	-	1	2	3	3
C04	-	2	2	-	-	-	-	-	-	-	-	1	2	3	3
C05	-	1	2	-	-	-	-	-	-	-	-	1	1	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).

**TEXTBOOKS:**

1. Silberschatz & Galvin, "Operating System Concepts", Wiley, 7th edition, 2007.

**REFERENCE BOOKS:**

1. William Stallings, "Operating Systems", PHI, 5th Edition, 2004.

2. B.A. Forouzan & R.F. Giberg, —Unix and shell Programming||, Thomson, First Edition, New Delhi, 2003.

3. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir/index.html>

4. [https://swayam.gov.in/nd1\\_noc19\\_cs50/preview](https://swayam.gov.in/nd1_noc19_cs50/preview)

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN)****UNIT-I: Introduction to Operating 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
1.	Introduction to Course Outcomes and Program Outcomes	1	03-01-2024		<b>TLM2</b>	
2.	Operating-System Services	1	04-01-2024		<b>TLM2</b>	
3.	User Operating-System Interface.	1	06-01-2024		<b>TLM2</b>	
4.	System Calls, Types of System Calls,	1	08-01-2024		<b>TLM2</b>	
5.	System Programs, Operating-System Design and Implementation	1	10-01-2024		<b>TLM2</b>	
6.	<b>Tutorial-1</b>	1	11-01-2024		<b>TLM3</b>	
7.	Operating-System Structure	1	12-01-2024		<b>TLM2</b>	
8.	Virtual Machines.	1	18-01-2024		<b>TLM2</b>	
9.	Operating-System Generation, System Boot	1	20-01-2024		<b>TLM2</b>	
10.	<b>Tutorial-2</b>	1	22-01-2024		<b>TLM3</b>	
11.	<b>Assignment-1/ Quiz-1</b>	1	24-01-2024		<b>TLM6</b>	
No. of classes required to complete UNIT-I		11	No. of classes taken:			

**UNIT-II: Process Management & Process 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
12.	Process Concept, IPC.	1	25-01-2024		TLM2	
13.	Communication in Client-Server Systems.	1	27-01-2024		TLM2	
14.	Threads: Overview,	1	29-01-2024		TLM2	
15.	Multithreading Models	1	31-01-2024		TLM2	
16.	Process Scheduling: Scheduling Criteria.	1	01-02-2024		TLM2	
17.	Scheduling Algorithms (FCFS, SJF)	1	03-02-2024		TLM2	
18.	Scheduling Algorithms (Priority)	1	05-02-2024		TLM2	
19.	<b>Tutorial-3</b>	1	07-02-2024		TLM3	
20.	Scheduling Algorithms (Round Robin)	1	08-02-2024		TLM2	
21.	Discuss various problems related to scheduling algorithms	1	12-02-2024		TLM2	
22.	Discuss various problems related to scheduling algorithms	1	14-02-2024		TLM2	
23.	<b>Tutorial-4</b>	1	15-02-2024		TLM3	
24.	<b>Assignment-2 / Quiz-2</b>	1	17-02-2024		TLM6	
No. of classes required to complete UNIT-II		14	No. of classes taken:			

**UNIT-III: Synchronization and 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
25.	The Critical-Section Problem	1	19-02-2024		TLM2	
26.	Peterson's Solution, Synchronization Hardware.	1	21-02-2024		TLM2	
27.	Semaphores, Classic Problems of Synchronization.	1	22-02-2024		TLM2	
28.	Monitors <b>Tutorial-5</b>	1	04-03-2024		TLM2 TLM3	
29.	Deadlocks: System Model, Deadlock Characterization.	1	06-03-2024		TLM2	
30.	Methods for Handling Deadlocks.	1	07-03-2024		TLM2	
31.	Deadlock Prevention	1	11-03-2024		TLM2	
32.	Deadlock Avoidance, Deadlock Detection.	1	13-03-2024		TLM2	
33.	Recovery from Deadlock.	1	14-03-2024		TLM2, TLM3	
34.	<b>Tutorial-6 Assignment-3 / Quiz-3</b>	1	16-03-2024		TLM3 TLM6	
No. of classes required to complete UNIT-III		11	No. of classes taken:			

**(26-02-2024 TO 02-03-2024) I-MID EXAMS**

**UNIT-IV: Memory Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
35.	Memory Management Strategies: Swapping, Contiguous Memory Allocation.	1	18-03-2024		TLM2	
36.	Paging, Structure of the Page Table.	1	20-03-2024		TLM2	
37.	Segmentation	1	21-03-2024		TLM2	
38.	<b>Tutorial-7</b>	1	23-03-2024		TLM3	
39.	Virtual Memory Management:	1	27-03-2024		TLM2	
40.	Demand Paging	1	28-03-2024		TLM2	
41.	Page Replacement,	1	30-04-2024		TLM2	
42.	Allocation of Frames, Thrashing.	1	01-04-2024		TLM2	
43.	<b>Tutorial-8</b>	1	03-04-2024		TLM3	
44.	<b>Assignment-4 / Quiz-4</b>	1	04-04-2024		TLM6	
No. of classes required to complete UNIT-IV		10	No. of classes taken:			

**UNIT-V: File System Management**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
45.	Overview of Mass-Storage Structure, Disk Structure.	1	06-04-2024		TLM2	
46.	Disk Attachment, Disk Scheduling.	1	08-04-2024		TLM2	
47.	Disk Management	1	10-04-2024		TLM2	
48.	<b>Tutorial-9</b>	1	15-04-2024		TLM3	
49.	File-System Structure, File-System Implementation	1	18-04-2024		TLM2	
50.	Directory Implementation, Allocation Methods	1	19-04-2024		TLM2	
51.	Free-space Management	1	20-04-2024		TLM2	
52.	Efficiency and Performance, Recovery.	1	22-04-2024		TLM2	
53.	<b>Tutorial-10 Assignment-4 / Quiz-4</b>	1	24-04-2024		TLM3 TLM6	
No. of classes required to complete UNIT-V		11	No. of classes taken:			

**(29-04-2024 TO 04-05-2024) 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
54.	Multiprocessor Operating Systems	1	25-04-2024			
55.	Virtualization	1	27-04-2024			

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

### ACADEMIC CALENDAR:

Description	From	To	Weeks
<b>Commencement of Class Work</b>	<b>01-01-2024</b>		
I Phase of Instructions	01-01-2024	24-02-2024	8 W
I Mid Examinations	<b>26-02-2024</b>	<b>02-03-2024</b>	1W
II Phase of Instructions	04-03-2024	27-04-2024	8 W
II Mid Examinations	<b>29-04-2024</b>	<b>04-05-2024</b>	1W
Preparation and Practical	06-05-2024	11-05-2024	1W
Semester End Examinations	<b>13-05-2024</b>	<b>25-05-2024</b>	2W
Internship	27-05-2024	06-07-2024	6W

### EVALUATION PROCESS:(R20 Regulations)

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



## PART-D

### PROGRAMME OUTCOMES (POs):

PO1	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/Development of Solutions:</b> 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	<b>Conduct Investigations of Complex Problems:</b> 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	<b>Modern Tool Usage:</b> 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	<b>The Engineer and Society:</b> 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	<b>Environment and Sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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	<b>Project Management and Finance:</b> 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	<b>Life-long Learning:</b> 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):

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

Course Instructor	Module Coordinator	Course Coordinator	HOD
Mrs. T. karuna Latha	Dr. O. Rama Devi	Mr. Rajendra	Dr. B. Srinivasa Rao



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)  
 An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution  
 Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada  
 L.B. REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

<http://lbrce.ac.in/it/index.php>, hodit@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : Mr.G. Rajendra  
 Course Name & Code : Operating Systems and Linux Internals Lab & 20IT53  
 L-T-P Structure : 0-0-3 Credits : 1.5  
 Program/Sem/Sec : B.Tech., IT., IV-Sem.,-A A.Y : 2023-24

**PRE-REQUISITE:** Programming language, DBMS, OOP concepts.

**Course Educational Objective:** The objective of this lab is to provide the various UNIX/Linux operating system commands, importance of System calls, Scheduling algorithms and Memory Management techniques.

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

CO1	Experiment with Unix commands and shell programming ( <b>Understand- L2</b> )
CO2	Implement CPU scheduling algorithms and memory management techniques ( <b>Apply- L3</b> ).
CO3	Simulate process synchronization and file system management using system calls ( <b>Apply -L3</b> ).
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				3								3		
CO2	3				3								1		
CO3		3			3										3
CO4										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).

## 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
1.	Introduction to CO's and PSO's. Cycle-1	3	02-01-2024		TLM1	
2.	Cycle-1	3	09-01-2024		TLM4	
3.	Cycle-2	3	23-01-2024		TLM4	
4.	Cycle-3	3	30-01-2024		TLM4	
5.	Cycle-4	3	05-02-2024		TLM4	
6.	Cycle-5	3	12-02-2024 19-02-2024		TLM4	
7.	Cycle-6	3	05-03-2024		TLM4	
8.	Cycle-7	3	12-03-2024		TLM4	
9.	Cycle-8	3	19-03-2024		TLM4	
10.	Cycle-9	3	26-03-2024		TLM4	
11.	Cycle-10	3	02-04-2024		TLM4	
12.	Additional Lab Experiments	3	16-04-2024		TLM4	
13.	Additional Lab Experiments	3	23-04-2024		TLM4	
14.	Internal Lab Exam	3	30-04-2024		TLM4	

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

## PART-C

### EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Day-to-day work	D1=05
Record	R1=05
Internal Test	IT1=5
<b>Continuous Internal Evaluation (CIE)=D1+R1+IT1</b>	<b>15</b>
Procedure/Algorithm	P1=5
Experimentation/Program execution	E1=10
Observations/Calculations/Validation	O1=10
Result/Inference	R1=5
Viva voce	V1=5
<b>Semester End Examination (SEE)= P1+ E1+ O1+ V1</b>	<b>30</b>
<b>Total Marks = CIE+SEE</b>	<b>50</b>

## PART-D

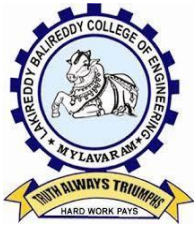
### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
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### PROGRAMME SPECIFIC OUTCOMES (PSOs):

<b>PSO 1</b>	Organize, Analyze and Interpret the data to extract meaningful conclusions.
<b>PSO 2</b>	Design, Implement and Evaluate a computer-based system to meet desired needs.
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<b>Course Instructor</b>	<b>Module Coordinator</b>	<b>Course Coordinator</b>	<b>HOD</b>
Mr. G. Rajendra	Mr. G. Rajendra	Dr. O. Rama Devi	Dr. B. Srinivasa Rao



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**DEPARTMENT OF INFORMATION TECHNOLOGY**

## COURSE HANDOUT

### PART-A

Name of Course Instructor : DR D RATNA KISHOR  
Course Name & Code : DAA (20CS06)  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., IT,IV-B A.Y: 2023-24

**PRE-REQUISITE:** Data structures and DMS

#### **COURSE EDUCATIONAL OBJECTIVES (CEOs):**

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

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

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

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

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

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

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

#### **TEXT BOOKS:**

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

T2: Data Structures and Algorithm Analysis in C++, 3/e, Mark Allen Weiss, Pearson, 2007.

**REFERENCE BOOKS:**

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

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

**PART-B****COURSE DELIVERY PLAN (LESSON PLAN): Section C****UNIT-I : Introduction, Divide and conquer**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction	1	03.01.2024		TLM1	
2.	Algorithm definition and Specifications	1	03.01.2024.		TLM1	
3.	Performance Analysis	1	05.01.2024		TLM1	
4.	Time Complexity and space complexity	2	06.01.2024		TLM1	
5.	Asymptotic Notations- Big-Oh, Omega and Theta	1	06.01.2024		TLM1	
6.	Divide & Conquer Technique: General Method	1	08.01.2024		TLM1	
7.	Binary Search and its analysis	1	10.01.2024		TLM1	
8.	Finding Maximum and Minimum and its Analysis	1	12.01.2024		TLM1	
9.	Merge sort and its Analysis	1	13.01.2024		TLM1	
10.	Quick Sort algorithm and its analysis	1	19.01.2024		TLM1	
11.	Closest pair of points	1	19.01.2024		TLM1	
12.	Tutorial - 1	1	20.01.2024		TLM3	
<b>No. of classes required to complete UNIT-I</b>		<b>13</b>		<b>No of classes taken</b>		

**UNIT-II: The Greedy method**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Greedy Method – Introduction, General method	1	22.01.2024 & 22.01.2024		TLM1	
15.	Knapsack problem, Example problem	2	24.01.2024 & 25.01.2024		TLM1	

16.	Job sequencing with deadlines, Example problem	1	27.01.2024		TLM1	
17.	Minimum cost spanning trees, example problem	2	29.01.2024 &31.01.2024		TLM1	
18.	Optimal storage on tapes, Example problem	1	02.02.2024		TLM1	
19.	Single source shortest path problem	2	03.02.2024& 05.02.2024		TLM1	
20.	Huffman coding	1	07.02.2024		TLM1	
21.	Tutorial – II / Quiz - II	1	09.02.2024		TLM3	
<b>No. of classes required to complete UNIT-II</b>		<b>11</b>		<b>No of classes taken</b>		

### UNIT-III: Dynamic Programming

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
22.	Dynamic Programming-General method	1	12.02.2024		TLM1	
23.	Multistage Graph, Example problem	2	14.02.2024& 16.02.2024		TLM1	
24.	All pairs shortest path, Example problem	2	17.02.2024 & 19.02.2024		TLM1	
25.	Optimal Binary Search Tree, Example problem	2	21.02.2024& 23.02.2024		TLM1	
26.	0/1 Knapsack Problem	1	24.02.2024		TLM1	
<b>MID-1 EXAMINATIONS</b>						
27.	Travelling Salesperson Problem	2	04.03.2024 & 06.03.2024		TLM1	
28.	Single source shortest path problem, Example Problem	1	11.03.2024		TLM1	
29.	Reliability design, Example Problem	2	13.03.2024 & 15.03.2024		TLM1	
30.	Tutorial – III / Quiz - III	1	16.03.2024		TLM3	
<b>No. of classes required to complete UNIT-III</b>		<b>14</b>		<b>No of classes taken</b>		

### UNIT-IV: Back tracking

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	General Method	1	18.03.2024		TLM1	
32.	The 8-Queens problem	2	20.03.2024 & 22.03.2024		TLM1	
33.	Sum of subsets problem	2	23.03.2024 & 27.03.2024		TLM1	
34.	Graph coloring problem	2	30.03.2024 & 01.04.2024		TLM1	
35.	Hamiltonian cycles	1	03.04.2024		TLM1	
36.	Tutorial – IV / Quiz - IV	1	06.04.2024		TLM3	
<b>No. of classes required to complete UNIT-IV</b>		<b>09</b>		<b>No of classes taken</b>		

#### UNIT-V: Branch and Bound

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
43.	Branch and Bound- General method-job sequencing with deadlines	2	08.04.2024 & 10.04.2024		TLM1	
44.	LC Branch and bound solution for Travelling Salesperson Problem	2	12.04.2024 & 13.04.2024		TLM2	
45.	LC Branch and bound solution 0/1 Knapsack problem	1	15.04.2024		TLM2	
46.	FIFO Branch and bound solution for Travelling Sales Person Problem	2	19.04.2024 & 20.03.2024		TLM2	
47.	FIFO Branch and bound solution 0/1 Knapsack problem	1	22.04.2024		TLM2	
48.	LIFO Branch and Bound	1	24.04.2024		TLM2	
49.	Tutorial – V / Quiz - V	1	26.04.2024		TLM3	
50.	Discussion about SEE paper	1	27.04.2024		TLM3	
<b>No. of classes required to complete UNIT-V</b>		<b>11</b>		<b>No of classes taken</b>		

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
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### PART-C

#### EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I , Unit-II , Unit-III)	A1=5
Assignment-II (Unit-III , Unit-IV , Unit-V)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

### PART-D

#### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> 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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<b>PO 12</b>	<b>Life-long learning:</b> 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):**

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

Course Instructor  
Dr. D RATNA  
KISHOR

Course Coordinator

Module Coordinator  
Dr. M. Sitha Ram

HOD  
Dr.B.SRINIVA  
SA RAO



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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mr.B.Ravindra chanti babu(T920)  
**Course Name & Code** : Software Engineering Lab, 20IT55  
**L-T-P Structure** : 0-0-3 **Credits:** 1.5  
**Program/Sem/Sec** : B.Tech-IT / IV SEM / A  
**A.Y.** : 2023-24  
**PREREQUISITE** : Object Oriented Programming

#### Course Educational Objectives:

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

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

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

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

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

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1	Case Studies	3	04-01-2024		TLM4	CO1	
2	<b>Cycle-1:</b> Analyze the Requirements for the following Case Studies. 1) Automated Teller Machine (ATM) 2) Library Management System 3) Railway Ticket Reservation System	3	11-01-2024		TLM4	CO1	
3	<b>Cycle-2:</b> Analyze the Requirements for the following Case Studies. 1) Point-of-Sale Terminal 2) Customer Support Service Operations 3) Cab Booking Service	3	18-01-2024		TLM4	CO1	
4	<b>Cycle-3:</b> Basics of UML, 1) Introduction to UML. 2) Familiarization with any one of the Software such as Rational Rose or Umbrello or Gliffy Diagram etc.	3	25-01-2024		TLM4	CO1	
5	<b>Cycle-4:</b> For each case study given earlier, Construct Use Case Diagram for following: 1) Identify and Analyze the Actors. 2) Identify the Actions. 3) Analyze the Relationships between Actors and Actions. 4) Sketch the Use Case Diagram.	3	01-02-2024		TLM4	CO2	
6	<b>Cycle-5:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram	3	08-02-2024		TLM4	CO1	
7	<b>Cycle-6:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and Analyze the Classes related to		15-02-2024				

	<p>your problem.</p> <p>2) Analyze the Attributes and Operations</p> <p>3) Analyze the Relationships between Classes</p> <p>4) Sketch the Class Diagram</p>					
8	<p><b>Cycle-7:</b> For each case study given earlier, Construct Interaction Diagrams in the following manner: 1) Identify the Objects participating in Communication.</p> <p>2) Identify the Messages between the objects.</p> <p>3) Give numbering to messages.</p> <p>4) Use Flat Sequencing or Procedural Sequencing for numbering</p>	3	22-02-2024		TLM4	CO2
9	<p><b>Cycle-8:</b>For each case study given earlier, Construct Activity Diagram in the following manner:</p> <p>1) Identify activities in your case study.</p> <p>2) Identify relationships among activities.</p> <p>3) Use Fork or Join, if necessary.</p> <p>4) Sketch the diagram.</p>	6	07-03-2024 & 14-03-2024		TLM4	CO3
10	<p><b>Cycle-9:</b> For each case study given earlier, Construct State Chart Diagram in the following manner: 1) Identify the different states in your case study.</p> <p>2) List out the different sub-states present in the state.</p> <p>3) Identify relationships among the state to state.</p> <p>4) Sketch the diagram.</p>	6	21-03-2024 & 28-03-2024		TLM4	CO3
11	<p><b>Cycle-10:</b>For each case study given earlier, Construct Component Diagram in the following manner: 1) Identify the different components in your case study</p> <p>2) Create a visual for each of the component.</p> <p>3) Describe the organization and relationships between components using interfaces, ports etc.</p> <p>4) Sketch the diagram.</p>	6	04-04-2024 & 18-04-2024		TLM4	CO3

12	<b>Cycle-11:</b> For each case study given earlier, Construct Deployment Diagram in the following manner: 1) Identify the nodes. 2) Identify the relationships among the nodes. 3) Sketch the Diagram.	3	25-04-2024		TLM4	CO3	
13	<b>Internal Lab Exam</b>		09-05-2024				

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

### PART-C

#### EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Day-to-Day Work	A1 = 5
Record & Observation	B1 = 5
Internal Exam	C1 = 5
<b>Cumulative Internal Examination (CIE): (A1+B1+C1)</b>	<b>15</b>
<b>Semester End Examination (SEE)</b>	<b>35</b>
<b>Total Marks = CIE + SEE</b>	<b>50</b>

### PART-D

#### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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.
<b>PO 6</b>	<b>The engineer and society:</b> 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.

<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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
<b>PO 12</b>	<b>Life-long learning:</b> 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):**

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

	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Mr.B.Ravindra chanti babu	Dr.J.Nageswara Rao	Mr.G.Rajendra	Dr.B.Srinivasa Rao
<b>Signature</b>				



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC with 'A' Grade & NBA (Under Tier - I)

An ISO 21001:2018, 14001:2015, 50001:2018 Certified Institution

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

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

<http://lbrce.ac.in/it/index.php>, hodit@lbrce.ac.in, Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSEHANDOUT

#### PART-A

Name of Course Instructor : Mr. B. Ravindrachantibabu (T920)

Course Name & Code : Software Engineering, 20IT01

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

Program/Sem/Sec : B.Tech, IV, Sec-A

Credits: 3

A.Y.: 2023-24

PREREQUISITE : Object Oriented Programming

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

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

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

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	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
- R4** [https://nptel.ac.in/courses/106/105/106105182/\[1,2,3\]](https://nptel.ac.in/courses/106/105/106105182/[1,2,3])
- R5** [https://onlinecourses.nptel.ac.in/noc20\\_cs68\[1,2,3,4,5\]](https://onlinecourses.nptel.ac.in/noc20_cs68[1,2,3,4,5])



## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Software and software Engineering & Software Process and Process Models

S. No.	Topic 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	02/01/24		TLM-1	
2.	The Evolving role of Software	1	03/01/24		TLM-1	
3.	Characteristics of Software	1	06/01/24		TLM-2	
4.	Importance of software Engineering	1	08/01/24		TLM-2	
5.	Changing nature of software, Legacy Software	1	09/01/24		TLM-2	
6.	Software Myths.	1	10/01/24		TLM-1	
7.	Layered technology, Process framework	2	20/01/24 & 22/01/24		TLM-1	
8.	The process and Product	1	23/01/24		TLM-1	
9.	Software process models, The waterfall model	2	24/01/24 & 27/01/24		TLM-2	
10.	Incremental model,	1	29/01/24		TLM-2	
11.	The spiral and V Model	1	30/01/24		TLM-2	
12.	Component based s/w development	1	31/01/24		TLM-2	
13.	Unified process model	1	03/02/24		TLM-1	
<b>No. of classes required to complete UNIT-I: 15</b>				<b>No. of classes taken:</b>		

#### UNIT-II: Requirements Analysis and Software design & Data Engineering

S. No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	Requirements gathering	1	05/02/24		TLM-1	
15.	Requirements analysis	1	06/02/24		TLM-1	
16.	software requirements specifications (SRS)	2	07/02/24 & 12/02/24		TLM-1	
17.	overview of design process	2	13/02/24 & 14/02/24		TLM-1	
18.	Design Concepts	2	17/02/24 & 19/02/24		TLM-2	
19.	Architectural Concepts	2	20/02/24 & 21/02/24		TLM-2	
<b>No. of classes required to complete UNIT-II: 10</b>				<b>No. of classes taken:</b>		

#### UNIT-III: Design Using UML

S. No.	Topic to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Building Blocks of UML	1	24/02/24		TLM-1	
21.	Defining things	1	04/02/24		TLM-1	
22.	Relationships and diagrams	1	05/03/24		TLM-1	
23.	Common Mechanism in UML	1	06/03/24		TLM-1	
24.	Class Diagrams	1	11/03/24		TLM-2	
25.	Object Diagrams	1	12/03/24		TLM-2	
<b>No. of classes required to complete UNIT-III: 6</b>				<b>No. of classes taken:</b>		

**UNIT-IV:BehavioralModeling**

S. No.	Topicstobecovered	No. of Classes Required	Tentative Date of Completion	Actual Dateof Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Interactions,Interaction diagrams	1	13/03/24		TLM-2	
27.	usecases,UsecaseDiagrams	2	16/03/24& 18/03/24		TLM-2	
28.	ActivityDiagrams	2	19/03/24& 20/03/24		TLM-2	
29.	Eventsandsignals	2	23/03/24& 26/03/24		TLM-1	
30.	statemachines	2	27/03/24& 30/03/24		TLM-1	
31.	ProcessesandThreads	1	01/04/24		TLM-1	
32.	Timeandspace	1	02/04/24		TLM-1	
33.	Statechart diagrams	1	03/04/24		TLM-2	
<b>No.ofclassesrequiredtocompleteUNIT-IV: 12</b>				<b>No.ofclassestaken:</b>		

**UNIT-V:Testing Techniques**

S. No.	Topicstobecovered	No. of Classes Required	Tentative Date of Completion	Actual Dateof Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Softwaretestingfundamentals	1	06/04/24		TLM-2	
35.	Unittesting	2	08/04/24& 10/04/24		TLM-1	
36.	Integrationtesting	2	15/04/24 16/04/24		TLM-1	
37.	Blackbox testing	2	20/04/24& 22/04/24		TLM-1	
38.	whiteboxtesting	1	23/04/24		TLM-1	
39.	Debugging	1	24/04/24		TLM-1	
40.	Systemtesting	1	27/04/24		TLM-1	
<b>No.ofclassesrequiredtocompleteUNIT-V:10</b>				<b>No.ofclassestaken:</b>		

<b>TeachingLearning Methods</b>			
<b>TLM1</b>	ChalkandTalk	<b>TLM4</b>	Demonstration(Lab/FieldVisit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT(NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	GroupDiscussion/Project

**PART-C****EVALUATIONPROCESS(R20Regulation):**

EvaluationTask	Marks
Assignment-I(Units-I,II&UNIT-III(HalfoftheSyllabus))	A1=5
I-DescriptiveExamination(Units-I,II&UNIT-III(HalfoftheSyllabus))	M1=15
I-QuizExamination(Units-I,II&UNIT-III(HalfoftheSyllabus))	Q1=10
Assignment-II(Unit-III(RemainingHalfoftheSyllabus),IV&V)	A2=5

II-DescriptiveExamination(UNIT-III(RemainingHalfoftheSyllabus),IV& V)	M2=15
II-QuizExamination(UNIT-III(RemainingHalfoftheSyllabus),IV& V)	Q2=10
MidMarks=80%ofMax((M1+Q1+A1),(M2+Q2+A2))+20%ofMin((M1+Q1+A1),(M2+Q2+A2))	M=30
CumulativeInternalExamination(CIE):M	30
SemesterEndExamination(SEE)	70
TotalMarks =CIE+SEE	100

## PART-D

### PROGRAMMEOUTCOMES(POs):

<b>PO1</b>	<b>Engineeringknowledge:</b> Applytheknowledgeofmathematics,science,engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problemanalysis:</b> Identify,formulate,reviewresearchliterature,andanalyzecomplex engineeringproblemsreachingsubstantiatedconclusionsusingfirstprinciplesofmathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/developmentof solutions:</b> Design solutionsforcomplexengineering problemsand design system components or processes that meet the specified needs with appropriate considerationforthepublichealthandsafety,andthecultural,societal, andenvironmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methodsincludingdesign ofexperiments,analysisandinterpretationofdata,and synthesisof theinformationtoprovidevalidconclusions.
<b>PO5</b>	<b>Moderntoolusage:</b> Create,select,andapplyappropriatetechniques,resources,andmodern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal,health,safety,legalandculturalissuesandtheconsequentresponsibilitiesrelevantto theprofessionalengineeringpractice
<b>PO7</b>	<b>Environmentandsustainability:</b> Understandtheimpactoftheprofessional engineering solutions insocietal and environmental contexts, and demonstratetheknowledge of, andneed for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Applyethicalprinciplesandcommittoprofessionaethicsandresponsibilitiesand norms of the engineering practice.
<b>PO9</b>	<b>Individual and teamwork:</b> Function effectivelyas an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able tocomprehendandwrite effective reports and design documentation, make effective presentations, and give and receiveclear instructions.
<b>PO11</b>	<b>Projectmanagementandfinance:</b> Demonstrateknowledgeandunderstandingofthe engineeringand management principles and applythese to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> 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.

**PROGRAMMESPECIFICOUTCOMES(PSOs):**

<b>PSO1</b>	Organize,AnalyzeandInterpretthedataextractmeaningfulconclusions
<b>PSO2</b>	Design,Implementandevaluateacomputer-basedsystemtomeetdesiredneeds
<b>PSO3</b>	DevelopITapplicationserviceswiththehelpofdifferentcurrentengineeringtools

	<b>CourseInstructor</b>	<b>CourseCoordinator</b>	<b>Module Coordinator</b>	<b>Headof the Department</b>
<b>Nameofthe Faculty</b>	Mr.B.RavindraChanti Babu	Dr.J.Nageswara Rao	Mr .G.Rajendra	Dr.B.SrinivasaRao
<b>Signature</b>				



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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mrs.K.Lakshmi Devi  
**Course Name & Code** : Software Engineering Lab, 20IT55  
**L-T-P Structure** : 0-0-3 **Credits:** 1.5  
**Program/Sem/Sec** : B.Tech-IT / IV SEM / B  
**A.Y.** : 2023-24  
**PREREQUISITE** : Object Oriented Programming

#### Course Educational Objectives:

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

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

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

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

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

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

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

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

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1	Case Studies	3	03-01-2024		TLM4	CO1	
2	<b>Cycle-1:</b> Analyze the Requirements for the following Case Studies. 1) Automated Teller Machine (ATM) 2) Library Management System 3) Railway Ticket Reservation System	3	10-01-2024		TLM4	CO1	
3	<b>Cycle-2:</b> Analyze the Requirements for the following Case Studies. 1) Point-of-Sale Terminal 2) Customer Support Service Operations 3) Cab Booking Service	3	24-01-2024		TLM4	CO1	
4	<b>Cycle-3:</b> Basics of UML, 1) Introduction to UML. 2) Familiarization with any one of the Software such as Rational Rose or Umbrello or Gliffy Diagram etc.	3	31-01-2024		TLM4	CO1	
5	<b>Cycle-4:</b> For each case study given earlier, Construct Use Case Diagram for following: 1) Identify and Analyze the Actors. 2) Identify the Actions. 3) Analyze the Relationships between Actors and Actions. 4) Sketch the Use Case Diagram.	3	07-02-2024		TLM4	CO2	
6	<b>Cycle-5:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram	3	14-02-2024		TLM4	CO1	
7	<b>Cycle-6:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and		21-02-2024				

	Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram					
8	<b>Cycle-7:</b> For each case study given earlier, Construct Interaction Diagrams in the following manner: 1) Identify the Objects participating in Communication. 2) Identify the Messages between the objects. 3) Give numbering to messages. 4) Use Flat Sequencing or Procedural Sequencing for numbering	3	06-03-2024		TLM4	CO2
9	<b>Cycle-8:</b> For each case study given earlier, Construct Activity Diagram in the following manner: 1) Identify activities in your case study. 2) Identify relationships among activities. 3) Use Fork or Join, if necessary. 4) Sketch the diagram.	6	13-03-2024 & 20-03-2024		TLM4	CO3
10	<b>Cycle-9:</b> For each case study given earlier, Construct State Chart Diagram in the following manner: 1) Identify the different states in your case study. 2) List out the different sub-states present in the state. 3) Identify relationships among the state to state. 4) Sketch the diagram.	6	27-03-2024 & 03-04-2024		TLM4	CO3
11	<b>Cycle-10:</b> For each case study given earlier, Construct Component Diagram in the following manner: 1) Identify the different components in your case study 2) Create a visual for each of the component. 3) Describe the organization and relationships between components using interfaces, ports etc.	6	10-04-2024		TLM4	CO3

	4) Sketch the diagram.						
12	<b>Cycle-11:</b> For each case study given earlier, Construct Deployment Diagram in the following manner: 1) Identify the nodes. 2) Identify the relationships among the nodes. 3) Sketch the Diagram.	3	24-04-2024		TLM4	CO3	
13	<b>Internal Lab Exam</b>		08-05-2024				

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

### PART-C

#### EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Day-to-Day Work	A1 = 5
Record & Observation	B1 = 5
Internal Exam	C1 = 5
<b>Cumulative Internal Examination (CIE): (A1+B1+C1)</b>	<b>15</b>
<b>Semester End Examination (SEE)</b>	<b>35</b>
Total Marks = CIE + SEE	50

### PART-D

#### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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.



<b>PO 6</b>	<b>The engineer and society:</b> 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.
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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
<b>PO 12</b>	<b>Life-long learning:</b> 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):**

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

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



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

Name of Course Instructor: Mrs.K.Lakshmi Devi

Course Name & Code : Software Engineering Lab, 20IT55

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

Credits: 1.5

Program/Sem/Sec : B.Tech-IT / IV SEM / B

A.Y. : 2023-24

PREREQUISITE : Object Oriented Programming

#### Course Educational Objectives:

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

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

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

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

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

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

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

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

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1	Case Studies	3	03-01-2024		TLM4	CO1	
2	<b>Cycle-1:</b> Analyze the Requirements for the following Case Studies. 1) Automated Teller Machine (ATM) 2) Library Management System 3) Railway Ticket Reservation System	3	10-01-2024		TLM4	CO1	
3	<b>Cycle-2:</b> Analyze the Requirements for the following Case Studies. 1) Point-of-Sale Terminal 2) Customer Support Service Operations 3) Cab Booking Service	3	24-01-2024		TLM4	CO1	
4	<b>Cycle-3:</b> Basics of UML, 1) Introduction to UML. 2) Familiarization with any one of the Software such as Rational Rose or Umbrello or Gliffy Diagram etc.	3	31-01-2024		TLM4	CO1	
5	<b>Cycle-4:</b> For each case study given earlier, Construct Use Case Diagram for following: 1) Identify and Analyze the Actors. 2) Identify the Actions. 3) Analyze the Relationships between Actors and Actions. 4) Sketch the Use Case Diagram.	3	07-02-2024		TLM4	CO2	
6	<b>Cycle-5:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram	3	14-02-2024		TLM4	CO1	
7	<b>Cycle-6:</b> For each case study given earlier, Construct Class Diagram in the following manner: 1) Identify and		21-02-2024				

	Analyze the Classes related to your problem. 2) Analyze the Attributes and Operations 3) Analyze the Relationships between Classes 4) Sketch the Class Diagram					
8	<b>Cycle-7:</b> For each case study given earlier, Construct Interaction Diagrams in the following manner: 1) Identify the Objects participating in Communication. 2) Identify the Messages between the objects. 3) Give numbering to messages. 4) Use Flat Sequencing or Procedural Sequencing for numbering	3	06-03-2024		TLM4	CO2
9	<b>Cycle-8:</b> For each case study given earlier, Construct Activity Diagram in the following manner: 1) Identify activities in your case study. 2) Identify relationships among activities. 3) Use Fork or Join, if necessary. 4) Sketch the diagram.	6	13-03-2024 & 20-03-2024		TLM4	CO3
10	<b>Cycle-9:</b> For each case study given earlier, Construct State Chart Diagram in the following manner: 1) Identify the different states in your case study. 2) List out the different sub-states present in the state. 3) Identify relationships among the state to state. 4) Sketch the diagram.	6	27-03-2024 & 03-04-2024		TLM4	CO3
11	<b>Cycle-10:</b> For each case study given earlier, Construct Component Diagram in the following manner: 1) Identify the different components in your case study 2) Create a visual for each of the component. 3) Describe the organization and relationships between components using interfaces, ports etc.	6	10-04-2024		TLM4	CO3

	4) Sketch the diagram.						
12	<b>Cycle-11:</b> For each case study given earlier, Construct Deployment Diagram in the following manner: 1) Identify the nodes. 2) Identify the relationships among the nodes. 3) Sketch the Diagram.	3	24-04-2024		TLM4	CO3	
13	<b>Internal Lab Exam</b>		08-05-2024				

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

### PART-C

#### EVALUATION PROCESS (R20 Regulation):

Evaluation Task	Marks
Day-to-Day Work	A1 = 5
Record & Observation	B1 = 5
Internal Exam	C1 = 5
<b>Cumulative Internal Examination (CIE): (A1+B1+C1)</b>	<b>15</b>
<b>Semester End Examination (SEE)</b>	<b>35</b>
Total Marks = CIE + SEE	50

### PART-D

#### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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.

<b>PO 6</b>	<b>The engineer and society:</b> 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.
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
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#### **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

<b>PSO 1</b>	Organize, Analyze and Interpret the data to extract meaningful conclusions.
<b>PSO 2</b>	Design, Implement and Evaluate a computer-based system to meet desired needs.
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	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Mrs.K.Lakshmi Devi	Dr.J.Nageswara Rao	Mr.G.Rajendra	Dr.B.Srinivasa Rao
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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, 20IT01

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

Credits: 3

Program/Sem/Sec : B.Tech, IV,Sec-B

A.Y.: 2023-24

PREREQUISITE : Object Oriented Programming

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

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

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

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	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/\[1,2,3\]](https://nptel.ac.in/courses/106/105/106105182/[1,2,3])
- R5** [https://onlinecourses.nptel.ac.in/noc20\\_cs68](https://onlinecourses.nptel.ac.in/noc20_cs68) [1,2,3,4,5]

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Software and software Engineering & Software Process and Process 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	02/01/24		TLM-1	
2.	The Evolving role of Software	1	04/01/24		TLM-1	
3.	Characteristics of Software	1	05/01/24		TLM-2	
4.	Importance of software Engineering	1	06/01/24		TLM-2	
5.	Changing nature of software, Legacy Software	1	09/01/24		TLM-2	
6.	Software Myths.	1	11/01/24		TLM-1	
7.	Layered technology, Process frame work	2	12/01/24& 18/01/24		TLM-1	
8.	The process and Product	1	19/01/24		TLM-1	
9.	Software process models, The water fall model	2	20/01/24& 23/01/24		TLM-2	
10.	Incremental model,	1	25/01/24		TLM-2	
11.	The spiral and V Model	1	27/01/24		TLM-2	
12.	Component based s/w development	1	30/01/24		TLM-2	
13.	Unified process model	1	01/02/24		TLM-1	
<b>No. of classes required to complete UNIT-I: 15</b>				<b>No. of classes taken:</b>		

#### UNIT-II: Requirements Analysis and Software design & Data 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
14.	Requirements gathering	1	02/02/24		TLM-1	
15.	Requirements analysis	1	03/02/24		TLM-1	
16.	software requirements specifications (SRS)	2	06/02/24& 08/02/24		TLM-1	
17.	overview of design process	2	09/02/24& 13/02/24		TLM-1	
18.	Design Concepts	2	15/02/24& 16/02/24		TLM-2	
19.	Architectural Concepts	2	17/02/24& 20/02/24		TLM-2	
<b>No. of classes required to complete UNIT-II: 10</b>				<b>No. of classes taken:</b>		

#### UNIT-III: Design Using UML

S. N o.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
20.	Building Blocks of UML	1	22/02/24		TLM-1	
21.	Defining things	1	23/02/24		TLM-1	
22.	Relationships and diagrams	1	24/02/24		TLM-1	
23.	Common Mechanism in UML	1	05/03/24		TLM-1	
24.	Class Diagrams	1	07/03/24		TLM-2	
25.	Object Diagrams	1	12/03/24		TLM-2	
<b>No. of classes required to complete UNIT-III: 6</b>				<b>No. of classes taken:</b>		



**UNIT-IV: Behavioral Modeling**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Interactions, Interaction diagrams	1	14/03/24		TLM-2	
27.	use cases, Use case Diagrams	2	15/03/24& 16/03/24		TLM-2	
28.	Activity Diagrams	2	19/03/24& 21/03/24		TLM-2	
29.	Events and signals	2	22/03/24& 23/03/24		TLM-1	
30.	state machines	2	26/03/24& 28/03/24		TLM-1	
31.	Processes and Threads	1	30/03/24		TLM-1	
32.	Time and space	1	02/04/24		TLM-1	
33.	State chart diagrams	1	04/04/24		TLM-2	
<b>No. of classes required to complete UNIT-IV: 12</b>				<b>No. of classes taken:</b>		

**UNIT-V: Testing Techniques**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
34.	Software testing fundamentals	1	04/04/24		TLM-2	
35.	Unit testing	2	05/04/24& 06/04/24		TLM-1	
36.	Integration testing	2	12/04/24 16/04/24		TLM-1	
37.	Black box testing	2	18/04/24& 19/04/24		TLM-1	
38.	white box testing	2	20/04/24& 23/04/24		TLM-1	
39.	Debugging	2	25/04/24& 26/04/24		TLM-1	
40.	System testing	1	27/04/24		TLM-1	
<b>No. of classes required to complete UNIT-V: 12</b>				<b>No. of classes taken:</b>		

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

**PART-C****EVALUATION PROCESS (R20 Regulation):**

Evaluation Task	Marks
Assignment-I (Units-I, II & UNIT-III (Half of the Syllabus))	A1=5
I-Descriptive Examination (Units-I, II & UNIT-III (Half of the Syllabus))	M1=15
I-Quiz Examination (Units-I, II & UNIT-III (Half of the Syllabus))	Q1=10
Assignment-II (Unit-III (Remaining Half of the Syllabus), IV & V)	A2=5

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

## PART-D

### PROGRAMME OUTCOMES (POs):

PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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
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PO 8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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PO 12	<b>Life-long learning:</b> 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):**

<b>PSO 1</b>	Organize, Analyze and Interpret the data to extract meaningful conclusions
<b>PSO 2</b>	Design, Implement and evaluate a computer-based system to meet desired needs
<b>PSO 3</b>	Develop IT application services with the help of different current engineering tools

	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Mrs.K.Lakshmi Devi	Mr Ravindra Chanti Babu		Dr. B.Srinivasa Rao
<b>Signature</b>				



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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Dr. B. SRINIVASA RAO

**Course Name & Code** : Universal Human Values 2: Understanding Harmony (20HS01)

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

**Program/Sem/Sec** : B.Tech IV Semester – IT Section-A **A.Y.** : 2023-24

**PREREQUISITE:** Nil

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

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

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

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

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

**TEXTBOOKS:**

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

**REFERENCE BOOKS:**

- R1** Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999  
**R2** Human values, A N Tripathi, New Age Publishers, New Delhi, 2004  
**R3** The story of my experiments with Truth, Mohandas Karamchand Gandhi

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction, COs	1	2-1-2024		TLM2	
2.	Process for self exploration: Natural Acceptance	1	5-1-2024		TLM.2	
3.	Experiential validation	1	6-1-2024		TLM2	
4.	Continuous Happiness and prosperity	1	8-1-2024 9-1-2024		TLM2	
5.	A look at basic human aspirations: Right understanding	1	19-1-2024 20-1-2024		TLM2	
6.	Relationship	1	22-1-2024		TLM2	
7.	Physical facility	1	23-1-2024		TLM2	
8.	Understanding Happiness and prosperity	1	27-1-2024		TLM2	
9.	Understanding Happiness and prosperity	1	29-1-2024 30-1-2024		TLM2	
<b>No. of classes required to complete UNIT-I: 12</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
10.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	2-2-2024		TLM2	
11.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	1	3-2-2024		TLM2	
12.	Understanding the Body as an instrument of 'I'	2	5-2-2024 6-2-2024		TLM2	
13.	Understanding the characteristics and activities of 'I' and harmony in 'I'	1	9-2-2024		TLM2	
14.	Understanding the harmony of I with the Body	1	10-2-2024 12-2-2024		TLM2	
15.	Sanyam and Health	2	13-2-2024 16-12-2024		TLM2	
16.	Correct appraisal of Physical needs	1	17-2-2024		TLM2	
17.	Meaning of prosperity in detail	1	19-2-2024		TLM1	
<b>No. of classes required to complete UNIT-II: 10</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Understanding values in human-human relationship: meaning of justice	1	20-2-2024		TLM2	
19.	Program for fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship	1	23-2-2024		TLM2	
20.	Understanding Harmony in the society: Resolution	1	24-2-2024		TLM2	
21.	I-Mid examinations					
22.	Prosperity, fearlessness and co-existence as comprehensive human goals	2	4-3-2024 5-3-2024		TLM2	
23.	Visualizing a universal harmonious order in the society- undivided society	1	9-3-2024		TLM2	
24.	Universal order-from family to world family	1	11-9-2024		TLM2	
25.	Gratitude as a universal value in relationships	1	12-3-2024		TLM2	
<b>No. of classes required to complete UNIT-III: 8</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Understanding Harmony in the Nature	1	15-3-2024		TLM2	
27.	Interconnectedness and mutual fulfillment among four orders of nature	1	16-3-2024		TLM2	
28.	Recyclability and self regulation in nature	1	18-3-2024		TLM2	
29.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	19-3-2024		TLM2	
30.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	1	22-3-2024		TLM2	
31.	Holistic perception of harmony at all levels of existence	1	23-3-2024		TLM2	
<b>No. of classes required to complete UNIT-IV: 6</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Natural acceptance of human values	2	1-4-2024 2-4-2024		TLM2	
33.	Definitiveness of ethical human conduct	2	6-4-2024 8-4-2024		TLM2	

34.	Basis for humanistic education	2	12-4-2024 13-4-2024		TLM2	
35.	Humanistic constitution and humanistic universal order	1	15-4-2024		TLM2	
36.	Competence in professional ethics	2	16-4-2024 19-4-2024		TLM2	
37.	Strategy for transition from the present state to universal human order	2	20-4-2024 22-4-2024		TLM2	
38.	Revision	3	23-4-2024 26-4-2024 27-4-2024		TLM2	
<b>No. of classes required to complete UNIT-V: 11</b>				<b>No. of classes taken:</b>		

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

### **PART-C**

#### **EVALUATION PROCESS (R17 Regulation):**

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

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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
<b>PO 6</b>	<b>The engineer and society:</b> 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
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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):

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

<b>Title</b>	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	<b>Dr. B. SRINIVASA RAO</b>	<b>Dr. B. SRINIVASA RAO</b>	<b>Dr. B. SRINIVASA RAO</b>	<b>Dr. B. SRINIVASA RAO</b>
<b>Signature</b>				





# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

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

Phone: 08659-222933, Fax: 08659-222931

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor** Dr. Annapareddy V N Reddy

**Course Name & Code** : Universal Human Values 2: Understanding Harmony (20HS01)

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

**Program/Sem/Sec** : B.Tech IV Semester – IT Section-B **A.Y.** : 2023-24

**PREREQUISITE:** Nil

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

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

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

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

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

**TEXTBOOKS:**

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

**REFERENCE BOOKS:**

- R1** Jeevan vidya: Ek Parichaya, A.Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999  
**R2** Human values, A N Tripathi, New Age Publishers, New Delhi, 2004  
**R3** The story of my experiments with Truth, Mohandas Karamchand Gandhi

## PART-B

### **COURSE DELIVERY PLAN (LESSON PLAN):**

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

<b>S. No.</b>	<b>Topics to be covered</b>	<b>No. of Classes Required</b>	<b>Tentative Date of Completion</b>	<b>Actual Date of Completion</b>	<b>Teaching Learning Methods</b>	<b>HOD Sign Weekly</b>
1.	Introduction, COs	1	2-1-2024		TLM2	
2.	Process for self exploration: Natural Acceptance	1	3-1-2024		TLM.2	
3.	Experiential validation	1	4-1-2024		TLM2	
4.	Continuous Happiness and prosperity	1	6-1-2024		TLM2	
5.	A look at basic human aspirations: Right understanding	1	9-1-2024		TLM2	
6.	Relationship	1	10-1-2024		TLM2	
7.	Physical facility	1	11-1-2024		TLM2	
8.	Understanding Happiness and prosperity	2	18-1-2024 20-1-2024		TLM2	
9.	Understanding Happiness and prosperity	2	23-1-2024 24-1-2024		TLM2	
<b>No. of classes required to complete UNIT-I: 11</b>				<b>No. of classes taken:</b>		

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

<b>S. No.</b>	<b>Topics to be covered</b>	<b>No. of Classes Required</b>	<b>Tentative Date of Completion</b>	<b>Actual Date of Completion</b>	<b>Teaching Learning Methods</b>	<b>HOD Sign Weekly</b>
10.	Understanding Human being as a co-existence of sentient 'I' and the material 'Body'	1	25-1-2024		TLM2	
11.	Understanding the needs of self ('I') and 'Body'- Happiness and Physical facility	2	27-1-2024 30-1-2024		TLM2	
12.	Understanding the Body as an instrument of 'I'	1	31-1-2024		TLM2	
13.	Understanding the characteristics and activities of 'I' and harmony in 'I'	2	1-2-2024 3-2-2024		TLM2	
14.	Understanding the harmony of I with the Body	2	6-2-2024 7-2-2024		TLM2	
15.	Sanyam and Health	2	8-2-2024 10-2-2024		TLM2	
16.	Correct appraisal of Physical needs	2	13-2-2024 14-2-2024		TLM2	
17.	Meaning of prosperity in detail	2	15-2-2024 17-2-2024		TLM1	
<b>No. of classes required to complete UNIT-II: 14</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
18.	Understanding values in human-human relationship: meaning of justice	2	20-2-2024 21-2-2024		TLM2	
19.	Program for fulfillment to ensure mutual happiness, Trust and Respect as the foundational values of relationship	1	22-2-2024		TLM2	
20.	Understanding Harmony in the society: Resolution	1	24-2-2024		TLM2	
21.	I-Mid examinations		26-2-2024 To 2-3-2024			
22.	Prosperity, fearlessness and co-existence as comprehensive human goals	2	5-3-2024 6-3-2024		TLM2	
23.	Visualizing a universal harmonious order in the society- undivided society	2	7-3-2024 9-3-2024		TLM2	
24.	Universal order-from family to world family	2	12-3-2024 13-3-2024		TLM2	
25.	Gratitude as a universal value in relationships	2	14-3-2024 16-3-2024		TLM2	
<b>No. of classes required to complete UNIT-III: 12</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Understanding Harmony in the Nature	2	19-3-2024 20-3-2024		TLM2	
27.	Interconnectedness and mutual fulfillment among four orders of nature	2	21-3-2024 23-3-2024		TLM2	
28.	Recyclability and self regulation in nature	2	26-3-2024 27-3-2024		TLM2	
29.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	2	28-3-2024 30-3-2024		TLM2	
30.	Understanding Existence as co-existence of mutually interacting units in all pervasive space	2	2-4-2024 3-4-2024		TLM2	
31.	Holistic perception of harmony at all levels of existence	2	4-4-2024 6-4-2024		TLM2	
<b>No. of classes required to complete UNIT-IV: 12</b>				<b>No. of classes taken:</b>		

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

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
32.	Natural acceptance of human values	1	10-4-2024		TLM2	
33.	Definitiveness of ethical human conduct	1	13-4-2024		TLM2	

34.	Basis for humanistic education	1	16-4-2024		TLM2	
35.	Humanistic constitution and humanistic universal order	2	18-4-2024 20-4-2024		TLM2	
36.	Competence in professional ethics	2	23-4-2024 24-4-2024		TLM2	
37.	Strategy for transition from the present state to universal human order	1	25-4-2024		TLM2	
38.	Revision	1	27-4-2024		TLM2	
<b>No. of classes required to complete UNIT-V: 9</b>				<b>No. of classes taken:</b>		

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

### PART-C

#### **EVALUATION PROCESS (R17 Regulation):**

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

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> 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
<b>PO 6</b>	<b>The engineer and society:</b> 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
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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):

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

<b>Title</b>	<b>Course Instructor</b>	<b>Course Coordinator</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Dr.A.V.N.Reddy	Dr. B. SRINIVASA RAO	Dr. B. SRINIVASA RAO	Dr. B. SRINIVASA RAO
<b>Signature</b>				