



**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**

(An Autonomous Institution since 2010)

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

L.B. Reddy Nagar, Mylavaram, NTR District, Andhra Pradesh - 521230



**FRESHMAN ENGINEERING DEPARTMENT**  
**COURSE HANDOUT**

**PART-A**

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

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

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

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

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

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

**BOS APPROVED TEXTBOOKS:**

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

**BOS APPROVED REFERENCE BOOKS:**

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

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Probability and Random Variables

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction class, course outcomes	1	07-08-23		TLM1	
2.	Basic concepts of probability	1	10-08-23		TLM1	
3.	problems on basic probability	1	11-08-23		TLM1	
4.	Addition theorem, problems	1	14-08-23		TLM1	
5.	Problems on Addition theorem	1	17-08-23		TLM1	
6.	Multiplication theorem, examples	1	18-08-23		TLM1&2	
7.	Independent events, theorems	1	19-08-23		TLM1	
8.	Baye's theorem, Examples	1	21-08-23		TLM1	
9.	Problems on Baye's theorem	1	24-08-23		TLM1&2	
10.	Random variables, Expectations	1	25-08-23		TLM1	
11.	Problems on PMF	1	26-08-23		TLM1	
12.	Problems on PMF	1	28-08-23		TLM1	
13.	Problems on PDF	1	31-08-23		TLM1	
14.	Problems on PDF	1	01-09-23		TLM1	
No. of classes required to complete UNIT-I: 14				No. of classes taken:		

#### UNIT-II: Probability Distributions

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Binomial Distribution- mean & variance	1	02-09-23		TLM1&2	
2.	Problems on Binomial distribution	1	04-09-23		TLM1	
3.	Fitting of binomial distribution	1	07-09-23		TLM1	
4.	Poisson distribution, mean and variance	1	08-09-23		TLM1&2	
5.	Problems on Poisson distribution	1	11-09-23		TLM1	
6.	Fitting of Poisson distribution	1	14-09-23		TLM1	
7.	Normal distribution: mean & variance	1	15-09-23		TLM1&2	
8.	Problems on Normal Distribution	1	16-09-23		TLM1	
9.	Problems on Normal Distribution	1	18-09-23		TLM1	
10.	Applications of Normal Distribution	1	21-09-23		TLM1	
11.	Exponential distribution	1	22-09-23		TLM1	
No. of classes required to complete UNIT-II: 11				No. of classes taken:		

#### UNIT-III: Sampling distribution and Estimation

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sampling distribution, definitions	1	23-09-23		TLM1&2	
2.	Sampling distribution of mean, variance	1	25-09-23		TLM1	
3.	Sampling distribution -problems	1	29-09-23		TLM1&2	
4.	Central limit theorem, Examples	1	30-09-23		TLM1&2	
<b>Mid-I examinations</b>			02-10-23	to	07-10-23	
5.	Problems on central limit theorem	1	09-10-23		TLM1	
6.	Point and interval estimation	1	12-10-23		TLM1&2	
7.	Confidence Interval of mean	1	13-10-23		TLM1	
8.	Problems	1	16-10-23		TLM1	
9.	Confidence Interval of proportion	1	19-10-23		TLM1	
10.	Confidence Interval of mean ( $n < 30$ )	1	20-10-23		TLM1	
11.	problems	1	21-10-23		TLM1&2	
No. of classes required to complete UNIT-III: 11				No. of classes taken:		

#### UNIT-IV: Tests of Hypothesis

S. No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign
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		Required	Completion	Completion	Methods	Weekly
1.	Testing of Hypothesis, definitions	1	26-10-23		TLM1 & 2	
2.	Z-test for single mean	1	27-10-23		TLM1	
3.	Z-test for difference of means	1	28-10-23		TLM1	
4.	Z-test for single Proportion	1	30-10-23		TLM1	
5.	Z-test for difference of Proportions	1	02-11-23		TLM1	
6.	t-test for single mean	1	03-11-23		TLM1	
7.	t-test for difference of means	1	04-11-23		TLM1	
8.	Paired t-test	1	06-11-23		TLM1	
9.	problems on means	1	09-11-23		TLM1	
10.	F-test for variances	1	10-11-23		TLM1	
11.	$\chi^2$ -test for goodness of fit	1	13-11-23		TLM1	
12.	$\chi^2$ -test for independence of attributes	1	16-11-23		TLM1	
No. of classes required to complete UNIT-IV: 12				No. of classes taken:		

### UNIT-V: Correlation and Regression

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Simple Bi-variate Correlation	1	17-11-23		TLM1 & 2	
2.	Problems on Pearson's Correlation	1	18-11-23		TLM1	
3.	Regression lines	1	20-11-23		TLM1	
4.	Problems on Regression lines	1	23-11-23		TLM1	
5.	Problems on Regression lines	1	24-11-23		TLM1	
6.	Properties of Regression coefficients	1	25-11-23		TLM1 & 2	
7.	Problems on Regression coefficients	1	27-11-23		TLM1	
8.	Problems on rank Correlation	1	30-11-23		TLM1	
9.	Problems on repeated ranks	1	01-12-23		TLM1	
10.	Practice problems	1	02-12-23		TLM1	
No. of classes required to complete UNIT-V: 10				No. of classes taken:		

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

## PART-C

### EVALUATION PROCESS (R20 Regulations):

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

## PART-D

### **Program Educational Objectives (PEOs):**

<b>PEO1</b>	Pursue a successful career in Information Technology or its allied fields.
<b>PEO2</b>	Exhibit sound knowledge in the fundamentals of Information Technology and apply practical experience with programming techniques to solve real world problems.
<b>PEO3</b>	Able to demonstrate self-learning, life-long learning, and work in teams on multidisciplinary projects.
<b>PEO4</b>	Able to understand the professional code of ethics and demonstrate ethical behavior, effective communication, team work and leadership skills in their job.

### **Program Outcomes (POs):**

<b>PO1 - Engineering Knowledge</b>	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2 - 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>PO3 - 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>PO4 - 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>PO5 - 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>PO6 - 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>PO7 - 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>PO8 - Ethics</b>	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9 - Individual and Team Work</b>	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10 - 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>PO11 - 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.
<b>PO12 - 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.

### **Program Specific Outcomes (PSOs):**

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

Course Instructor  
(M.Rami Reddy)

Course Coordinator  
(M.Rami Reddy)

Module Coordinator  
(Dr.A.Rami Reddy)

HOD  
(Dr.A.Rami Reddy)



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(AUTONOMOUS)

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

DEPARTMENT OF INFORMATION TECHNOLOGY

## COURSE HANDOUT

### PART-A

PROGRAM	: II B. Tech., I-Sem., IT - B
ACADEMIC YEAR	: 2023-24
COURSE NAME & CODE	: PROBABILITY AND STATISTICS
L-T-P STRUCTURE	: 3-0-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: K. N. V. Lakshmi
COURSE COORDINATOR	: M. Rami Reddy
PRE-REQUISITES	: None

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

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

CO1: Understand various probabilistic situations using the laws of probability and Random variables. (Understand - L2)

CO2: Apply probability distributions like Binomial, Poisson, Normal and Exponential distributions in solving engineering problems. (Apply - L3)

CO3: Calculate the standard error of sampling distribution and confidence intervals for parameters like mean and proportion based on sample data. (Apply - L3)

CO4: Analyze the data scientifically with the appropriate statistical methodologies to apply the suitable test of hypothesis. (Analyze - L4)

CO5: Construct the regression lines to predict the dependent variables and calculate the Correlation Coefficient for a bivariate statistical data. (Apply - L4)

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

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

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

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

### **BOS APPROVED TEXT BOOKS:**

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## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Probability and Random Variables

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction class, course outcomes	1	9/8/23		TLM1	
2.	Basic concepts of probability	1	10/8/23		TLM1	
3.	problems on basic probability	1	11/8/23		TLM1	
4.	problems on addition theorem	1	16/8/23		TLM1	
5.	Conditional probability	1	17/8/23		TLM1	
6.	Multiplication theorem, examples	1	18/8/23		TLM1	
7.	Independent events, theorems	1	19/8/23		TLM1	
8.	Problems on multiplication theorem, independent events	1	23/8/23		TLM1	
9.	Baye's theorem, problems	1	24/8/23		TLM1	
10.	Random variables, Expectations	1	25/8/23		TLM1	
11.	Problems on PMF	1	26/8/23		TLM1	
12.	Problems on PDF	1	30/8/23		TLM1	
13.	Tutorial-1	1	31/8/23		TLM3	
No. of classes required to complete UNIT-I: 13				No. of classes taken:		

#### UNIT-II: Probability Distributions

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Binomial Distribution- mean & variance	1	1/9/23		TLM1	
2.	Problems on Binomial distribution	1	2/9/23		TLM1	
3.	Fitting of binomial distribution	1	7/9/23		TLM1	
4.	Poisson distribution, mean and variance	1	8/9/23		TLM1	
5.	Problems on Poisson distribution and fitting of Poisson distribution	1	13/9/23		TLM1	
6.	Normal distribution: mean & variance	1	14/9/23		TLM1	
7.	Problems on Normal Distribution	1	15/9/23		TLM1	
8.	Exponential distribution:	1	16/9/23		TLM1	
9.	Tutorial -2	1	20/9/23		TLM3	
No. of classes required to complete UNIT-II: 9				No. of classes taken:		

**UNIT-III: Sampling distribution and Estimation**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Sampling distribution, definitions	1	21/9/23		TLM1	
2.	Sampling distribution of mean, variance	1	22/9/23		TLM1	
3.	Problems	1	23/9/23		TLM1	
4.	Problems on central limit theorem	2	27/9/23 29/9/23		TLM1	
5.	Problems	1	30/9/23		TLM1	
6.	I MID		4/10/23			
7.	I MID		5/10/23			
8.	I MID		6/10/23			
9.	I MID		7/10/23			
10.	Estimation	1	11/10/23			
11.	Estimation	1	12/10/23		TLM1	
12.	Point and interval estimation	1	13/10/23		TLM1	
13.	Interval estimation of mean and proportions in large samples	1	18/10/23		TLM1	
14.	Interval estimation of mean in small samples	1	19/10/23		TLM1	
15.	Problems	1	25/10/23		TLM1	
16.	Tutorial-3	1	26/10/23		TLM3	
No. of classes required to complete UNIT-III: 13				No. of classes taken:		

**UNIT-IV : Tests of Hypothesis**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Testing of Hypothesis , definitions	1	27/10/23		TLM1	
2.	Z-test for means	1	28/10/23		TLM1	
3.	Z-test for means	1	1/11/23		TLM1	
4.	Z-test for proportions	1	2/11/23		TLM1	
5.	Z-test for proportions	1	3/11/23		TLM1	
6.	t-test for means	2	4/11/23 8/11/23		TLM1	
7.	paired t-test	1	9/11/23		TLM1	
8.	F-test for variances	1	10/11/23		TLM1	
9.	$\chi^2$ -test for goodness of fit	1	15/11/23		TLM1	
10.	$\chi^2$ -test for independence of attributes	2	16/11/23 17/11/23		TLM1	

11.	Tutorial-4	1	18/11/23		TLM3	
No. of classes required to complete UNIT-IV: 13				No. of classes taken:		

### UNIT-V :Correlation and Regression

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Simple Bi-variate Correlation	1	22/11/23		TLM1	
2.	Problems on Pearson's Correlation	1	23/11/23		TLM1	
3.	Regression lines	1	24/11/23		TLM1	
4.	Problems on Regression lines	1	25/11/23		TLM1	
5.	Properties of Regression coefficients	1	29/11/23		TLM1	
6.	Rank correlation coefficient and problems	1	30/11/23		TLM1	
7.	Problems on rank correlation	1	1/12/23		TLM1	
8.	Tutorial-5	1	2/12/23		TLM3	
9.	II MID		6/12/23			
10.	II MID		7/12/23			
11.	II MID		8/12/23			
No. of classes required to complete UNIT-V: 8				No. of classes taken:		

### Teaching Learning Methods

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

## PART-C

### EVALUATION PROCESS (R17 Regulations):

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

Course Instructor  
(K. N. V. Lakshmi)

Course Coordinator  
(M. Rami Reddy)

Module Coordinator  
(Dr. A. Rami Reddy)

HOD  
(Dr. A. Rami Reddy)





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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:** MS.D.Vijaya Sri

**Course Name & Code** : DBMS & 20CS07

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

**Program/Sem/Sec** : B.TECH /III SEM /A-SECTION

**Credits:** 3

**A.Y.:** 2023-2024

**PREREQUISITE:** Data Structures

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

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

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

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

#### **TEXTBOOKS:**

**T1** Henry F. Korth, Abraham Silberschatz, S.Sudarshan, "Database System Concepts", McGrawHill, 6th edition, 2009.

**T2** Shashank Tiwari, " ProfessionalNoSql", John Wiley & Sons, 2011.

#### **REFERENCE BOOKS:**

**R1** Raghu Ramakrishnan, Johannes Gehrke, –Database Management System||, McGrawHill, 3rd edition, 2000.

**R2** Date C J, –An Introduction to Database System, Pearson Education, 8th edition, 2003.

**R3** Ramez Elmasri, Shamkanth B. Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th edition, 2010.

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to prerequisite, course educational objectives and course outcomes.	1	7-08-23		TLM1 TLM2	
2.	An overview of Database Management System	1	08-08-23		TLM1 TLM2	
3.	Database System Vs File System	1	09-08-23		TLM1 TLM2	
4.	Database System Concepts and Three Schema Architecture, Database Structure.	1	14-08-23		TLM1 TLM2	
5.	Data Models, Database Schema	1	16-08-23		TLM1	
6.	Data Instances, Data Independence	1	19-08-23		TLM1	
7.	Database Languages	1	21-08-23		TLM4	
8.	Data Modelling using the Entity Relationship Model: ER model concepts	1	22-08-23		TLM1 TLM2	
9.	Notation for ER Diagram	1	23-08-23		TLM2	
10.	Mapping Constraints, Keys, Concepts of Super Key	1	26-08-23		TLM1 TLM2	
11.	Candidate Key, Primary Key, Generalization,	1	28-08-23		TLM1 TLM2	
12.	Aggregation, Reduction of an ER Diagrams to Tables, Relationships of Higher Degree.	1	29-08-23		TLM2	
<b>No. of classes required to complete UNIT-I: 12</b>				<b>No. of classes taken:</b>		

#### UNIT-II:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Relational Data Model and Language: Relational Data Model Concepts	1	30-08-23		TLM1 TLM2	
14.	Integrity Constraints: Entity Integrity, Referential Integrity, Key Constraints	1	02-09-23		TLM1 TLM2	
15.	Domain Constraints, and Relational Algebra.	1	04-09-23		TLM1 TLM2	
16.	Introduction to SQL: Characteristics of SQL, Advantage of SQL.	1	05-09-23		TLM1 TLM2	
17.	SQL Data types and Literals, Insert, Update and Delete Operations	1	11-09-23		TLM1 TLM4	
18.	Tables, Views and Indexes	1	12-09-23		TLM4	
19.	Nested Queries	1	13-09-23		TLM4	
20.	Aggregate Functions, Joins	1	16-09-23		TLM4	
21.	Unions, Intersection, Minus, Cursors in SQL	1	19-09-23		TLM4	
22.	Triggers in SQL.	1	20-09-23		TLM4	
<b>No. of classes required to complete UNIT-II: 10</b>				<b>No. of classes taken:</b>		

**UNIT-III:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Normalization: Functional Dependencies	2	23-09-23		TLM1 TLM2	
24.	Normal Forms - First, Second	1	25-09-23		TLM1 TLM2	
25.	Third Normal Forms	1	26-09-23		TLM1 TLM2	
26.	BCNF, Inclusion Dependences	1	27-09-23		TLM1 TLM2	
27.	Loss Less Join Decompositions	1	30-09-23		TLM1 TLM2	
28.	Multi Valued Dependencies, Fourth Normal Form	1	09-10-23		TLM1 TLM2	
29.	Join Dependencies	1	10-10-23		TLM1 TLM2	
30.	Fifth Normal Form.	1	11-10-23		TLM1 TLM2	
<b>No. of classes required to complete UNIT-III: 09</b>				<b>No. of classes taken:</b>		

**UNIT-IV:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Transaction Processing Concepts: Transaction System	1	16-10-23		TLM1 TLM2	
32.	Testing of Serializability, Serializability of Schedules	1	17-10-23		TLM1 TLM2	
33.	Conflict & View Serializability, Recoverability	1	18-10-23		TLM1 TLM2	
34.	Deadlock Handling, Concurrency Control Techniques	1	21-10-23		TLM1 TLM2	
35.	Concurrency Control, Locking Techniques for Concurrency Control	1	30-10-23		TLM1 TLM2	
36.	Time Stamping Protocols for Concurrency Control	1	31-10-23		TLM1 TLM2	
37.	Validation Based Protocol, Multiple Granularity	1	01-11-23		TLM1 TLM2	
38.	Recovery with Concurrent Transactions.	1	04-11-23		TLM1 TLM2	
39.	Crash Recovery: Log Based Recovery	1	06-11-23		TLM1 TLM2	
40.	Checkpoints, ARIES Algorithm	1	07-11-23		TLM1 TLM2	
<b>No. of classes required to complete UNIT-IV: 10</b>				<b>No. of classes taken:</b>		

**UNIT-V:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Physical Database Design: Storage and file structure,	1	08-11-23		TLM1 TLM2	
42.	indexed files, hashed files	1	13-11-23		TLM1	
43.	B+ trees	1	14-11-23		TLM1 TLM2	

44.	Files with dense index; files with variable length records.	1	15-11-23		TLM1	
45.	Interfacing And Interacting With NoSQL : Introduction to NoSQL	2	18-11-23 20-11-23		TLM1 TLM2	
46.	Storing and Accessing Data,.	1	21-11-23		TLM1 TLM2	
47.	Storing Data In and Accessing Data from MongoDB	2	22-11-23 25-11-23		TLM1 TLM2	
48.	Querying MongoDB	2	27-11-23 28-11-23		TLM1 TLM2	
49.	Revision	2	29-12-23 02-12-23		TLM1	
<b>No. of classes required to complete UNIT-V: 13</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
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.
PO 10	<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.
PO 11	<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.
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):

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

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



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (Under Tier - I), ISO 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:** MS.D.Vijaya Sri

**Course Name & Code** : DBMS & 20CS07

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

**Program/Sem/Sec** : B.TECH /III SEM /B-SECTION

**Credits:** 3

**A.Y.:** 2023-2024

**PREREQUISITE:** Data Structures

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

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

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

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

#### **TEXTBOOKS:**

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

#### **REFERENCE BOOKS:**

- R1** Raghu Ramakrishnan, Johannes Gehrke, –Database Management System||, McGrawHill, 3rd edition, 2000.
- R2** Date C J, –An Introduction to Database System, Pearson Education, 8th edition, 2003.
- R3** Ramez Elmasri, Shamkanth B. Navathe, "Fundamentals of Database Systems", Addison Wesley, 6th edition, 2010.

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to prerequisite, course educational objectives and course outcomes.	1	7-08-23		TLM1 TLM2	
2.	An overview of Database Management System	1	08-08-23		TLM1 TLM2	
3.	Database System Vs File System	1	11-08-23		TLM1 TLM2	
4.	Database System Concepts and Three Schema Architecture, Database Structure.	1	14-08-23		TLM1 TLM2	
5.	Data Models, Database Schema	1	18-08-23		TLM1	
6.	Data Instances, Data Independence	1	19-08-23		TLM1	
7.	Database Languages	1	21-08-23		TLM4	
8.	Data Modelling using the Entity Relationship Model: ER model concepts	1	22-08-23		TLM1 TLM2	
9.	Notation for ER Diagram	1	25-08-23		TLM2	
10.	Mapping Constraints, Keys, Concepts of Super Key	1	26-08-23		TLM1 TLM2	
11.	Candidate Key, Primary Key, Generalization,	1	28-08-23		TLM1 TLM2	
12.	Aggregation, Reduction of an ER Diagrams to Tables, Relationships of Higher Degree.	1	29-08-23		TLM2	
<b>No. of classes required to complete UNIT-I: 12</b>				<b>No. of classes taken:</b>		

#### UNIT-II:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Relational Data Model and Language: Relational Data Model Concepts	1	01-09-23		TLM1 TLM2	
14.	Integrity Constraints: Entity Integrity, Referential Integrity, Key Constraints	1	02-09-23		TLM1 TLM2	
15.	Domain Constraints, and Relational Algebra.	1	04-09-23		TLM1 TLM2	
16.	Introduction to SQL: Characteristics of SQL, Advantage of SQL.	1	05-09-23		TLM1 TLM2	
17.	SQL Data types and Literals, Insert, Update and Delete Operations	1	08-09-23		TLM1 TLM4	
18.	Tables, Views and Indexes	1	11-09-23		TLM4	
19.	Nested Queries	1	12-09-23		TLM4	
20.	Aggregate Functions, Joins	1	15-09-23		TLM4	
21.	Unions, Intersection, Minus, Cursors in SQL	1	16-09-23		TLM4	
22.	Triggers in SQL.	1	19-09-23		TLM4	
<b>No. of classes required to complete UNIT-II: 10</b>				<b>No. of classes taken:</b>		

**UNIT-III:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
23.	Normalization: Functional Dependencies	2	22-09-23 23-09-23		TLM1 TLM2	
24.	Normal Forms - First, Second	1	25-09-23		TLM1 TLM2	
25.	Third Normal Forms	1	26-09-23		TLM1 TLM2	
26.	BCNF, Inclusion Dependences	1	29-09-23		TLM1 TLM2	
27.	Loss Less Join Decompositions	1	30-09-23		TLM1 TLM2	
28.	Multi Valued Dependencies, Fourth Normal Form	1	09-10-23		TLM1 TLM2	
29.	Join Dependencies	1	10-10-23		TLM1 TLM2	
30.	Fifth Normal Form.	1	13-10-23		TLM1 TLM2	
<b>No. of classes required to complete UNIT-III: 09</b>				<b>No. of classes taken:</b>		

**UNIT-IV:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
31.	Transaction Processing Concepts: Transaction System	1	16-10-23		TLM1 TLM2	
32.	Testing of Serializability, Serializability of Schedules	1	17-10-23		TLM1 TLM2	
33.	Conflict & View Serializability, Recoverability	1	20-10-23		TLM1 TLM2	
34.	Deadlock Handling, Concurrency Control Techniques	1	21-10-23		TLM1 TLM2	
35.	Concurrency Control, Locking Techniques for Concurrency Control	1	30-10-23		TLM1 TLM2	
36.	Time Stamping Protocols for Concurrency Control	1	31-10-23		TLM1 TLM2	
37.	Validation Based Protocol, Multiple Granularity	1	03-11-23		TLM1 TLM2	
38.	Recovery with Concurrent Transactions.	1	04-11-23		TLM1 TLM2	
39.	Crash Recovery: Log Based Recovery	1	06-11-23		TLM1 TLM2	
40.	Checkpoints, ARIES Algorithm	1	07-11-23		TLM1 TLM2	
<b>No. of classes required to complete UNIT-IV: 10</b>				<b>No. of classes taken:</b>		

**UNIT-V:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Physical Database Design: Storage and file structure,	1	10-11-23		TLM1 TLM2	
42.	indexed files, hashed files	1	13-11-23		TLM1	
43.	B+ trees	1	14-11-23		TLM1 TLM2	



44.	Files with dense index; files with variable length records.	1	17-11-23		TLM1
45.	Interfacing And Interacting With NoSQL : Introduction to NoSQL	2	18-11-23 20-11-23		TLM1 TLM2
46.	Storing and Accessing Data,.	1	21-11-23		TLM1 TLM2
47.	Storing Data In and Accessing Data from MongoDB	2	24-11-23 25-11-23		TLM1 TLM2
48.	Querying MongoDB	2	27-11-23 28-11-23		TLM1 TLM2
49.	Revision	2	01-12-23 02-12-23		TLM1
<b>No. of classes required to complete UNIT-V: 13</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
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.
PO 10	<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.
PO 11	<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.
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):

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

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



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC 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** : COMPUTER ORGANIZATION & 20CS08

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

**Credits:** 3

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

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

**PREREQUISITE:** Discrete Mathematical Structures, Fundamentals of Computer Hardware

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

The objective of the course is to learn about the functional blocks and data representation of computer system and understands the design principles of processor and organization and management of memory and peripheral devices.

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

<b>CO1</b>	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. <b>(Understand- L2)</b>
<b>CO2</b>	Design Combinational logic circuits and Sequential logic circuits <b>(Apply - L3)</b>
<b>CO3</b>	Understand computer architecture and Data representation to perform computer arithmetic operations. <b>(Understand- L2)</b>
<b>CO4</b>	Illustrate the design principles of control unit and pipelining. <b>(Understand- L2)</b>
<b>CO5</b>	Analyze the memory hierarchy in computer system. <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>CO1</b>	3															
<b>CO2</b>	2		1													
<b>CO3</b>	3	1														
<b>CO4</b>	2	1														
<b>CO5</b>		1	1													
			<b>1 - Low</b>					<b>2 -Medium</b>					<b>3 - High</b>			

#### **TEXTBOOKS:**

**T1** Morris Mano, Michael D Ciletti, Digital Design, 4/e, 2008, PEA

**T2** Carl Hamacher, Zvonks Vranesic, Safeazaky, "Computer Organization", TMH publications.

#### **REFERENCE BOOKS:**

**R1** M. Morris Mano, "Computer Systems Architecture", Pearson Education Publishers. [Units-1,2].

**R2** Leach, Malvino, Saha, "Digital Logic Design", TMH, 2006.

**R3** A.Anand Kumar, "Switching Theory and Logic Design", PHI Pvt, 2010.

**R4** Kohavi, Jha, Cambridge, "Switching and Finite Autometa Theory", 3/e.

**R5** R.P.Jain, "Modern Digital Electronics", MH, 2011

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Number Systems, Logic Gates and Boolean algebra

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.	Number Systems: Binary, Octal, Decimal, Hexadecimal Number Systems	1	07-08-2023		TLM2	
2.	Conversion of numbers from one radix to another radix	1	09-08-2023		TLM2	
3.	Conversion of numbers from one radix to another radix	1	11-08-2023		TLM2	
4.	R's complement and (R-1)'s complement	1	14-08-2023		TLM2	
5.	Subtraction using complements	1	16-08-2023		TLM2	
6.	Binary codes	1	18-08-2023		TLM2	
7.	Basic gates, Universal gates, Special gates	1	19-08-2023		TLM2	
8.	Fundamental postulates of Boolean algebra, basic theorems and properties	1	21-08-2023		TLM2	
9.	Complement and Dual of logical expressions	1	23-08-2023		TLM2	
10.	SOP & POS	1	25-08-2023		TLM2	
11.	Minimization of logic functions using Boolean theorems	1	26-08-2023		TLM2	
12.	Karnaugh Maps for minimization of Boolean functions	1	28-08-2023		TLM2	
13.	Karnaugh Maps for minimization of Boolean functions using Don't cares	1	30-08-2023		TLM2	
<b>No. of classes required to complete UNIT-I: 13</b>				<b>No. of classes taken:</b>		

**UNIT-II: Combinational & Sequential Logic Circuits**

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.	Design of Half Adder, Full Adder	1	01-09-2023		TLM2	
15.	Design of Half Subtractor, Full Subtractor	1	02-09-2023		TLM2	
16.	Ripple carry adder	1	04-09-2023		TLM2	
17.	Design of Decoders	1	08-09-2023		TLM2	
18.	Design of Encoders	1	08-09-2023		TLM2	
19.	Design of Multiplexers	1	11-09-2023		TLM2	
20.	Design of Demultiplexers	1	13-09-2023		TLM2	
21.	Priority encoder	1	13-09-2023		TLM2	
22.	Latch and Flip-flop, RS-Latch using Universal gates	1	15-09-2023		TLM2	
23.	RS, JK, T and D flip-flops, Truth tables and excitation tables	1	16-09-2023		TLM2	
24.	Conversion of flip-flops	1	20-09-2023		TLM2	
25.	Master-Slave flip-flop	1	22-09-2023		TLM2	
26.	Registers	1	23-09-2023		TLM2	
27.	Counters	1	25-09-2023		TLM2	
28.	Tutorial, Assignment, Quiz	1	27-09-2023		TLM3	
<b>No. of classes required to complete UNIT-II: 15</b>				<b>No. of classes taken:</b>		

**UNIT-III: Functional blocks of a computer & Data representation**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
29.	Fundamental Blocks of a computer: CPU, Memory, Input-Output subsystems, Control unit	1	29-09-2023		TLM2	
30.	Instruction set architecture of a CPU-Registers	1	30-09-2023		TLM2	
31.	Instruction execution cycle	1	09-10-2023		TLM2	
32.	RTL interpretation of instructions	1	11-10-2023		TLM2	
33.	Addressing Modes	1	13-10-2023		TLM2	
34.	Instruction Set	1	16-10-2023		TLM2	
35.	Signed number representation, Fixed and floating point representation	1	18-10-2023		TLM2	
36.	Character representation- Integer addition and subtraction, multiplication, shift	1	20-10-2023		TLM2	
37.	Booth Multiplier	1	21-10-2023		TLM2	
38.	Division Restoring and Non-Restoring Techniques	1	25-10-2023		TLM2	
39.	Floating point Arithmetic	1	27-10-2023		TLM2	
40.	Tutorial, Assignment, Quiz	1	28-10-2023		TLM3	
<b>No. of classes required to complete UNIT-III: 12</b>				<b>No. of classes taken:</b>		

**UNIT-IV: CPU control unit design, Parallel Processors**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	Hardwired and Micro programmed design approaches	1	30-10-2023		TLM2	
42.	Basic concepts of pipelining	1	01-11-2023		TLM2	
43.	Pipelining	1	03-11-2023		TLM2	
44.	Throughput, Speedup,	1	04-11-2023		TLM2	
45.	Pipeline hazards	1	06-11-2023		TLM2	
46.	Tutorial, Assignment, Quiz	1	08-11-2023		TLM3	
<b>No. of classes required to complete UNIT-IV: 6</b>				<b>No. of classes taken:</b>		

**UNIT-V: Memory System Design, Peripheral Devices and their characteristics**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
47.	Memory organization	1	10-11-2023		TLM1	
48.	Memory interleaving	1	13-11-2023		TLM1	
49.	Hierarchical memory organization	1	15-11-2023		TLM2	
50.	Cache memory	1	17-11-2023		TLM2	
51.	Cache Memory Mapping Techniques	1	18-11-2023		TLM2	
52.	Input-output subsystems	1	20-11-2023		TLM2	
53.	I/O device interface	1	22-11-2023		TLM2	
54.	I/O transfers: Program controlled	1	24-11-2023		TLM2	
55.	Interrupt driven	1	25-11-2023		TLM2	
56.	DMA	1	27-11-2023		TLM2	
57.	Tutorial, Assignment, Quiz	1	29-11-2023		TLM3	
<b>No. of classes required to complete UNIT-V: 11</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.	BCD Addition & Subtraction	1	01-12-2023		TLM2	
2.	Hamming code	1	02-12-2023		TLM2	

## 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/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

## ACADEMIC CALENDAR: A.Y 2023-24

Description	From	To	Weeks
I Phase of Instructions	07-08-2023	30-09-2023	8W
<b>I Mid Examinations</b>	<b>02-10-2023</b>	<b>07-10-2023</b>	<b>1 W</b>
II Phase of Instructions	09-10-2023	02-12-2023	8W
<b>II Mid Examinations</b>	<b>04-12-2023</b>	<b>09-12-2023</b>	<b>1 W</b>
Preparation and Practical	11-12-2023	16-12-2023	1 W
Semester End Examinations	18-12-2023	30-12-2023	2 W

## 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
<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>	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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. G. Rajendra	Dr.Ch. Venkata Narayana	Mr.G.Rajendra	Dr.B.Srinivasa Rao
Signature				





# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Mr. G. RAJENDRA  
**Course Name & Code** : COMPUTER ORGANIZATION & 20CS08  
**L-T-P Structure** : 3-0-0 **Credits:** 3  
**Program/Sem/Sec** : B.Tech/III/B **A.Y.:** 2023-24

**PREREQUISITE:** Discrete Mathematical Structures, Fundamentals of Computer Hardware

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

The objective of the course is to learn about the functional blocks and data representation of computer system and understands the design principles of processor and organization and management of memory and peripheral devices.

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

<b>CO1</b>	Evaluate digital number systems and use Boolean algebra theorems, Properties and Canonical forms for digital logic circuit design. ( <b>Understand- L2</b> )
<b>CO2</b>	Design Combinational logic circuits and Sequential logic circuits ( <b>Apply - L3</b> )
<b>CO3</b>	Understand computer architecture and Data representation to perform computer arithmetic operations. ( <b>Understand- L2</b> )
<b>CO4</b>	Illustrate the design principles of control unit and pipelining. ( <b>Understand- L2</b> )
<b>CO5</b>	Analyze the memory hierarchy in computer system. ( <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>CO1</b>	3														
<b>CO2</b>	2		1												
<b>CO3</b>	3	1													
<b>CO4</b>	2	1													
<b>CO5</b>		1	1												
	1 - Low			2 -Medium						3 - High					

#### **TEXTBOOKS:**

- T1** Morris Mano, Michael D Ciletti, Digital Design, 4/e, 2008, PEA  
**T2** Carl Hamacher, Zvonks Vranesic, Safeazaky, "Computer Organization", TMH publications.

#### **REFERENCE BOOKS:**

- R1** M. Morris Mano, "Computer Systems Architecture", Pearson Education Publishers. [Units-1,2].  
**R2** Leach, Malvino, Saha, "Digital Logic Design", TMH, 2006.  
**R3** A.Anand Kumar, "Switching Theory and Logic Design", PHI Pvt, 2010.  
**R4** Kohavi, Jha, Cambridge, "Switching and Finite Autometa Theory", 3/e.  
**R5** R.P.Jain, "Modern Digital Electronics", MH, 2011

## PA RT-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: Number Systems, Logic Gates and Boolean algebra

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.	Number Systems: Binary, Octal, Decimal, Hexadecimal Number Systems	1	07-08-2023		TLM2	
2.	Conversion of numbers from one radix to another radix	1	08-08-2023		TLM2	
3.	Conversion of numbers from one radix to another radix	1	10-08-2023		TLM2	
4.	R's complement and (R-1)'s complement	1	11-08-2023		TLM2	
5.	Subtraction using complements	1	14-08-2023		TLM2	
6.	Binary codes	1	17-08-2023		TLM2	
7.	Basic gates, Universal gates, Special gates	1	18-08-2023		TLM2	
8.	Fundamental postulates of Boolean algebra, basic theorems and properties	1	21-08-2023		TLM2	
9.	Complement and Dual of logical expressions	1	22-08-2023		TLM2	
10.	SOP & POS	1	24-08-2023		TLM2	
11.	Minimization of logic functions using Boolean theorems	1	25-08-2023		TLM2	
12.	Karnaugh Maps for minimization of Boolean functions	1	28-08-2023		TLM2	
13.	Karnaugh Maps for minimization of Boolean functions using Don't cares	1	29-08-2023		TLM2	
14.	Tutorial/ Assignment/ Quiz	1	31-08-2023		TLM3	
<b>No. of classes required to complete UNIT-I: 14</b>				<b>No. of classes taken:</b>		

**UNIT-II: Combinational & Sequential Logic Circuits**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
15.	Design of Half Adder, Full Adder	1	01-09-2023		TLM2	
16.	Design of Half Subtractor, Full Subtractor	1	04-09-2023		TLM2	
17.	Ripple carry adder	1	05-09-2023		TLM2	
18.	Design of Decoders	1	08-09-2023		TLM2	
19.	Design of Encoders	1	11-09-2023		TLM2	
20.	Design of Multiplexers	1	12-09-2023		TLM2	
21.	Design of Demultiplexers	1	14-09-2023		TLM2	
22.	Priority encoder	1	15-09-2023		TLM2	
23.	Latch and Flip-flop, RS-Latch using Universal gates	1	18-09-2023		TLM2	
24.	RS, JK, T and D flip-flops, Truth tables and excitation tables	1	20-09-2023		TLM2	
25.	Conversion of flip-flops	1	21-09-2023		TLM2	
26.	Master-Slave flip-flop	1	22-09-2023		TLM2	
27.	Registers	1	25-09-2023		TLM2	
28.	Counters	1	26-09-2023		TLM2	
29.	Tutorial, Assignment, Quiz	1	29-09-2023		TLM3	
<b>No. of classes required to complete UNIT-II: 15</b>				<b>No. of classes taken:</b>		

**UNIT-III: Functional blocks of a computer & Data representation**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
30.	Fundamental Blocks of a computer: CPU, Memory, Input-Output subsystems, Control unit	1	30-09-2023		TLM2	
31.	Instruction set architecture of a CPU-Registers	1	09-10-2023		TLM2	
32.	Instruction execution cycle	1	10-10-2023		TLM2	
33.	RTL interpretation of instructions	1	12-10-2023		TLM2	
34.	Addressing Modes	1	13-10-2023		TLM2	
35.	Instruction Set	1	16-10-2023		TLM2	
36.	Signed number representation, Fixed and floating point representation	1	17-10-2023		TLM2	
37.	Character representation- Integer addition and subtraction, multiplication, shift	1	19-10-2023		TLM2	
38.	Booth Multiplier	1	20-10-2023		TLM2	
39.	Division Restoring and Non-Restoring Techniques	1	23-10-2023		TLM2	
40.	Floating point Arithmetic	1	26-10-2023		TLM2	
41.	Tutorial, Assignment, Quiz	1	30-10-2023		TLM3	
<b>No. of classes required to complete UNIT-III: 12</b>				<b>No. of classes taken:</b>		

**UNIT-IV: CPU control unit design, Parallel Processors**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
42.	Hardwired and Micro programmed design approaches	1	31-10-2023		TLM2	
43.	Basic concepts of pipelining	1	02-11-2023		TLM2	
44.	Pipelining	1	03-11-2023		TLM2	
45.	Throughput, Speedup,	1	06-11-2023		TLM2	
46.	Pipeline hazards	1	07-11-2023		TLM2	
47.	Tutorial, Assignment, Quiz	1	09-11-2023		TLM3	
<b>No. of classes required to complete UNIT-IV: 6</b>				<b>No. of classes taken:</b>		

**UNIT-V: Memory System Design, Peripheral Devices and their characteristics**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
48.	Memory organization	1	10-11-2023		TLM1	
49.	Memory interleaving	1	13-11-2023		TLM1	
50.	Hierarchical memory organization	1	14-11-2023		TLM2	
51.	Cache memory	1	16-11-2023		TLM2	
52.	Cache Memory Mapping Techniques	1	17-11-2023		TLM2	
53.	Input-output subsystems	1	20-11-2023		TLM2	
54.	I/O device interface	1	21-11-2023		TLM2	
55.	I/O transfers: Program controlled	1	23-11-2023		TLM2	
56.	Interrupt driven	1	24-11-2023		TLM2	
57.	DMA	1	27-11-2023		TLM2	
58.	Tutorial, Assignment, Quiz	1	28-11-2023		TLM3	
<b>No. of classes required to complete UNIT-V: 11</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.	BCD Addition & Subtraction	1	30-11-2023		TLM2	
2.	Hamming code	1	01-12-2023		TLM2	

**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
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 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>	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.

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr. G. Rajendra	Dr.Ch. Venkata Narayana	Mr.G.Rajendra	Dr.B.Srinivasa Rao
Signature				



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

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

## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Dr S.Naganjaneyulu

**Course Name & Code** : Object Oriented Programming, 20CS09

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

**Credits:** 03

**Program/Sem/Sec** : B.Tech-IT / III SEM / A

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

**PREREQUISITE** : Programming for Problem solving using C

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

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

CO 1	Demonstrate the fundamentals of object-oriented programming and basic building blocks of Java. ( <b>Understand- L2</b> )
CO 2	Apply object-oriented programming principles for the development of reusable applications. ( <b>Apply - L3</b> )
CO 3	Understand the importance of abstraction, user defined package creation and handling different exceptions. ( <b>Understand- L2</b> )
CO 4	Develop multitasking applications using JAVA multithreaded programming and perform different operations upon various data structures by using collection framework. ( <b>Apply – L3</b> )
CO 5	Develop GUI applications using AWT (Abstract Window Toolkit). ( <b>Apply- L3</b> )

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

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

## **TEXTBOOKS:**

1. Herbert Schildt, “Java: The complete reference”, TMH Publications, 7th edition, 2006.
2. Cay S. Horstmann, “Core Java Volume I – Fundamentals”, Pearson, Eleventh edition, 2018.

## **REFERENCE BOOKS:**

1. Dr.R.NageswaraRao, “Core JAVA: An Integrated Approach”, Dreamtech Press, 1st Edition 2008.
2. E. Balaguruswamy, “Programming with JAVA”, TMH Publications, 2nd Edition, 2000.
3. Patrick Niemeyer & Jonathan Knudsen, “Learning Java”, O’REILLY Publications, 3rd Edition, 2005.
4. Benjamin J Evans & David Flanagan, “Java–in a Nutshell – A desktop quick reference”, O’REILLY Publications, 6th Edition, 2014.

## **COURSE DELIVERY PLAN (LESSON PLAN): Section-C**

### **UNIT-I:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
1.	Programming Paradigms	1	07-08-2023		TLM1,2	CO1	T1 & R1	
2.	Difference Between OOP vs POP	1	09-08-2023		TLM1,2	CO1	T1 & R1	
3.	Principles of OOP	1	10-08-2023		TLM1,2	CO1	T1 & R1	
4.	Java Introduction- History, Buzzwords	1	14-08-2023		TLM1,2	CO1	T1 & R1	
5.	Data Types	1	16-08-2023		TLM1,2	CO1	T1 & R1	
6.	Keywords, Variables	1	17-08-2023		TLM1,2	CO1	T1 & R1	
7.	Operators	1	19-08-2023		TLM1,2	CO1	T1 & R1	
8.	Control Statements	1	21-08-2023		TLM1,2	CO1	T1 & R1	
9.	Class Definition, Variables and Methods	1	23-08-2023		TLM1,2	CO1	T1 & R1	
10.	Declaring Objects, this Keyword	1	24-08-2023		TLM1,2	CO1	T1 & R1	
11.	Constructors	1	26-08-2023		TLM1,2	CO1	T1 & R1	
<b>No. of classes required to complete UNIT-I: 11</b>						<b>No. of classes taken:</b>		

### **UNIT-II:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
12.	Overloading Methods and Constructors	1	28-08-2023		TLM1,2	CO2	T1 & R1	
13.	Parameter Passing and Returning Objects	1	30-08-2023		TLM1,2	CO2	T1 & R1	
14.	Recursion and Access Control	1	31-08-2023		TLM1,2	CO2	T1 & R1	
15.	Nested and Inner Classes	1	02-09-2023		TLM1,2	CO2	T1 & R1	
16.	Final Keyword & Static	1	04-09-2023		TLM1,2	CO2	T1 & R1	
17.	Variable and Command Line Arguments	1	06-09-2023		TLM1,2	CO2	T1 & R1	



18.	Inheritance Introduction	1	11-09-2023		TLM1,2	CO2	T1 & R1		
19.	Types of Inheritance	1	13-09-2023		TLM1,2	CO2	T1 & R1		
20.	Super Keyword	1	14-09-2023		TLM1,2	CO2	T1 & R1		
21.	Overriding and Dynamic Method Dispatch	1	16-09-2023		TLM1,2	CO2	T1 & R1		
22.	Abstract Class and Final with Inheritance	1	18-09-2023		TLM1,2	CO2	T1 & R1		
23.	String	1	20-09-2023		TLM1,2	CO2	T1 & R1		
24.	StringBuffer and StringTokenizer	1	21-09-2023		TLM1,2	CO2	T1 & R1		
<b>No. of classes required to complete UNIT-II: 13</b>							<b>No. of classes taken:</b>		

### UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
25.	Interfaces, Inheritance in interfaces	1	23-09-2023		TLM1,2	CO3	T1 & R1		
26.	Packages -Introduction, Creation	1	25-09-2023		TLM1,2	CO3	T1 & R1		
27.	Java Built in Packages	1	27-09-2023		TLM1,2	CO3	T1 & R1		
28.	Exception Hierarchy	1	30-09-2023		TLM1,2	CO3	T1 & R1		
29.	Try,catch,throw	1	09-10-2023		TLM1,2	CO3	T1 & R1		
30.	Throws and finally	1	11-10-2023		TLM1,2	CO3	T1 & R1		
31.	User Defined Exception	1	12-10-2023		TLM1,2	CO3	T1 & R1		
32.	Assertions	1	16-10-2023		TLM1,2	CO3	T1 & R1		
<b>No. of classes required to complete UNIT-III: 08</b>							<b>No. of classes taken:</b>		

### UNIT-IV:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
33.	Multi Threading -Introduction	1	18-10-2023		TLM1,2	CO4	T1 & R1		
34.	Thread Life Cycle	1	19-10-2023		TLM1,2	CO4	T1 & R1		
35.	Creation of Thread	1	21-10-2023		TLM1,2	CO4	T1 & R1		
36.	Naming a Thread, Joining a Thread	1	25-10-2023		TLM1,2	CO4	T1 & R1		
37.	Thread Priorities, Daemon Thread	1	26-10-2023		TLM1,2	CO4	T1 & R1		
38.	Thread Pool, Thread Group	1	28-10-2023		TLM1,2	CO4	T1 & R1		
39.	Thread Synchronization	1	30-10-2023		TLM1,2	CO4	T1 & R1		
40.	Inter Thread Communications	1	01-11-2023		TLM1,2	CO4	T1 & R1		
41.	Collections Framework	1	02-11-2023		TLM1,2	CO4	T1 & R1		
42.	Hierarchy, Generics	1	04-11-2023		TLM1,2	CO4	T1 & R1		
43.	List, Set	1	06-11-2023		TLM1,2	CO4	T1 & R1		
44.	Queue and Map	1	08-11-2023		TLM1,2	CO4	T1 & R1		
<b>No. of classes required to complete UNIT-IV: 12</b>							<b>No. of classes taken:</b>		

**UNIT-V:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
45.	AWT Hierarchy	1	09-11-2023		TLM1	CO5	T1 & R1		
46.	Components & Containers	1	13-11-2023		TLM1	CO5	T1 & R1		
47.	Button, Label, Text Field	1	15-11-2023		TLM2	CO5	T1 & R1		
48.	Checkbox, Choice, List	1	16-11-2023		TLM2	CO5	T1 & R1		
49.	Canvas, Scrollbar, Menus	1	18-11-2023		TLM2	CO5	T1 & R1		
50.	Layout Managers	1	20-11-2023		TLM2	CO5	T1 & R1		
51.	Event Delegation Model, Event Classes	1	22-11-2023		TLM2	CO5	T1 & R1		
52.	Listener Interfaces	2	23-11-2023 25-11-2023		TLM2	CO5	T1 & R1		
53.	Key Listener and Window Listener	2	27-11-2023 29-11-2023		TLM2	CO5	T1 & R1		
54.	Adapter Classes, close AWS Window	1	30-11-2023		TLM2	CO5	T1 & R1		
<b>No. of classes required to complete UNIT-V: 12</b>							<b>No. of classes taken:</b>		

**Contents beyond the Syllabus**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
55.	Introduction to Swings	1	02-12-2023		TLM2	CO5	T1 & R1	

**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/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

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

Description	From	To	Weeks
I Phase of Instructions	07-08-2023	30-09-2023	8W
<b>I Mid Examinations</b>	<b>02-10-2023</b>	<b>07-10-2023</b>	<b>1 W</b>
II Phase of Instructions	09-10-2023	02-12-2023	8W
<b>II Mid Examinations</b>	<b>04-12-2023</b>	<b>09-12-2023</b>	<b>1 W</b>
Preparation and Practical	11-12-2023	16-12-2023	1 W
Semester End Examinations	18-12-2023	30-12-2023	2 W

## PART-C

### EVALUATION PROCESS:

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

## PART-D

### PROGRAMME OUTCOMES (POs):

<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>	<b>Dr S Naganjaneyulu</b>	<b>Dr.S.Naganjaneyulu</b>	<b>Dr.K.Phaneendra</b>	<b>Dr. B.Srinivasa Rao</b>
<b>Signature</b>				



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## DEPARTMENT OF INFORMATION TECHNOLOGY

### COURSE HANDOUT

#### PART-A

**Name of Course Instructor:** Dr S.Naganjaneyulu

**Course Name & Code** : Object Oriented Programming, 20CS09

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

**Credits:** 03

**Program/Sem/Sec** : B.Tech-IT / III SEM / A

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

**PREREQUISITE** : Programming for Problem solving using C

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

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

CO 1	Demonstrate the fundamentals of object-oriented programming and basic building blocks of Java. <b>(Understand- L2)</b>
CO 2	Apply object-oriented programming principles for the development of reusable applications. <b>(Apply - L3)</b>
CO 3	Understand the importance of abstraction, user defined package creation and handling different exceptions. <b>(Understand- L2)</b>
CO 4	Develop multitasking applications using JAVA multithreaded programming and perform different operations upon various data structures by using collection framework. <b>(Apply – L3)</b>
CO 5	Develop GUI applications using AWT (Abstract Window Toolkit). <b>(Apply- L3)</b>

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

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

## **TEXTBOOKS:**

1. Herbert Schildt, "Java: The complete reference", TMH Publications, 7th edition, 2006.
2. Cay S. Horstmann, "Core Java Volume I – Fundamentals", Pearson, Eleventh edition, 2018.

## **REFERENCE BOOKS:**

1. Dr.R.NageswaraRao, "Core JAVA: An Integrated Approach", Dreamtech Press, 1st Edition 2008.
2. E. Balaguruswamy, "Programming with JAVA", TMH Publications, 2nd Edition, 2000.
3. Patrick Niemeyer & Jonathan Knudsen, "Learning Java", O'REILLY Publications, 3rd Edition, 2005.
4. Benjamin J Evans & David Flanagan, "Java-in a Nutshell – A desktop quick reference", O'REILLY Publications, 6th Edition, 2014.

## **COURSE DELIVERY PLAN (LESSON PLAN): Section-C**

### **UNIT-I:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
1.	Programming Paradigms	1	07-08-2023		TLM1,2	CO1	T1 & R1	
2.	Difference Between OOP vs POP	1	09-08-2023		TLM1,2	CO1	T1 & R1	
3.	Principles of OOP	1	10-08-2023		TLM1,2	CO1	T1 & R1	
4.	Java Introduction- History, Buzzwords	1	14-08-2023		TLM1,2	CO1	T1 & R1	
5.	Data Types	1	16-08-2023		TLM1,2	CO1	T1 & R1	
6.	Keywords, Variables	1	17-08-2023		TLM1,2	CO1	T1 & R1	
7.	Operators	1	19-08-2023		TLM1,2	CO1	T1 & R1	
8.	Control Statements	1	21-08-2023		TLM1,2	CO1	T1 & R1	
9.	Class Definition, Variables and Methods	1	23-08-2023		TLM1,2	CO1	T1 & R1	
10.	Declaring Objects, this Keyword	1	24-08-2023		TLM1,2	CO1	T1 & R1	
11.	Constructors	1	26-08-2023		TLM1,2	CO1	T1 & R1	
<b>No. of classes required to complete UNIT-I: 11</b>						<b>No. of classes taken:</b>		

### **UNIT-II:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
12.	Overloading Methods and Constructors	1	28-08-2023		TLM1,2	CO2	T1 & R1	
13.	Parameter Passing and Returning Objects	1	30-08-2023		TLM1,2	CO2	T1 & R1	
14.	Recursion and Access Control	1	31-08-2023		TLM1,2	CO2	T1 & R1	
15.	Nested and Inner Classes	1	02-09-2023		TLM1,2	CO2	T1 & R1	
16.	Final Keyword & Static	1	04-09-2023		TLM1,2	CO2	T1 & R1	
17.	Variable and Command Line Arguments	1	06-09-2023		TLM1,2	CO2	T1 & R1	

18.	Inheritance Introduction	1	11-09-2023		TLM1,2	CO2	T1 & R1		
19.	Types of Inheritance	1	13-09-2023		TLM1,2	CO2	T1 & R1		
20.	Super Keyword	1	14-09-2023		TLM1,2	CO2	T1 & R1		
21.	Overriding and Dynamic Method Dispatch	1	16-09-2023		TLM1,2	CO2	T1 & R1		
22.	Abstract Class and Final with Inheritance	1	18-09-2023		TLM1,2	CO2	T1 & R1		
23.	String	1	20-09-2023		TLM1,2	CO2	T1 & R1		
24.	StringBuffer and StringTokenizer	1	21-09-2023		TLM1,2	CO2	T1 & R1		
<b>No. of classes required to complete UNIT-II: 13</b>							<b>No. of classes taken:</b>		

### UNIT-III:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
25.	Interfaces, Inheritance in interfaces	1	23-09-2023		TLM1,2	CO3	T1 & R1		
26.	Packages -Introduction, Creation	1	25-09-2023		TLM1,2	CO3	T1 & R1		
27.	Java Built in Packages	1	27-09-2023		TLM1,2	CO3	T1 & R1		
28.	Exception Hierarchy	1	30-09-2023		TLM1,2	CO3	T1 & R1		
29.	Try,catch,throw	1	09-10-2023		TLM1,2	CO3	T1 & R1		
30.	Throws and finally	1	11-10-2023		TLM1,2	CO3	T1 & R1		
31.	User Defined Exception	1	12-10-2023		TLM1,2	CO3	T1 & R1		
32.	Assertions	1	16-10-2023		TLM1,2	CO3	T1 & R1		
<b>No. of classes required to complete UNIT-III: 08</b>							<b>No. of classes taken:</b>		

### UNIT-IV:

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
33.	Multi Threading -Introduction	1	18-10-2023		TLM1,2	CO4	T1 & R1		
34.	Thread Life Cycle	1	19-10-2023		TLM1,2	CO4	T1 & R1		
35.	Creation of Thread	1	21-10-2023		TLM1,2	CO4	T1 & R1		
36.	Naming a Thread, Joining a Thread	1	25-10-2023		TLM1,2	CO4	T1 & R1		
37.	Thread Priorities, Daemon Thread	1	26-10-2023		TLM1,2	CO4	T1 & R1		
38.	Thread Pool, Thread Group	1	28-10-2023		TLM1,2	CO4	T1 & R1		
39.	Thread Synchronization	1	30-10-2023		TLM1,2	CO4	T1 & R1		
40.	Inter Thread Communications	1	01-11-2023		TLM1,2	CO4	T1 & R1		
41.	Collections Framework	1	02-11-2023		TLM1,2	CO4	T1 & R1		
42.	Hierarchy, Generics	1	04-11-2023		TLM1,2	CO4	T1 & R1		
43.	List, Set	1	06-11-2023		TLM1,2	CO4	T1 & R1		
44.	Queue and Map	1	08-11-2023		TLM1,2	CO4	T1 & R1		
<b>No. of classes required to complete UNIT-IV: 12</b>							<b>No. of classes taken:</b>		

**UNIT-V:**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly	
45.	AWT Hierarchy	1	09-11-2023		TLM1	CO5	T1 & R1		
46.	Components & Containers	1	13-11-2023		TLM1	CO5	T1 & R1		
47.	Button, Label, Text Field	1	15-11-2023		TLM2	CO5	T1 & R1		
48.	Checkbox, Choice, List	1	16-11-2023		TLM2	CO5	T1 & R1		
49.	Canvas, Scrollbar, Menus	1	18-11-2023		TLM2	CO5	T1 & R1		
50.	Layout Managers	1	20-11-2023		TLM2	CO5	T1 & R1		
51.	Event Delegation Model, Event Classes	1	22-11-2023		TLM2	CO5	T1 & R1		
52.	Listener Interfaces	2	23-11-2023 25-11-2023		TLM2	CO5	T1 & R1		
53.	Key Listener and Window Listener	2	27-11-2023 29-11-2023		TLM2	CO5	T1 & R1		
54.	Adapter Classes, close AWS Window	1	30-11-2023		TLM2	CO5	T1 & R1		
<b>No. of classes required to complete UNIT-V: 12</b>							<b>No. of classes taken:</b>		

**Contents beyond the Syllabus**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Textbook Followed	HOD Sign Weekly
55.	Introduction to Swings	1	02-12-2023		TLM2	CO5	T1 & R1	

**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/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

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

Description	From	To	Weeks
I Phase of Instructions	07-08-2023	30-09-2023	8W
<b>I Mid Examinations</b>	<b>02-10-2023</b>	<b>07-10-2023</b>	<b>1 W</b>
II Phase of Instructions	09-10-2023	02-12-2023	8W
<b>II Mid Examinations</b>	<b>04-12-2023</b>	<b>09-12-2023</b>	<b>1 W</b>
Preparation and Practical	11-12-2023	16-12-2023	1 W
Semester End Examinations	18-12-2023	30-12-2023	2 W



## PART-C

### EVALUATION PROCESS:

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

## PART-D

### PROGRAMME OUTCOMES (POs):

<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
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<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>	<b>Dr S Naganjaneyulu</b>	<b>Dr.S.Naganjaneyulu</b>	<b>Dr.K.Phaneendra</b>	<b>Dr. B.Srinivasa Rao</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 : Mr. G. RAJENDRA  
 Course Name & Code : R Programming Lab & 20IT53  
 L-T-P Structure : 0-0-3 Credits : 1  
 Program/Sem/Sec : B.Tech., IT., III-Sem.,-A A.Y : 2023-24

**PRE-REQUISITE:** Mathematics.

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

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

<b>CO 1</b>	Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming (Understand - L2)
<b>CO 2</b>	Implement the concepts of R Script to extract the data from data frames and file operations. (Apply – L3)
<b>CO 3</b>	Implement the various statistical techniques with visualization using R add-on packages. (Apply – L3)
<b>CO4</b>	Improve individual / team work skills, communication & report writing skills with ethical values. (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
<b>CO1</b>	3				3								3		
<b>CO2</b>	3				3								1		
<b>CO3</b>		3			3										3
<b>CO4</b>										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 (SYLLABUS)**

### **Week 1:**

- a) Installing R and RStudio
- b) Basic functionality of R, variable, data types in R

### **Week 2:**

- a) Implement R script to show the usage of various operators available in R language.
- b) Implement R script to read person's age from keyboard and display whether he is eligible for voting or not.
- c) Implement R script to find biggest number between two numbers.
- d) Implement R script to check the given year is leap year or not.

### **Week 3:**

- a) Implement R Script to create a list.
- b) Implement R Script to access elements in the list.
- c) Implement R Script to merge two or more lists.
- d) Implement R Script to perform matrix operation

### **Week 4:**

Implement R script to perform following operations:

- a) various operations on vectors
- b) Finding the sum and average of given numbers using arrays.
- c) To display elements of list in reverse order.
- d) Finding the minimum and maximum elements in the array.

### **Week 5:**

- a) Implement R Script to perform various operations on matrices
- b) Implement R Script to extract the data from data frames.
- c) Write R script to display file contents.
- d) Write R script to copy file contents from one file to another

### **Week 6:**

- a) Write an R script to find basic descriptive statistics using summary(), str(), quartile() function on mtcars datasets.
- b) Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset

### **Week 7:**

- a) Reading different types of data sets (.txt, .csv) from Web or disk and writing in file in specific disk location.
- b) Reading Excel data sheet in R.
- c) Reading XML dataset in R.

### **Week 8:**

- a) Implement R Script to create a Pie chart, Bar Chart, Scatter Plot and Histogram (Introduction to ggplot2 graphics)
- b) Implement R Script to perform mean, median, mode, range, summary, variance, standard deviation operations.

### **Week 9:**

- a) Implement R Script to perform Normal, and Binomial distributions.
- b) Implement R Script to perform correlation, Linear and multiple regression.

### **Week 10:**

- a) Introduction to Non-Tabular Data Types: Time series, spatial data, Network data.
- b) Data Transformations: Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding.

### **Week 11:**

Introduction to Dirty data problems: Missing values, data manipulation, duplicates, forms of data dates, outliers, spelling.

### **Week 12:**

Data sources: SQLite examples for relational databases, Loading SPSS and SAS files, Reading from Google Spreadsheets, API and web scraping examples

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

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction Course Outcomes and Program Outcomes	3	08-08-2023		TLM1	
2.	WEEK 1	3	08-08-2023		TLM8	
3.	WEEK 2	3	22-08-2023		TLM8	
4.	WEEK 3	3	29-08-2023		TLM8	
5.	WEEK 4	3	05-09-2023		TLM8	
6.	WEEK 5	3	12-09-2023		TLM8	
7.	WEEK 6	3	26-09-2023		TLM8	
8.	WEEK 7	3	10-10-2023		TLM8	
9.	WEEK 8	3	17-10-2023		TLM8	
10.	WEEK 9	3	31-10-2023		TLM8	
11.	WEEK 10	3	07-11-2023		TLM8	
12.	WEEK 11	3	14-11-2023		TLM8	
13.	WEEK 12	3	21-11-2023		TLM8	
<b>Additional Lab Experiments</b>						
14.	R Program to Make a Simple Calculator	1	28-11-2023		TLM8	
15.	Linear Algebra Operations on Vectors and Matrices	2	28-11-2023		TLM8	

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

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

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## PART-C

### EVALUATION PROCESS (R20 Regulations):

Evaluation Task	Marks
Day-to-day work	A1 = 05
Record	A2 = 05
Internal test	A3 = 05
<b>CIE Total: (A1+A2+A3)</b>	<b>M1 = 15</b>
Procedure/Algorithm	B1 = 5
Experimentation/Program execution	B2 = 10
Observations/Calculations/Validation	B3 = 10
Result/Inference	B4 = 5
Viva voce	B5 = 5
<b>SEE Total: (B1+B2+B3+B4+B5)</b>	<b>M2 = 35</b>
<b>Total Marks = CIE + SEE = (M1+M2)</b>	<b>50</b>

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<b>Title</b>	<b>Course Instructor</b>	<b>Module Coordinator</b>	<b>Head of the Department</b>
<b>Name of the Faculty</b>	Mr. G. RAJENDRA	(Mrs.M.Hemalatha)	Dr. B. Srinivasa Rao
<b>Signature</b>			