LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., III Sem., CSE (A)

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PROBABILITY AND STATISTICS – 17FE08

L-T-P STRUCTURE : 3-2-0

COURSE CREDITS : 4

COURSE INSTRUCTOR : M.RAMI REDDY

COURSE COORDINATOR : M.RAMI REDDY

PRE-REQUISITES: None

COURSE EDUCATIONAL OBJECTIVES (CEOs) : In this course the students are able to understand the applications of probability distributions. They also learn various sample tests in testing the hypothesis and correlation, regression of a bi-variate data.

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

CO1: Predict various probabilistic situations based on various laws of probability and random variables.
CO2: Distinguish among the criteria of selection and application of Binomial, Poisson, Normal and Exponential distributions.
CO3: Estimate the point and interval estimators of mean and proportion for the given Sample data.
CO4: Apply various sample tests like Z-test, t-test, F-test and x2 -test for decision making regarding the population based on sample data.
CO5: Estimate the level of correlation, the linear relationship using the regression lines for the given bivariate data.

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

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

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

BOS APPROVED TEXT BOOKS:

T1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.

T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:

R1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012.

R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Subject, course outcomes	1	17-06-19		TLM1	---	---	
2.	Introduction to probability	1	19-06-19		TLM1	CO1	T1	
3.	Basic definitions, simple problems	1	20-06-19		TLM1	CO1	T1	
4.	Problem on addition theorem	1	21-06-19		TLM1	CO1	T1, ,T2	
5.	Conditional probability	1	22-06-19		TLM1	CO1	T1	
6.	Multiplication theorem, examples	1	24-06-19		TLM1	CO1	T1	
7.	Independent events, theorems	1	26-06-19		TLM1	CO1	T1	
8.	Problems on multiplication theorem	1	27-06-19		TLM1	CO1	T1, ,T2	
9.	Tutorial-1	1	28-06-19		TLM3	CO1	T1	
10.	Baye's theorem	1	29-06-19		TLM1	CO1	T1, ,T2	
11.	Problems on baye's theorem	1	01-07-19		TLM1	CO1	T1	
12.	Random variables, Mathematical Expections	1	03-07-19		TLM1	CO1	T1,T2	
13.	Problems on PMF	1	04-07-19		TLM1	CO1	T1,T2	
14.	Problems on PMF	1	05-07-19		TLM1	CO1	T1,T2	
15.	Problems on PDF	1	06-07-19		TLM1	CO1	T1,T2	
16.	Problems on PDF	1	08-07-19		TLM1	CO1	T1,T2	
17.	problems	1	10-07-19		TLM1	CO1	T1,T2	
18.	Tutorial -2	1	11-07-19		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		18			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Binomial Distribution : mean and variance	1	12-07-19		TLM1,5	CO2	T1	
20.	Problems on Binomial distribution	1	15-07-19		TLM1	CO2	T1,T2	
21.	Problems on Binomial distribution	1	17-07-19		TLM1	CO2	T1,T2	
22.	Fitting of binomial distribution	1	18-07-19		TLM1	CO2	T1,T2	
23.	Poisson distribution, mean and variance	1	19-07-19		TLM1	CO2	T1	
24.	Problems on Poisson distribution	1	20-07-19		TLM1	CO2	T1,T2	
25.	Fitting of poisson distributions	1	22-07-19		TLM1	CO2	T1,T2	
26.	Tutorial -3	1	24-07-19		TLM3	CO2	T1,T2	
27.	Normal distribution: mean, variance	1	25-07-19		TLM1,5	CO2	T1,T2	
28.	Problems on Normal Distribution	1	26-07-19		TLM1	CO2	T1,T2	
29.	Problems on Normal Distribution	1	27-07-19		TLM1	CO2	T1,T2	
30.	Applications	1	29-07-19		TLM1	CO2	T2	
31.	Exponential distribution: mean and variance	1	31-07-19		TLM1	CO2	T2	
32.	applications	1	01-08-19		TLM1	CO2	T2	
33.	problems	1	02-08-19		TLM1	CO2	T2	
34.	Tutorial-4	1	03-08-19		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		16			No. of classes taken:			

UNIT-III : Sampling Distribution & Estimation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
35.	Sampling distribution ,definitions	1	14-08-19		TLM1,5	CO3	T1	
36.	Sampling distribution of mean, variance	1	16-08-19		TLM1	CO3	T1	
37.	problems	1	17-08-19		TLM1	CO3	T1,T2	
38.	Problems on central limit theorem	1	19-08-19		TLM1	CO3	T2	
39.	Problems on central limit theorem	1	21-08-19		TLM1	CO3	T2	
40.	Sums and differences	1	22-08-19		TLM1	CO3	T1,T2	

41.	Tutorial-5	1	24-08-19		TLM3	CO3	T1,T2	
42.	Estimation	1	26-08-19		TLM1	CO3	T1,T2	
43.	Point and interval estimation	1	28-08-19		TLM1,5	CO3	T1,T2	
44.	Interval estimation of mean in large samples	1	29-08-19		TLM1	CO3	T1,T2	
45.	Interval estimation of proportion in large samples	1	30-08-19		TLM1	CO3	T1,T2	
46.	Interval estimation of mean in small samples	1	31-08-19		TLM1	CO3	T1,T2	
47.	Tutorial-6	1	04-09-19		TLM3	CO3	T1,T2	
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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
48.	Testing of Hypothesis , definitions	1	05-09-19		TLM1,5	CO4	T1,T2	
49.	Z-test for single mean	1	06-09-19		TLM1	CO4	T1,T2	
50.	Z-test for difference of means	1	07-09-19		TLM1	CO4	T1,T2	
51.	Z-test for single proportion	1	09-09-19		TLM1	CO4	T1,T2	
52.	Z-test for difference of proportions	1	11-09-19		TLM1	CO4	T1,T2	
53.	Tutorial-7	1	12-09-19		TLM3	CO4	T1,T2	
54.	t-test for single mean	1	13-09-19		TLM1	CO4	T1,T2	
55.	t-test for difference of means	1	16-09-19		TLM1	CO4	T1,T2	
56.	Paired t-test	1	18-09-19		TLM1	CO4	T2	
57.	F-test for population variances	1	19-09-19		TLM1	CO4	T1,T2	
58.	χ^2 test for goodness of fit	1	20-09-19		TLM1	CO4	T2	
59.	χ^2 test for independence of attributes	1	21-09-19		TLM1	CO4	T2	
60.	problems	1	23-09-19		TLM1	CO4	T2	
61.	Tutorial-8	1	25-09-19		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V : Correlation & Regression

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly

62.	Simple Bi-variate Correlation	1	26-09-19		TLM1	CO5	T1	
63.	Problems on Pearson's Correlation	1	27-09-19		TLM1,5	CO5	T1,T2	
64.	Problems	1	28-09-19		TLM1	CO5	T1,T2	
65.	Regression lines	1	30-09-19		TLM1	CO5	T2	
66.	Problems on Regression lines	1	03-10-19		TLM1	CO5	T1,T2	
67.	Properties of Regression coefficients	1	04-10-19		TLM1	CO5	T1,T2	
68.	Problems on Regression coefficients	1	05-10-19		TLM1	CO5	T1,T2	
69.	Tutorial-9	1	07-10-19		TLM3	CO5	T1,T2	
70.	Problems on rank Correlation	1	09-10-19		TLM1	CO5	T2	
71.	Problems on repeated ranks	1	10-10-19		TLM1	CO5	T2	
72.	Tutorial-10	1	11-10-19		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
73.	Moment Generating Function	1	02-08-19		TLM1	CO2	T1,T2	
74.	Bayesian Estimation	1	31-08-18		TLM1	CO3	T1,T2	

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:

Evaluation Task	Units	Marks
Assignment– 1	1	A1=5
Assignment– 2	2	A2=5
I-Mid Examination	1,2	B1=20
Online Quiz-1	1,2	C1=10
Assignment– 3	3	A3=5
Assignment– 4	4	A4=5
Assignment– 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Online Quiz-2	3,4,5	C2=10
Evaluation of Assignment: A=Avg (Best of Four(A1,A2,A3,A4,A5))	1,2,3,4,5	A=5

Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=20
Evaluation of Online Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks based on Percentage of attendance		D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations : E	**1,2,3,4,5**	**60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any Other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:-

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs):-

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HOD

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., III Sem., CSE (B)

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PROBABILITY AND STATISTICS – 17FE08

L-T-P STRUCTURE : 3-2-0

COURSE CREDITS : 4

COURSE INSTRUCTOR : M.RAMI REDDY

COURSE COORDINATOR : M.RAMI REDDY

PRE-REQUISITES: None

COURSE EDUCATIONAL OBJECTIVES (CEOs) : In this course the students are able to understand the applications of probability distributions. They also learn various sample tests in testing the hypothesis and correlation, regression of a bi-variate data.

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

CO1: Predict various probabilistic situations based on various laws of probability and random variables.
CO2: Distinguish among the criteria of selection and application of Binomial, Poisson, Normal and Exponential distributions.
CO3: Estimate the point and interval estimators of mean and proportion for the given Sample data.
CO4: Apply various sample tests like Z-test, t-test, F-test and x2 -test for decision making regarding the population based on sample data.
CO5: Estimate the level of correlation, the linear relationship using the regression lines for the given bivariate data.

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

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

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

BOS APPROVED TEXT BOOKS:

T1 Miller & Freund's "Probability and Statistics for Engineers",8th edition. PHI, New Delhi,2011.

T2 S.C.Gupta, V.K.Kapoor, "Fundamentals of Mathematical Statistics", 11thEdition, Sultan Chand and sons, New Delhi,2014.

BOS APPROVED REFERENCE BOOKS:

R1 Jay L.Devore "Probability and Statistics for engineering and the sciences." , 8th edition, Cengage Learning india, 2012.

R2 B.V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Subject, course outcomes	1	17-06-19		TLM1	---	---	
2.	Introduction to probability	1	19-06-19		TLM1	CO1	T1	
3.	Basic definitions, simple problems	1	20-06-19		TLM1	CO1	T1	
4.	Problem on addition theorem	1	21-06-19		TLM1	CO1	T1, ,T2	
5.	Conditional probability	1	22-06-19		TLM1	CO1	T1	
6.	Multiplication theorem, examples	1	24-06-19		TLM1	CO1	T1	
7.	Independent events, theorems	1	26-06-19		TLM1	CO1	T1	
8.	Problems on multiplication theorem	1	27-06-19		TLM1	CO1	T1, ,T2	
9.	Tutorial-1	1	28-06-19		TLM3	CO1	T1	
10.	Baye's theorem	1	29-06-19		TLM1	CO1	T1, ,T2	
11.	Problems on baye's theorem	1	01-07-19		TLM1	CO1	T1	
12.	Random variables, Mathematical Expections	1	03-07-19		TLM1	CO1	T1,T2	
13.	Problems on PMF	1	04-07-19		TLM1	CO1	T1,T2	
14.	Problems on PMF	1	05-07-19		TLM1	CO1	T1,T2	
15.	Problems on PDF	1	06-07-19		TLM1	CO1	T1,T2	
16.	Problems on PDF	1	08-07-19		TLM1	CO1	T1,T2	
17.	problems	1	10-07-19		TLM1	CO1	T1,T2	
18.	Tutorial -2	1	11-07-19		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-I		18			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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Binomial Distribution : mean and variance	1	12-07-19		TLM1,5	CO2	T1	
20.	Problems on Binomial distribution	1	15-07-19		TLM1	CO2	T1,T2	
21.	Problems on Binomial distribution	1	17-07-19		TLM1	CO2	T1,T2	
22.	Fitting of binomial distribution	1	18-07-19		TLM1	CO2	T1,T2	
23.	Poisson distribution, mean and variance	1	19-07-19		TLM1	CO2	T1	
24.	Problems on Poisson distribution	1	20-07-19		TLM1	CO2	T1,T2	
25.	Fitting of poisson distributions	1	22-07-19		TLM1	CO2	T1,T2	
26.	Tutorial -3	1	24-07-19		TLM3	CO2	T1,T2	
27.	Normal distribution: mean, variance	1	25-07-19		TLM1,5	CO2	T1,T2	
28.	Problems on Normal Distribution	1	26-07-19		TLM1	CO2	T1,T2	
29.	Problems on Normal Distribution	1	27-07-19		TLM1	CO2	T1,T2	
30.	Applications	1	29-07-19		TLM1	CO2	T2	
31.	Exponential distribution: mean and variance	1	31-07-19		TLM1	CO2	T2	
32.	applications	1	01-08-19		TLM1	CO2	T2	
33.	problems	1	02-08-19		TLM1	CO2	T2	
34.	Tutorial-4	1	03-08-19		TLM3	CO1	T1,T2	
No. of classes required to complete UNIT-II		16			No. of classes taken:			

UNIT-III : Sampling Distribution & Estimation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
35.	Sampling distribution ,definitions	1	14-08-19		TLM1,5	CO3	T1	
36.	Sampling distribution of mean, variance	1	16-08-19		TLM1	CO3	T1	
37.	problems	1	17-08-19		TLM1	CO3	T1,T2	
38.	Problems on central limit theorem	1	19-08-19		TLM1	CO3	T2	
39.	Problems on central limit theorem	1	21-08-19		TLM1	CO3	T2	
40.	Sums and differences	1	22-08-19		TLM1	CO3	T1,T2	
41.	Tutorial-5	1	24-08-19		TLM3	CO3	T1,T2	

42.	Estimation	1	26-08-19		TLM1	CO3	T1,T2	
43.	Point and interval estimation	1	28-08-19		TLM1,5	CO3	T1,T2	
44.	Interval estimation of mean in large samples	1	29-08-19		TLM1	CO3	T1,T2	
45.	Interval estimation of proportion in large samples	1	30-08-19		TLM1	CO3	T1,T2	
46.	Interval estimation of mean in small samples	1	31-08-19		TLM1	CO3	T1,T2	
47.	Tutorial-6	1	04-09-19		TLM3	CO3	T1,T2	
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	Learning Outcome COs	Text Book followed	HOD Sign Weekly
48.	Testing of Hypothesis , definitions	1	05-09-19		TLM1,5	CO4	T1,T2	
49.	Z-test for single mean	1	06-09-19		TLM1	CO4	T1,T2	
50.	Z-test for difference of means	1	07-09-19		TLM1	CO4	T1,T2	
51.	Z-test for single proportion	1	09-09-19		TLM1	CO4	T1,T2	
52.	Z-test for difference of proportions	1	11-09-19		TLM1	CO4	T1,T2	
53.	Tutorial-7	1	12-09-19		TLM3	CO4	T1,T2	
54.	t-test for single mean	1	13-09-19		TLM1	CO4	T1,T2	
55.	t-test for difference of means	1	16-09-19		TLM1	CO4	T1,T2	
56.	Paired t-test	1	18-09-19		TLM1	CO4	T2	
57.	F-test for population variances	1	19-09-19		TLM1	CO4	T1,T2	
58.	χ^2 test for goodness of fit	1	20-09-19		TLM1	CO4	T2	
59.	χ^2 test for independence of attributes	1	21-09-19		TLM1	CO4	T2	
60.	problems	1	23-09-19		TLM1	CO4	T2	
61.	Tutorial-8	1	25-09-19		TLM3	CO4	T1,T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V : Correlation & Regression

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
62.	Simple Bi-variate Correlation	1	26-09-19		TLM1	CO5	T1	

63.	Problems on Pearson's Correlation	1	27-09-19		TLM1,5	CO5	T1,T2	
64.	Problems	1	28-09-19		TLM1	CO5	T1,T2	
65.	Regression lines	1	30-09-19		TLM1	CO5	T2	
66.	Problems on Regression lines	1	03-10-19		TLM1	CO5	T1,T2	
67.	Properties of Regression coefficients	1	04-10-19		TLM1	CO5	T1,T2	
68.	Problems on Regression coefficients	1	05-10-19		TLM1	CO5	T1,T2	
69.	Tutorial-9	1	07-10-19		TLM3	CO5	T1,T2	
70.	Problems on rank Correlation	1	09-10-19		TLM1	CO5	T2	
71.	Problems on repeated ranks	1	10-10-19		TLM1	CO5	T2	
72.	Tutorial-10	1	11-10-19		TLM3	CO5	T1,T2	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
73.	Moment Generating Function	1	02-08-19		TLM1	CO2	T1,T2	
74.	Bayesian Estimation	1	31-08-18		TLM1	CO3	T1,T2	

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:

Evaluation Task	Units	Marks
Assignment– 1	1	A1=5
Assignment– 2	2	A2=5
I-Mid Examination	1,2	B1=20
Online Quiz-1	1,2	C1=10
Assignment– 3	3	A3=5
Assignment– 4	4	A4=5
Assignment– 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Online Quiz-2	3,4,5	C2=10
Evaluation of Assignment: A=Avg (Best of Four(A1,A2,A3,A4,A5))	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=20

Evaluation of Online Quiz Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=10
Attendance Marks based on Percentage of attendance		D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**40**
Semester End Examinations : E	**1,2,3,4,5**	**60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any Other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:-

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs):-

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., A.Sec.

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Environmental Science- 17FE03

L-T-P STRUCTURE : 3-0-0

COURSE CREDITS : **3**

COURSE INSTRUCTOR : **V.Bhagya Lakshmi**

COURSE COORDINATOR : **Dr. Shaheda Niloufer**

PRE-REQUISITE:

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

COURSE OUT COMES (CO): After the completion of the course, students should be able to:

CO1: Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO2: Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO3: Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO4: Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5: Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

Course Outcomes	ENVIRONMENAL STUDIES											
	Programme Outcomes											
PO's →	1	2	3	4	5	6	7	8	9	10	11	12
CO1.	3	3				3	3	3				3
CO2.	3	3				3	3					3
CO3.	3		3				2					2
CO4.	3					2	3	2				3
CO5.	3	3	3	3		3	3	3				3

BOS APPROVED TEXT BOOKS:

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

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

BOS APPROVED REFERENCE BOOKS:

R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.
R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.
R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.
R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.
R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
75.	Introduction, components of Environment	1	17-06-2019		1,2	CO1	T1	
76.	Scope and importance of environmental studies	1	19-06-2019		1,2	CO1	T1	
77.	Population explosion and variations among Nations.	1	22-06-2019		1,2	CO1	T1	
78.	Resettlement and Rehabilitation - Issues and possible solutions	1	24-06-2019		1,2,9	CO1	T1	
79.	Environment and human health	1	26-06-2019		1,2	CO1	T1	
80.	HIV-AIDS,	1	29-06-2019		1,2	CO1	T1	
81.	Environmental ethics	1	01-07-2019		1,2	CO1	T1	
82.	Role of Information Technology in environmental management and human health	1	03-07-2019		1,2	CO1	T1	
83.	**Assignment in UNIT I**	1	06-07-2019		6	CO1	T1	
84.	**Tutorial -1**	1	08-07-2019		3			
No. of classes required to complete UNIT-I		10			No. of classes taken:			

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
85.	Introduction and classification of Natural resources	1	10-07-2019		1,2	CO2	T1	
86.	Forest Resources	1	15-07-2019		1,2	CO2	T1	
87.	Water Resources	1	17-07-2019		1,2	CO2	T1	
88.	Water Resources	1	20-07-2019		1,2	CO2	T1	
89.	**Tutorial-2 & Assignment in Unit II**	1	22-07-2019		3&6	CO2	T1	
90.	Mineral Resources	1	24-07-2019		1,2	CO2	T1	
91.	Food Resources	1	27-07-2019		1,2	CO2	T1	
92.	Food Resources	1	29-07-2019		1,2	CO2	T1	
93.	Energy Resources	1	31-07-2019					
94.	Energy Resources	1	03-08-2019		1,2	CO2	T1	
95.	I MID Examinations		05-08-2019					
96.	I MID Examinations		07-08-2019					
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III: ECOLOGY AND BIODIVERSITY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
97.	Definition, structure and functions of an ecosystem Food chains and Food webs	1	14-08-2019		1,2	CO3	T1,T2	
98.	Ecological succession, Ecological pyramids	1	17-08-2019		1,2	CO3	T1, T2	
99.	Biogeochemical cycles, Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species	1	19-08-2019		1,2	CO3	T1, T2	
100.	**Tutorial-3 & Assignment Unit III**	1	21-08-2019		3&6	CO3	T1, T2	
101.	Biogeographical classification of India. India as a mega diversity nation	1	26-08-2019		1,2	CO3	T1, T2	
102.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Man and wild life conflicts. Endangered and endemic species of India	1	28-08-2019		1,2,9	CO3	T1, T2	
103.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	31-08-2019		1,2	CO3	T1, T2	
No. of classes required to complete UNIT-III		07			No. of classes taken:			

UNIT-IV: ENVIRONMENTAL POLLUTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
104.	Introduction to Environmental Pollution Causes, effects and control measures of: Air Pollution	1	04-09-2019					
105.	Causes, effects and control measures of: Water Pollution	1	07-09-2019		1,2,9	CO4	T1, T2	
106.	Causes, effects and control measures of: Soil Pollution	1	09-09-2019		1,2,9	CO4	T1, T2	
107.	**Tutorial-4 & Assignment in Unit IV**	1	11-09-2019		3&6	CO4	T1, T2	
108.	Causes, effects and control measures of: Noise Pollution. Causes, effects and control measures of: Nuclear Pollution	1	16-09-2019		1,2,9	CO4	T1, T2	
109.	Solid Waste Management	1	18-09-2019		1,2,9	CO4	T1, T2	
110.	Environmental Issues relating to Climate change, global warming, acid rain, ozone layer depletion	1	21-09-2019		1,2,9	CO4	T1, T2	
111.	Disaster Management-Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	23-09-2019		1,2,9	CO4	T1, T2	
No. of classes required to complete UNIT-IV		08			No. of classes taken:			

UNIT-V: ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
112.	Sustainable development and unsustainability	1	25-09-2019		1,2			
113.	Stockholm and Rio Summit	1	28-09-2019		1,2			
114.	**Tutorial-5 & Assignment in UNIT- V**	1	30-09-2019		1,2		T2	
115.	Environmental Impact Assessment (EIA), Green building	1	05-10-2019		1,2		T2	
116.	Consumerism and Waste products. Carbon credits and carbon trading.	1	07-10-2019		1,2		T2	
117.	Environmental Law- Air, Water Acts. Wild life, Forest, and Environmental protection act	1	09-10-2019		1,2		T2	
44.	**II MID EXAMINATION**		14-10-2019					
45.	**II MID EXAMINATION**		16-10-2019					
46	**II MID EXAMINATION**		19-10-2019					

No. of classes required to complete UNIT-V	06			No. of classes taken:

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
47	Case studies of Environmental Pollution	1			1,2			
48	Limitations for Environmental Legislation in India	1			1,2			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7
I Mid Examinations	05-08-2019	10-08-2019	1
II Phase of Instructions	12-08-2019	12-10-2019	9
II Mid Examinations	14-10-2019	19-10-2019	1
Preparation and Practical	21-10-2019	31-10-2019	1½
Semester End Examinations	01-11-2019	16-11-2019	2

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

V.Bhagya Lakshmi
Course Instructor

Dr. Shaheda Niloufer
Course Coordinator

Module Coordinator

HOD

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., B.Sec.

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Environmental Science- 17FE03

L-T-P STRUCTURE : 3-0-0

COURSE CREDITS : **3**

COURSE INSTRUCTOR : **V.Bhagya Lakshmi**

COURSE COORDINATOR : **Dr. Shaheda Niloufer**

PRE-REQUISITE:

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

COURSE OUT COMES (CO): After the completion of the course, students should be able to:

CO1: Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions.
CO2: Evaluate local, regional and global environmental issues related to resources and their sustainable management.
CO3: Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO4: Acknowledge and prevent the problems related to pollution of air, water and soil.
CO5: Identify the significance of implementing environmental laws and abatement devices for environmental management.

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

Course Outcomes	ENVIRONMENAL STUDIES											
	Programme Outcomes											
PO's →	1	2	3	4	5	6	7	8	9	10	11	12
CO6.	3	3				3	3	3				3
CO7.	3	3				3	3					3
CO8.	3		3				2					2
CO9.	3					2	3	2				3
CO10.	3	3	3	3		3	3	3				3

BOS APPROVED TEXT BOOKS:

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

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

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R1 S. Deswal, A. Deswal, "A Basic course in Environmental Studies", Educational & Technical Publishers, 2nd Edition, Delhi, 2014.
R2 R. Rajagopalan, "*Environmental Studies (From Crisis to Cure)*", Oxford University Press, 2nd Edition, New Delhi, 2012.
R3 De, A.K, "Environmental Chemistry", New Age International (P) Limited, 5th Edition, New Delhi, 2003.
R4 Dr.K.V.S.G. Murali Krishna, "Environmental Studies", VGS Techno Series, 1st Edition, Vijayawada, 2010.
R5 G. Tyler Miller, Scott Spoolman, "Introduction to Environmental Studies", Cengage Learning, 13th Edition, New Delhi, 2009.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: NATURE AND SCOPE OF ENVIRONMENTAL PROBLEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
118.	Introduction, components of Environment	1	17-06-2019		1,2	CO1	T1	
119.	Scope and importance of environmental studies	1	18-06-2019		1,2	CO1	T1	
120.	Population explosion and variations among Nations.	1	22-06-2019		1,2	CO1	T1	
121.	Resettlement and Rehabilitation - Issues and possible solutions	1	24-06-2019		1,2,9	CO1	T1	
122.	Environment and human health	1	25-06-2019		1,2	CO1	T1	
123.	HIV-AIDS,	1	29-06-2019		1,2	CO1	T1	
124.	Environmental ethics	1	01-07-2019		1,2	CO1	T1	
125.	Role of Information Technology in environmental management and human health	1	02-07-2019		1,2	CO1	T1	
126.	**Assignment in UNIT I**	1	06-07-2019		6	CO1	T1	
127.	**Tutorial -1**	1	08-07-2019		3			
No. of classes required to complete UNIT-I		10			No. of classes taken:			

UNIT-II: NATURAL RESOURCES AND CONSERVATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
128.	Introduction and classification of Natural resources	1	09-07-2019		1,2	CO2	T1	
129.	Forest Resources	1	15-07-2019		1,2	CO2	T1	
130.	Water Resources	1	16-07-2019		1,2	CO2	T1	
131.	Water Resources	1	20-07-2019		1,2	CO2	T1	
132.	**Tutorial-2 & Assignment in Unit II**	1	22-07-2019		3&6	CO2	T1	
133.	Mineral Resources	1	23-07-2019		1,2	CO2	T1	
134.	Food Resources	1	27-07-2019		1,2	CO2	T1	
135.	Food Resources	1	29-07-2019		1,2	CO2	T1	
136.	Energy Resources	1	30-07-2019					
137.	Energy Resources	1	03-08-2019		1,2	CO2	T1	
138.	I MID Examinations		05-08-2019					
139.	I MID Examinations		06-08-2019					
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III: ECOLOGY AND BIODIVERSITY

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
140.	Definition, structure and functions of an ecosystem Food chains and Food webs	1	13-08-2019		1,2	CO3	T1,T2	
141.	Ecological succession, Ecological pyramids	1	17-08-2019		1,2	CO3	T1, T2	
142.	Biogeochemical cycles, Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem, Ecological Niche and Keystone Species	1	19-08-2019		1,2	CO3	T1, T2	
143.	**Tutorial-3 & Assignment Unit III**	1	20-08-2019		3&6	CO3	T1, T2	
144.	Biogeographical classification of India. India as a mega diversity nation	1	26-08-2019		1,2	CO3	T1, T2	
145.	Values of biodiversity- Direct and Indirect values. Threats to biodiversity; Man and wild life conflicts. Endangered and endemic species of India	1	27-08-2019		1,2,9	CO3	T1, T2	
146.	Conservation of biodiversity: In-situ and Ex-situ conservation methods	1	31-08-2019		1,2	CO3	T1, T2	
No. of classes required to complete UNIT-III		07			No. of classes taken:			

UNIT-IV: ENVIRONMENTAL POLLUTION

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

		Required	Completion	Completion	Methods	COs	followed	Weekly
147.	Introduction to Environmental Pollution Causes, effects and control measures of: Air Pollution	1	03-09-2019					
148.	Causes, effects and control measures of: Water Pollution	1	07-09-2019		1,2,9	CO4	T1, T2	
149.	Causes, effects and control measures of: Soil Pollution	1	09-09-2019		1,2,9	CO4	T1, T2	
150.	**Tutorial-4 & Assignment in Unit IV**	1	16-09-2019		3&6	CO4	T1, T2	
151.	Causes, effects and control measures of: Noise Pollution. Causes, effects and control measures of: Nuclear Pollution	1	17-09-2019		1,2,9	CO4	T1, T2	
152.	Solid Waste Management	1	21-09-2019		1,2,9	CO4	T1, T2	
153.	Environmental Issues relating to Climate change, global warming, acid rain, ozone layer depletion	1	23-09-2019		1,2,9	CO4	T1, T2	
154.	Disaster Management-Floods, Cyclones, Earthquakes, Landslides and Tsunamis.	1	24-09-2019		1,2,9	CO4	T1, T2	
No. of classes required to complete UNIT-IV		08			No. of classes taken:			

UNIT-V: ENVIRONMENTAL MANAGEMENT

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
155.	Sustainable development and unsustainability	1	28-09-2019		1,2			
156.	Stockholm and Rio Summit	1	30-09-2019		1,2			
157.	**Tutorial-5 & Assignment in UNIT- V**	1	01-10-2019		1,2		T2	
158.	Environmental Impact Assessment (EIA), Green building, Environmental Law- Air, Water Acts. Wild life, Forest, and Environmental protection act	1	05-10-2019		1,2		T2	
159.	Consumerism and Waste products. Carbon credits and carbon trading.	1	07-10-2019		1,2		T2	
44.	**II MID EXAMINATION**		14-10-2019					
45.	**II MID EXAMINATION**		15-10-2019					
46	**II MID EXAMINATION**		19-10-2019					
No. of classes required to complete UNIT-V		05			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
47	Case studies of Environmental Pollution	1			1,2			
48	Limitations for Environmental Legislation in India	1			1,2			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7
I Mid Examinations	05-08-2019	10-08-2019	1
II Phase of Instructions	12-08-2019	12-10-2019	9
II Mid Examinations	14-10-2019	19-10-2019	1
Preparation and Practical	21-10-2019	31-10-2019	1½
Semester End Examinations	01-11-2019	16-11-2019	2

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Mid Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	**1,2,3,4,5**	**A+B=25**
Semester End Examinations	**1,2,3,4,5**	**C=75**
Total Marks: A+B+C	**1,2,3,4,5**	**100**

V.Bhagya Lakshmi
Course Instructor

Dr. Shaheda Niloufer
Course Coordinator

Module Coordinator

HOD

LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-Asec

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : DISCRETE MATHEMATICAL STRUCTURES &17CI03

L-T-P STRUCTURE : 3-1-2

COURSE CREDITS : 3

COURSE INSTRUCTOR : **D.SRINIVASA RAO**

COURSE COORDINATOR :

1. **Pre-requisites:** Basic mathematical knowledge

2. **Course Educational Objectives (CEOs):**

Perform the operations associated with sets, functions, and relations. Relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1: Outline basic proofs for theorems using the techniques of - direct proofs, example, and Proof by contradiction, mathematical induction.

CO2: Illustrate the basic terminology of functions, relations, and sets and demonstrate the knowledge of their associated operations by examples.

CO3: Understand the properties of graphs and able to relate these to practical problems.

CO4: Apply basic principles/techniques to solve different algebraic structures and combinatorial problems.

CO5: Solve linear recurrence relations by recognizing homogeneity, linearity, constant coefficients and characteristic equation.

4. Course Articulation Matrix:

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
S197	CO1	3	3													
	CO2	3	3	1	2											
	CO3	3	3	1	2									1		
	CO4	3	3	2	1									1		
	CO5	3	3	1												

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

BOS APPROVED TEXT BOOKS:

T1: Tremblay, Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH Publications

BOS APPROVED REFERENCE BOOKS:

R1: S.Santha, Discrete Mathematics, Cengage

R2: Thomas Koshy, Discrete Mathematics with Applications, Elsevier

R3: JK Sharma, Macmillan Discrete Mathematics, 2nd edition

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT –I: Mathematical Logic & Predicate calculus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
160.	Mathematical Logic: Propositional Calculus	1	17-06-2019		**TLM1**	CO1	T1	
161.	Statement and Notations, Connectives, Truth Tables	1	19-06-2019		**TLM1**	CO1	T1	
162.	Tautologies, Equivalence of Formulas, Duality law	1	20-06-2019		**TLM1**	CO1	T1	
163.	Tautological Implications	1	22-06-2019		**TLM1**	CO1	T1	
164.	Normal Forms	2	24-06-2019&26-06-2019		**TLM1**	CO1	T1,R1	
165.	Theory of Inference for Statement Calculus	2	27-06-2019 & 29-06-2019		**TLM1**	CO1	T1,R1	
166.	Consistency of Premises Indirect Method of Proof	1	01-07-2019		**TLM1**	CO1	T1,R1	
167.	Predicative Logic	1	03-07-2019		**TLM1**	CO1	T1,R1	
168.	Tutorial – I	1	04-07-2019		**TLM3**	CO1	T1	
169.	Statement Functions, Variables and Quantifiers Free & Bound Variables	1	06-07-2019		**TLM1**	CO1	T1	
170.	Inference theory for predicate calculus	1	08-07-2019		**TLM1**	CO1	T1	
No. of classes required to complete UNIT-I		**14**			No. of classes taken:			

UNIT –II: Set Theory & Functions

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
171.	Set Theory: Introduction, Operations on Binary Sets	1	10-07-2019		**TLM1**	CO2	T1	T1
172.	Principle of Inclusion and Exclusion	1	11-07-2019		**TLM1**	CO2	T1	
173.	Relations: Properties of Binary Relations	1	15-07-2019		**TLM1**	CO2	T1	
174.	Relation Matrix and Digraph Operations on Relations	1	17-07-2019		**TLM1**	CO2	T1	
175.	Partition and Covering, Transitive Closure	1	18-07-2019				T1	
176.	Equivalence Relation	1	20-07-2019		**TLM1**	CO2	T1,R1	
177.	Compatibility Relation	1	22-7-2019		**TLM1**	CO2	T1	
178.	Partial Ordering Relation & Hasse Diagrams	1	24-07-2019		**TLM1**	CO2	T1,R1	
179.	Functions: Bijective Functions	1	25-07-2019		**TLM1**	CO2	T1	
180.	Composition of Functions, Inverse Functions	1	27-07-2019		**TLM1**	CO2	T1,R1	
181.	Permutation Functions, Recursive Functions	1	29-07-2019		**TLM1**	CO2	T1,R1	
182.	Tutorial – II	1	31-07-2019		**TLM3**	CO2	T1	
No. of classes required to complete **UNIT-2**		**12**			No. of classes taken:			

UNIT –III: Graph Theory

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
183.	Basic Concepts of Graphs, Sub graphs	1	01-08-2019		**TLM1**	CO3	T1	
184.	Matrix Representation of Graphs	1	03-08-2019		**TLM1**	CO3	T1	
185.	Adjacency Matrices, Incidence Matrices	1	05-08-2019		**TLM1**	CO3	T1	
186.	Isomorphic Graphs, Paths and	2	07-08-2019 &		**TLM1**	CO3	T1,R1	

	Circuits		08-08-2019					
187.	Eulerian Graphs, Hamiltonian Graphs	1	14-08-2019		**TLM1**	CO3	T1,R1	
188.	Multigraphs, Planar Graphs, Euler's Formula	1	17-08-2019		**TLM1**		T1,R1	
189.	Tutorial – III	1	19-08-2019		**TLM3**	CO3	T1	
190.	Graph Colouring and Covering, Chromatic Number	1	21-08-2019		**TLM1**	CO3	T1	
191.	Trees, Directed trees	1	22-08-2019		**TLM1**	CO3	T1	
192.	Binary Trees, Decision Trees	1	26-08-2019		**TLM1**	CO3	T1	
193.	Spanning Trees: Properties	1	28-08-2019		**TLM1**	CO3	T1,R1	
194.	Algorithms for Spanning trees and Minimum Spanning Trees	2	29-08-2019 & 31-08-2019		**TLM1**	CO3	T1,R1	
No. of classes required to complete **UNIT-3**		14			No. of classes taken:			

UNIT –IV: Algebraic Structures & Combinatorics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
195.	Algebraic Systems with one Binary Operation	1	04-09-2019		**TLM1**	CO4	T1	
196.	Properties of Binary operations, Semi groups and Monoids	1	05-09-2019		**TLM1**	CO4	T1	
197.	Homomorphism of Semi groups and Monoids, Groups	1	07-09-2019		**TLM1**	CO4	T1	
198.	Abelian Group, Cosets, Subgroups	1	09-09-2019		**TLM1**	CO4	T1,R1	
199.	Lattice: Properties, Algebraic Systems with two Binary Operations: Rings	2	11-09-2019 & 12-09-2019		**TLM1**	CO4	T1,R1	
200.	Tutorial – IV	1	16-09-2019		**TLM3**	CO4	T1	
201.	Basic of Counting, Permutations, Derangements	1	18-09-2019		**TLM1**		T1	

202.	Permutations with Repetition of Objects	1	19-09-2019		**TLM1**	CO4	T1,R1	
203.	Circular Permutations, Restricted Permutations	1	21-09-2019		**TLM1**	CO4	T1	
204.	Combinations, Restricted Combinations	1	23-09-2019		**TLM1**	CO4	T1	
205.	Pigeonhole Principle and its Application	1	25-09-2019		**TLM1**	CO4	T1	
No. of classes required to complete **UNIT-4**		12			No. of classes taken:			

UNIT-V: Recurrence Relation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
206.	Binomial Theorem**,** Binomial and Multinomial Coefficients	1	26-09-2019		**TLM1**	CO5	T1	T1
207.	Generating Functions of Permutations and Combinations	2	28-09-2019 & 30-09-2019		**TLM1**	CO5	T1	
208.	The Principles of Inclusion – Exclusion	1	30-09-2019		**TLM1**	CO5	T1,R1,R2	
209.	Generating Function of Sequences, Partial Fractions	1	03-10-2019		**TLM1**	CO5	T1,R1,R2	
210.	Calculating Coefficient of Generating Functions	1	03-10-2019		**TLM1**	CO5	T1	
211.	Tutorial – V	1	05-10-2019		**TLM3**	CO5	T1	
212.	Recurrence Relations, Formulation as Recurrence Relations	1	05-10-2019		**TLM1**	CO5	T1,R1,R2	
213.	Solving linear homogeneous recurrence Relations by substitution	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	
214.	Generating functions and The Method of Characteristic Roots	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	
215.	Solving Inhomogeneous	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	

	Recurrence Relations							
No. of classes required to complete **UNIT-5**		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
216.	Rules of Inference and Automatic Theorem Proving	1			**TLM1**	CO1		
217.	Polish theorem	1			**TLM1**	CO4		
218.	DFS & BFS algorithm	1			**TLM1**	CO5	T1,R1	

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and

synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

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COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-B sec

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : DISCRETE MATHEMATICAL STRUCTURES &17CI03

L-T-P STRUCTURE : 3-1-2

COURSE CREDITS : 3

COURSE INSTRUCTOR : **D.SRINIVASA RAO**

COURSE COORDINATOR :

4. **Pre-requisites:** Basic mathematical knowledge

5. Course Educational Objectives (CEOs):

Perform the operations associated with sets, functions, and relations. Relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. Use formal logic proofs and/or informal but rigorous logical reasoning to, for example, predict the behavior of software or to solve problems such as puzzles.

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

CO1: Outline basic proofs for theorems using the techniques of - direct proofs, example, and Proof by contradiction, mathematical induction.

CO2: Illustrate the basic terminology of functions, relations, and sets and demonstrate the knowledge of their associated operations by examples.

CO3: Understand the properties of graphs and able to relate these to practical problems.

CO4: Apply basic principles/techniques to solve different algebraic structures and combinatorial problems.

CO5: Solve linear recurrence relations by recognizing homogeneity, linearity, constant coefficients and characteristic equation.

4. Course Articulation Matrix:

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
S197	CO1	3	3													
	CO2	3	3	1	2											
	CO3	3	3	1	2									1		
	CO4	3	3	2	1									1		
	CO5	3	3	1												

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

BOS APPROVED TEXT BOOKS:

T1: Tremblay, Manohar, Discrete Mathematical Structures with Applications to Computer Science, TMH Publications

BOS APPROVED REFERENCE BOOKS:

R1: S.Santha, Discrete Mathematics, Cengage

R2: Thomas Koshy, Discrete Mathematics with Applications, Elsevier

R3: JK Sharma, Macmillan Discrete Mathematics, 2nd edition

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT –I: Mathematical Logic & Predicate calculus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
219.	Mathematical Logic: Propositional Calculus	1	17-06-2019		**TLM1**	CO1	T1	
220.	Statement and Notations, Connectives, Truth Tables	1	18-06-2019		**TLM1**	CO1	T1	
221.	Tautologies, Equivalence of Formulas, Duality law	1	19-06-2019		**TLM1**	CO1	T1	
222.	Tautological Implications	1	22-06-2019		**TLM1**	CO1	T1	
223.	Normal Forms	2	24-06-2019&25-06-2019		**TLM1**	CO1	T1,R1	
224.	Theory of Inference for Statement Calculus	2	26-06-2019 & 29-06-2019		**TLM1**	CO1	T1,R1	
225.	Consistency of Premises Indirect Method of Proof	1	01-07-2019		**TLM1**	CO1	T1,R1	
226.	Predicative Logic	1	02-07-2019		**TLM1**	CO1	T1,R1	
227.	Tutorial – I	1	03-07-2019		**TLM3**	CO1	T1	
228.	Statement Functions, Variables and Quantifiers Free & Bound Variables	1	06-07-2019		**TLM1**	CO1	T1	
229.	Inference theory for predicate calculus	1	08-07-2019		**TLM1**	CO1	T1	
No. of classes required to complete UNIT-I		**14**			No. of classes taken:			

UNIT –II: Set Theory & Functions

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
230.	Set Theory: Introduction, Operations on Binary Sets	1	09-07-2019		**TLM1**	CO2	T1	T1
231.	Principle of Inclusion and Exclusion	1	10-07-2019		**TLM1**	CO2	T1	
232.	Relations: Properties of Binary Relations	1	15-07-2019		**TLM1**	CO2	T1	
233.	Relation Matrix and Digraph Operations on Relations	1	16-07-2019		**TLM1**	CO2	T1	
234.	Partition and Covering, Transitive Closure	1	17-07-2019				T1	
235.	Equivalence Relation	1	20-07-2019		**TLM1**	CO2	T1,R1	
236.	Compatibility Relation	1	22-7-2019		**TLM1**	CO2	T1	
237.	Partial Ordering Relation & Hasse Diagrams	1	23-07-2019		**TLM1**	CO2	T1,R1	
238.	Functions: Bijective Functions	1	24-07-2019		**TLM1**	CO2	T1	
239.	Composition of Functions, Inverse Functions	1	27-07-2019		**TLM1**	CO2	T1,R1	
240.	Permutation Functions, Recursive Functions	1	29-07-2019		**TLM1**	CO2	T1,R1	
241.	Tutorial – II	1	30-07-2019		**TLM3**	CO2	T1	
No. of classes required to complete **UNIT-2**		**12**			No. of classes taken:			

UNIT –III: Graph Theory

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
242.	Basic Concepts of Graphs, Sub graphs	1	31-07-2019		**TLM1**	CO3	T1	
243.	Matrix Representation of Graphs	1	03-08-2019		**TLM1**	CO3	T1	
244.	Adjacency Matrices,	1	05-08-2019		**TLM1**	CO3	T1	

	Incidence Matrices							
245.	Isomorphic Graphs, Paths and Circuits	2	06-08-2019 & 07-08-2019		**TLM1**	CO3	T1,R1	
246.	Eulerian Graphs, Hamiltonian Graphs	1	13-08-2019		**TLM1**	CO3	T1,R1	
247.	Multigraphs, Planar Graphs, Euler's Formula	1	14-08-2019		**TLM1**		T1,R1	
248.	Tutorial – III	1	17-08-2019		**TLM3**	CO3	T1	
249.	Graph Colouring and Covering, Chromatic Number	1	19-08-2019		**TLM1**	CO3	T1	
250.	Trees, Directed trees	1	20-08-2019		**TLM1**	CO3	T1	
251.	Binary Trees, Decision Trees	1	21-08-2019		**TLM1**	CO3	T1	
252.	Spanning Trees: Properties	1	26-08-2019		**TLM1**	CO3	T1,R1	
253.	Algorithms for Spanning trees and Minimum Spanning Trees	2	27-08-2019 & 28-08-2019		**TLM1**	CO3	T1,R1	
No. of classes required to complete **UNIT-3**		14			No. of classes taken:			

UNIT –IV: Algebraic Structures & Combinatorics

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
254.	Algebraic Systems with one Binary Operation	1	31-08-2019		**TLM1**	CO4	T1	
255.	Properties of Binary operations, Semi groups and Monoids	1	03-09-2019		**TLM1**	CO4	T1	
256.	Homomorphism of Semi groups and Monoids, Groups	1	04-09-2019		**TLM1**	CO4	T1	
257.	Abelian Group, Cosets, Subgroups	1	07-09-2019		**TLM1**	CO4	T1,R1	
258.	Lattice: Properties, Algebraic Systems with two Binary Operations: Rings	2	09-09-2019 & 11-09-2019		**TLM1**	CO4	T1,R1	
259.	Tutorial – IV	1	16-09-2019		**TLM3**	CO4	T1	

260.	Basic of Counting, Permutations, Derangements	1	17-09-2019		**TLM1**		T1	
261.	Permutations with Repetition of Objects	1	18-09-2019		**TLM1**	CO4	T1,R1	
262.	Circular Permutations, Restricted Permutations	1	21-09-2019		**TLM1**	CO4	T1	
263.	Combinations, Restricted Combinations	1	23-09-2019		**TLM1**	CO4	T1	
264.	Pigeonhole Principle and its Application	1	24-09-2019		**TLM1**	CO4	T1	
No. of classes required to complete **UNIT-4**		12			No. of classes taken:			

UNIT-V: Recurrence Relation

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
265.	Binomial Theorem, Binomial and Multinomial Coefficients	1	25-09-2019		**TLM1**	CO5	T1	T1
266.	Generating Functions of Permutations and Combinations	2	28-09-2019 & 30-09-2019		**TLM1**	CO5	T1	
267.	The Principles of Inclusion – Exclusion	1	30-09-2019		**TLM1**	CO5	T1,R1,R2	
268.	Generating Function of Sequences, Partial Fractions	1	01-10-2019		**TLM1**	CO5	T1,R1,R2	
269.	Calculating Coefficient of Generating Functions	1	01-10-2019		**TLM1**	CO5	T1	
270.	Tutorial – V	1	05-10-2019		**TLM3**	CO5	T1	
271.	Recurrence Relations, Formulation as Recurrence Relations	1	05-10-2019		**TLM1**	CO5	T1,R1,R2	
272.	Solving linear homogeneous recurrence Relations by substitution	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	
273.	Generating functions and The Method of	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	

	Characteristic Roots							
274.	Solving Inhomogeneous Recurrence Relations	1	07-10-2019		**TLM1**	CO5	T1,R1,R2	
No. of classes required to complete **UNIT-5**		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
275.	Rules of Inference and Automatic Theorem Proving	1			**TLM1**	CO1		
276.	Polish theorem	1			**TLM1**	CO4		
277.	DFS & BFS algorithm	1			**TLM1**	CO5	T1,R1	

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

13. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
14. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
15. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with

appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

16. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
17. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
18. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
19. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
20. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
21. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
22. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
23. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.
24. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor **Course Coordinator** **Module Coordinator** **HOD**

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, Accredited by NAAC & NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-A

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PYTHON PROGRAMMING – 17CI04

L-T-P STRUCTURE : 2-2-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Mr.K.SUNDEEP SARADHI**

COURSE COORDINATOR : **Mr.K.SUNDEEP SARADHI**

PRE-REQUISITE: C Programming

COURSE OBJECTIVE:. Python is a Modern Language useful for writing compact codes specifically for Programming in the area of Server-side Web Development, Data Analytics, AI and Scientific Computing as well as Production Tools and Game Programming

COURSE OUTCOMES (CO)

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

CO1: Identify the basic python constructs with a view of using them in problem solving.

CO2: Apply control structures and use python lists in examples of problem solving.

CO3: Explore the utility of strings and functions in modular programming using python.

CO4: Apply tuple, set and file operations to organize the data in real world problems.

CO5: Analyze various searching and sorting techniques using python and apply exception Handling, database operations in python.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO2	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO3	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO4	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO5	3	2	1	-	3	-	-	-	-		-	2	3	-	1

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

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

BOS APPROVED TEXT BOOKS:

T1 Povel Solin, Martin Novak, "Introduction to Python Programming", NC Lab Public Computing, 2013.

T2 Bill Lubanovic, "Introducing Python- Modern Computing in Simple Packages", O'Reilly Publication, 1st Edition, 2015.

BOS APPROVED REFERENCE BOOKS:

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R2 Y.Daniel Liang, "Introduction to programming using python", Pearson, 2013.

R3 R. Nageswara Rao, "Core python programming", Dreamtech, 2017.

R4 Mark Summerfield, "Programming in Python 3" Pearson Education, 2nd Edition, 2010.

R5 Magnus Lie Hetland, "Beginning Python – From Novice to Professional", APress Publication, 3rd Edition, 2017

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I : Introduction to Python & Operators

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
278.	Introduction to Programming	1	17.06.2019		**TLM1**	CO1	T1	
279.	History of Python	1	18.06.2019		**TLM1**	CO1	T1	
280.	Usage of Python Interpreter, Python Shell	1	19.06.2019		**TLM8**	CO1	T1	
281.	Indentation, Python Built-in types , Variables	1	22.06.2019		**TLM1/ TLM8**	CO1	T1	
282.	Assignment, Input-Output Statements	1	24.06.2019		**TLM1**	CO1	T1	
283.	Identifiers, keywords	1	25.06.2019		**TLM1**	CO1	T1	
284.	Literals , simple programs	1	26.06.2019		**TLM1/ TLM5**	CO1	R1	
285.	Tutorial - 1	1	29.06.2019		**TLM3**	CO1	T1	
286.	Arithmetic , Relational, Logical Operators	1	01.07.2019		**TLM4 / TLM5**	CO1	T1	
287.	Assignment Operators, Bitwise Operators,	1	02.07.2019		**TLM1/ TLM5**	CO1	T1	
288.	Python Membership Operator, Python Identity Operator , Operator Precedence	1	03.07.2019		**TLM1/ TLM5**	CO1	T1	
289.	Assignment / Quiz - 1	1	06.07.2019		**TLM6**	CO1	T1	
No. of classes required to complete UNIT-I		12			No. of classes taken:			

UNIT-II: Control Structures & Python Lists

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
290.	Conditional Statements – if, if-else	1	8.07.2019		**TLM1**	CO2	T1	
291.	Nested If-else, Jumping Statements – continue, break, pass	1	9.07.2019		**TLM1**	CO2	T1	
292.	Python Loops – While loop, for loop	1	10.07.2019		**TLM1**	CO2	T1	
293.	Nested Loops with Programs	1	15.07.2019		**TLM1/**	CO2	T1	

					TLM5			
294.	Mathematical functions & constants, Random Number functions	1	16.07.2019		**TLM4 / TLM5**	CO2	T1	
295.	Python List - concept , Creating and Accessing Elements	1	17.07.2019		**TLM1**	CO2	T1	
296.	Tutorial - 2	1	20.07.2019		**TLM3**	CO2	T1	
297.	Updating Lists & Deleting Lists	1	22.07.2019		**TLM1**	CO2	T1	
298.	Basic List operations , Reverse, Indexing	1	23.07.2019		**TLM1/ TLM5**	CO2	T1	
299.	Slicing & Matrices	1	24.07.2019		**TLM1**	CO2	T1	
300.	Built-in List Functions	1	27.07.2019		**TLM1/ TLM5**	CO2	T1	
301.	Assignment / Quiz - 2	1	29.07.2019		**TLM6**	CO2	T1	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III: Python Strings & Functions

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
302.	Python Strings - concept , Slicing, Escape Characters	1	30.07.2019		**TLM1**	CO3	T1	
303.	String Special Operations, String formatting operator	1	31.07.2019		**TLM1/ TLM5**	CO3	T1	
304.	Triple quotes , raw string, Unicode strings	1	03.08.2019		**TLM1**	CO3	T1	
305.	Built-in string methods	1	13.08.2019		**TLM1/ TLM5**	CO3	T1	
306.	Tutorial - 3	1	14.08.2019		**TLM3**	CO3	T1	
307.	Defining and calling a function, Types of functions,	1	17.08.2019		**TLM1**	CO3	T1	
308.	Function arguments, Anonymous functions	1	19.08.2019		**TLM1**	CO3	T1	
309.	Global and Local variables, Recursion with programs	1	20.08.2019		**TLM4 / TLM5**	CO3	T1	
310.	Assignment / Quiz-3	1	21.08.2019		**TLM6**	CO3	T1	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Python Tuples, Sets & Files

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
311.	Python Tuples – Introduction	1	26.08.2019		**TLM1**	CO4	T1	
312.	Creating and Deleting Tuples Accessing Values in a Tuple	1	27.08.2019		**TLM1**	CO4	T1	
313.	Updating tuples , Delete tuple elements, Basic tuple operations	1	28.08.2019		**TLM1/ TLM5**	CO4	T1	
314.	Indexing , Slicing and Matrices	1	31.08.2019		**TLM1**	CO4	T1	
315.	Built-in tuple functions	1	03.09.2019		**TLM1/ TLM5**	CO4	T1	
316.	Tutorial - 4	1	04.09.2019		**TLM1**	CO4	T1	
317.	Sets-concepts, operations	1	07.09.2019		**TLM1**	CO4	T1	
318.	Files – Creating files, Operation on files	1	09.09.2019		**TLM1/ TLM5**	CO4	T1	

319.	Assignment / Quiz - 4	1	11.09.2019		**TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V: Searching & Sorting, Exception Handling & Database

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
320.	Searching Techniques – Linear Search, Binary Search	1	16.09.2019		**TLM1/ TLM5**	CO5	T1	
321.	Sorting Techniques – Bubble sort Selection Sort	1	17.09.2019		**TLM1/ TLM5**	CO5	T1	
322.	Insertion Sort, Merge Sort	1	18.09.2019		**TLM1/ TLM5**	CO5	T1	
323.	Heap Sort	1	21.09.2019		**TLM1/ TLM5**	CO5	T1	
324.	Exception Handling – Exceptions, Except clause , try	1	23.09.2019		**TLM3**	CO5	T1	
325.	Tutorial - 5	1	24.09.2019		**TLM1**	CO5	T1	
326.	Finally clause, user defined exceptions	1	25.09.2019		**TLM1**	CO5	T1	
327.	Database – introduction, connections, Executing queries,	1	28.09.2019		**TLM1/ TLM5**	CO5	T1	
328.	Transactions , Handling errors , Simple Programs	1	30.09.2019		**TLM4 / TLM5**	CO5	T1	
329.	Assignment / Quiz - 5	1	01.10.2019		**TLM6**	CO5	T1	
No. of classes required to complete UNIT-V		10			No. of classes taken:			
330.	Revision on all Units	1	09.10.2019		**TLM3**	CO1	T1	

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	Text Book followed	HOD Sign Weekly
331.	Introduction to Classes and OOP	3	05.10.2019		**TLM1/ TLM5**			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7W
I Mid Examinations	05-08-2019	10-08-2019	1W
II Phase of Instructions	12-08-2019	12-10-2019	9W
II Mid Examinations	14-10-2019	19-10-2019	1W
Preparation and Practicals	21-10-2019	31-10-2019	1½ W
Semester End Examinations	01-11-2019	16-11-2019	2W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10
II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

25. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

26. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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28. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

29. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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35. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

36. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products

Course Instructor	Course Coordinator	Module Coordinator	HOD
K.Sundeep Saradhi	K.Sundeep Saradhi	Dr. D.Veeraiah	Dr.Ch.Venkata Narayana

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-B

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PYTHON PROGRAMMING – 17CI04

L-T-P STRUCTURE : 2-2-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Mr.K.SUNDEEP SARADHI**

COURSE COORDINATOR : **Mr.K.SUNDEEP SARADHI**

PRE-REQUISITE: C Programming

COURSE OBJECTIVE:. Python is a Modern Language useful for writing compact codes specifically for Programming in the area of Server-side Web Development, Data Analytics, AI and Scientific Computing as well as Production Tools and Game Programming

COURSE OUTCOMES (CO)

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

CO1: Identify the basic python constructs with a view of using them in problem solving.

CO2: Apply control structures and use python lists in examples of problem solving.

CO3: Explore the utility of strings and functions in modular programming using python.

CO4: Apply tuple, set and file operations to organize the data in real world problems.

CO5: Analyze various searching and sorting techniques using python and apply exception Handling, database operations in python.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO2	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO3	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO4	3	2	1	-	3	-	-	-	-		-	2	3	-	1
CO5	3	2	1	-	3	-	-	-	-		-	2	3	-	1

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

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

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BOS APPROVED REFERENCE BOOKS:

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R3 R. Nageswara Rao, "Core python programming", Dreamtech, 2017.

R4 Mark Summerfield, "Programming in Python 3" Pearson Education, 2nd Edition, 2010.

R5 Magnus Lie Hetland, "Beginning Python – From Novice to Professional", APress Publication, 3rd Edition, 2017

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : Introduction to Python & Operators

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
332.	Introduction to Programming	1	17.06.2019		**TLM1**	CO1	T1	
333.	History of Python	1	18.06.2019		**TLM1**	CO1	T1	
334.	Usage of Python Interpreter, Python Shell	1	20.06.2019		**TLM8**	CO1	T1	
335.	Indentation, Python Built-in types , Variables	1	21.06.2019		**TLM1/ TLM8**	CO1	T1	
336.	Assignment, Input-Output Statements	1	24.06.2019		**TLM1**	CO1	T1	
337.	Identifiers, keywords	1	25.06.2019		**TLM1**	CO1	T1	
338.	Literals , simple programs	1	27.06.2019		**TLM1/ TLM5**	CO1	R1	
339.	Tutorial - 1	1	28.06.2019		**TLM3**	CO1	T1	
340.	Arithmetic , Relational, Logical Operators	1	01.07.2019		**TLM4 / TLM5**	CO1	T1	
341.	Assignment Operators, Bitwise Operators,	1	02.07.2019		**TLM1/ TLM5**	CO1	T1	
342.	Python Membership Operator, Python Identity Operator , Operator Precedence	1	04.07.2019		**TLM1/ TLM5**	CO1	T1	
343.	Assignment / Quiz - 1	1	05.07.2019		**TLM6**	CO1	T1	
No. of classes required to complete UNIT-I		12			No. of classes taken:			

UNIT-II: Control Structures & Python Lists

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
344.	Conditional Statements – if, if-else	1	08.07.2019		**TLM1**	CO2	T1	
345.	Nested If-else, Jumping Statements – continue, break, pass	1	09.07.2019		**TLM1**	CO2	T1	
346.	Python Loops – While loop, for loop	1	11.07.2019		**TLM1**	CO2	T1	

347.	Nested Loops with Programs	1	12.07.2019		**TLM1/ TLM5**	CO2	T1	
348.	Mathematical functions & constants, Random Number functions	1	15.07.2019		**TLM4 / TLM5**	CO2	T1	
349.	Python List - concept , Creating and Accessing Elements	1	16.07.2019		**TLM1**	CO2	T1	
350.	Tutorial - 2	1	18.07.2019		**TLM3**	CO2	T1	
351.	Updating Lists & Deleting Lists	1	19.07.2019		**TLM1**	CO2	T1	
352.	Basic List operations , Reverse, Indexing	1	22.07.2019		**TLM1/ TLM5**	CO2	T1	
353.	Slicing & Matrices	1	23.07.2019		**TLM1**	CO2	T1	
354.	Built-in List Functions	1	25.07.2019		**TLM1/ TLM5**	CO2	T1	
355.	Assignment / Quiz - 2	1	26.07.2019		**TLM6**	CO2	T1	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III: Python Strings & Functions

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
356.	Python Strings - concept , Slicing, Escape Characters	1	29.07.2019		**TLM1**	CO3	T1	
357.	String Special Operations, String formatting operator	1	30.07.2019		**TLM1/ TLM5**	CO3	T1	
358.	Triple quotes , raw string, Unicode strings	1	01.08.2019		**TLM1**	CO3	T1	
359.	Built-in string methods	1	02.08.2019		**TLM1/ TLM5**	CO3	T1	
360.	Tutorial - 3	1	13.08.2019		**TLM3**	CO3	T1	
361.	Defining and calling a function, Types of functions,	1	16.08.2019		**TLM1**	CO3	T1	
362.	Function arguments, Anonymous functions	1	19.08.2019		**TLM1**	CO3	T1	
363.	Global and Local variables, Recursion with programs	1	20.08.2019		**TLM4 / TLM5**	CO3	T1	
364.	Assignment / Quiz-3	1	22.08.2019		**TLM6**	CO3	T1	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Python Tuples, Sets & Files

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
365.	Python Tuples – Introduction	1	23.08.2019		**TLM1**	CO4	T1	
366.	Creating and Deleting Tuples Accessing Values in a Tuple	1	26.08.2019		**TLM1**	CO4	T1	
367.	Updating tuples , Delete tuple elements, Basic tuple operations	1	27.08.2019		**TLM1/ TLM5**	CO4	T1	
368.	Indexing , Slicing and Matrices	1	29.08.2019		**TLM1**	CO4	T1	
369.	Built-in tuple functions	1	30.08.2019		**TLM1/ TLM5**	CO4	T1	
370.	Tutorial - 4	1	03.09.2019		**TLM1**	CO4	T1	
371.	Sets-concepts, operations	1	05.09.2019		**TLM1**	CO4	T1	
372.	Files – Creating files, Operation on files	1	06.09.2019		**TLM1/ TLM5**	CO4	T1	

373.	Assignment / Quiz - 4	1	09.09.2019		**TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V: Searching & Sorting, Exception Handling & Database

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
374.	Searching Techniques – Linear Search, Binary Search	1	12.09.2019		**TLM1/ TLM5**	CO5	T1	
375.	Sorting Techniques – Bubble sort Selection Sort	1	13.09.2019		**TLM1/ TLM5**	CO5	T1	
376.	Insertion Sort, Merge Sort	1	16.09.2019		**TLM1/ TLM5**	CO5	T1	
377.	Heap Sort	1	17.09.2019		**TLM1/ TLM5**	CO5	T1	
378.	Exception Handling – Exceptions, Except clause , try	1	19.09.2019		**TLM3**	CO5	T1	
379.	Tutorial - 5	1	20.09.2019		**TLM1**	CO5	T1	
380.	Finally clause, user defined exceptions	1	23.09.2019		**TLM1**	CO5	T1	
381.	Database – introduction, connections, Executing queries,	1	24.09.2019		**TLM1/ TLM5**	CO5	T1	
382.	Transactions , Handling errors , Simple Programs	1	26.09.2019		**TLM4 / TLM5**	CO5	T1	
383.	Assignment / Quiz - 5	1	27.09.2019		**TLM6**	CO5	T1	
No. of classes required to complete UNIT-V		10			No. of classes taken:			
384.	Revision on UNIT-I	1	01.10.2019		**TLM3**	CO1	T1	
385.	Revision on UNIT-II	1	03.10.2019		**TLM3**	CO2	T1	
386.	Revision on UNIT-III	1	04.10.2019		**TLM3**	CO3	T1	
387.	Revision on UNIT-IV	1	10.10.2019		**TLM3**	CO4	T1	
388.	Revision on UNIT-V	1	11.10.2019		**TLM3**	CO5	T1	

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	Text Book followed	HOD Sign Weekly
389.	Introduction to Classes and OOP	3	30.01.2019		**TLM1/ TLM5**			

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7W
I Mid Examinations	05-08-2019	10-08-2019	1W
II Phase of Instructions	12-08-2019	12-10-2019	9W

II Mid Examinations	14-10-2019	19-10-2019	1W
Preparation and Practicals	21-10-2019	31-10-2019	1½ W
Semester End Examinations	01-11-2019	16-11-2019	2W

EVALUATION PROCESS:

Evaluation Task	**COs**	**Marks**
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10
II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

37. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

38. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

39. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

40. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

41. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

42. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

43. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

44. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

45. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

46. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

47. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

48. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HOD
K.Sundeep Saradhi	K.Sundeep Saradhi	Dr. D.Veeraiah	Dr.Ch.Venkata Narayana

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi)
Accredited by NACC and NBA , Certified by ISO 9001:2015
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech. III-Sem., CSE- A

ACADEMIC YEAR : 2018-19

COURSE NAME & CODE : **Data Structures -17CI05**

L-T-P STRUCTURE : 4-1-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Mr. L V Krishna rao**

COURSE COORDINATOR : **Dr. R Chandra Sekharam**

PRE-REQUISITE: C programming language

COURSE OBJECTIVE: To make students familiar with:

Writing algorithms to implement operations involved in different data structures like stack and queue using arrays as well as linked list, to implement different types of trees, various searching and sorting techniques.

COURSE OUTCOMES (CO)

CO1: Compare normal data type with abstract data type (ADT). Analyze example programs with data structures using analyzing tools.

CO2: Develop & analyze the algorithms for stacks and Queues

CO3: Analyze, implement and compare searching and sorting Techniques.

CO4: Design & analyze algorithms for operations on Binary Search Trees & AVL Trees data structures.

CO5: Evaluate Graph traversal and minimum cost spanning tree algorithms and compare hashing methods on hash table data structure.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1										3	3	2
CO2	3	3	2										3	3	1
CO3	3	3	1										3	3	2
CO4	3	3	2										3	3	1
CO5	3	3	2										3	3	1

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

TEXT BOOKS:

T1 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2ndedition

T2 Reema Thareja, Data Structures using c, Oxford Publications.

REFERENCE BOOKS:

R1 Langson, Augenstein &Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.

R2 RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

R3 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2011.

R4 Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, PHI, 2009.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

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	Text Book followed	HOD Sign Weekly
390.	Introduction	1	17-06-19		TLM1	CO1	T1,T2	
391.	Mathematical Background	1	18-06-19		TLM1	CO1	T1,R4	
392.	Model, Analysis and Run Time Calculations	2	19-06-19 & 20-06-19		TLM4	CO1	T1,R4	
393.	Introduction to Data Structure and Abstract Data Type(ADTs)	1	21-06-19		TLM1	CO1	T1,R3	
394.	List ADT: List implementation using arrays and its operations	2	24-06-19& 25-06-19		TLM1	CO1	T1,R3	
395.	Tutorial-1	1	26-06-19		TLM3	CO1	T1,R1	
396.	List ADT : List implementation using pointers(Linked list)	2	27-06-19 & 28-06-19		TLM1	CO1	T1,R2	
397.	Operations on singly linked list	2	01-07-19 &02-07-19		TLM1	CO1	T1,T2	
398.	Operations on Doubly linked list	1	03-07-19		TLM1	CO1	T1	
399.	Operations on Circular linked list	2	04-07-19 & 05-07-19		TLM1	CO1	T1	
400.	Polynomial ADT .	1	08-07-19		TLM1	CO1	T1	
401.	Tutorial -2	1	09-07-19		TLM3	CO1	T1	

402.	Assignment/Quiz-1	1	10-07-19		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		18			No. of classes taken:			

UNIT-II: Stacks, Queues and its Applications.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
403.	Stack: Definition and its operations, implementation using arrays	1	11-07-19		TLM1	CO2	T1,R1	
404.	Stack implementation Using Linked List	1	12-07-19		TLM1	CO2	T1,R1	
405.	Infix to postfix expression conversion	1	15-07-19		TLM1	CO2	T1,R2	
406.	Evaluation of Postfix expressions	1	16-07-18		TLM2	CO2	T1,R3	
407.	Balancing the symbols	1	17-07-18		TLM1	CO2	T1,R2	
408.	Tutorial-3	1	18-07-18		TLM3	CO2	T1,R2	
409.	Queue: definition and its operations	1	19-07-19		TLM5	CO2	T1,R3	
410.	implementation using arrays	1	22-07-19		TLM1	CO2	T1,R3	
411.	implementation using linked lists	1	23-07-19		TLM5	CO2	T1,R3	
412.	Circular queue: definition its operations, implementation	2	24-07-19 &25-07-19		TLM1	CO2	T1	
413.	DEQUEUE : Definition & its implementation.	2	26-07-19 &29-07-19		TLM2	CO2	T1	
414.	Tutorial-4	1	30-07-19		TLM3	CO2	T1,R1	
415.	Assignment/Quiz-2	1	31-07-19		TLM6	CO2		
No. of classes required to complete UNIT-II		15			No. of classes taken:			

UNIT-III: Searching & Sorting Techniques

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
416.	Searching: Linear Searching	1	01-08-19		TLM1	CO3	T1,R3	
417.	Binary Search	1	02-08-19		TLM1	CO3	T1	
418.	Fibonacci Search	1	13-08-19		TLM5	CO3	T1	

419.	Sorting: Bubble sort	1	14-08-19		TLM5	CO3	T1	
420.	Insertion Sort	1	16-08-19		TLM5	CO3	T1	
421.	Tutorial -5	1	19-08-19		TLM3	CO3	T1,R2	
422.	Merge Sort	2	20-08-19 & 21-08-19		TLM5	CO3	T1	
423.	Quick Sort	2	22-08-19 &23-08-19		TLM1	CO3	T1	
424.	Heap Sort	2	26-08-19 &27-08-19		TLM1	CO3	T1	
425.	Tutorial - 6	1	28-08-19		TLM3	CO3	T1,R1	
426.	Assignment/Quiz-3	1	29-08-19		TLM6	CO3		
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: Trees, Traversals, Search Trees

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
427.	Trees: Terminology, Binary Trees: definition	1	30-08-19		TLM1	CO4	T1,R1	
428.	types of binary trees, Representation	1	03-09-19		TLM1	CO4	T1,R1	
429.	Implementation using linked list	1	04-09-19		TLM1	CO4	T1	
430.	Tree traversals: Recursive techniques	2	05-09-19 &06-09-19		TLM5	CO4	T1	
431.	Expression Tress	1	09-09-19		TLM1	CO4	T1,R2	
432.	Search Tree: Binary Search Tree-search operation	1	11-09-19		TLM1	CO4	T1,R2	
433.	insertion, Deletion (all the three cases	2	12-09-19 &13-09-19		TLM1	CO4	T1,R2	
434.	Balanced Tree - Introduction to AVL Tress	1	16-09-19		TLM1	CO4	T1,R1	
435.	AVL tree and Rotations	2	17-09-19 &18-09-19		TLM1	CO4	T1,R1	
436.	TUTORIAL-7	1	19-09-19		TLM3	CO4	T1,R2	
437.	Assignment/Quiz-4	1	20-09-19		TLM6	CO4		
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V: Graphs, Hashing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
438.	Graphs: Fundamentals, Representation of graphs	1	23-09-19		TLM2	CO5	T1,R3	
439.	Graph Traversals: BFS, DFS	2	24-09-19 &26-09-19		TLM2	CO5	T1,R3	
440.	Minimum Cost spanning tree: Definition, Prim's Algorithm	1	27-09-19		TLM2	CO5	T1,R3	

441.	Tutorial -8	1	30-09-19		TLM3	CO5	T2,R4	
442.	Kruskal's algorithm	1	30-09-19		TLM1	CO5	T1,R4	
443.	Hashing: Hash Table and Hash Functions	1	01-10-19		TLM1	CO5	T1,R3	
444.	Collision resolution Techniques	1	03-10-19		TLM1	CO5	T1,R3	
445.	separate Chaining, Open addressing, rehashing.	2	04-10-19 & 07-10-19		TLM2	CO5	T1,R3	
446.	Tutorial- 9	1	09-10-19		TLM3	CO5	T1,R2	
447.	Assignment/Quiz-5				TLM6	CO5		
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
448.	Introduction to B Trees.	1	10-10-19		TLM1	CO4	T1,R2	
449.	Introduction to Splay Trees	1	11-10-19		TLM1	CO3	T2,R2	

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

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10
II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

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PROGRAM OUTCOMES

Engineering Graduates will be able to:

49. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PROGRAM SPECIFIC OUTCOMES

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products

Title	Course Instructor	Course Coordinator	Module Coordinator	Head of the Department
Name of the Faculty	Mr L V Krishna rao	Dr R Chandra Sekharam	Dr. D Veeraiah	Dr. Ch. Venkata Narayana
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech. III-Sem., CSE-B

ACADEMIC YEAR : 2018-19

COURSE NAME & CODE : **Data Structures – 17CI05**

L-T-P STRUCTURE : 4-1-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Mr. L V Krishna Rao**

COURSE COORDINATOR : **Dr. R Chandra sekharam**

PRE-REQUISITE: C programming language

COURSE OBJECTIVE: To make students familiar with:

Writing algorithms to implement operations involved in different data structures like stack and queue using arrays as well as linked list, to implement different types of trees, various searching and sorting techniques.

COURSE OUTCOMES (COs)

CO1: Compare normal data type with abstract data type (ADT). Analyze example programs with data structures using analyzing tools.

CO2: Develop & analyze the algorithms for stacks and Queues

CO3: Analyze, implement and compare searching and sorting Techniques.

CO4: Design & analyze algorithms for operations on Binary Search Trees & AVL Trees data structures.

CO5: Evaluate Graph traversal and minimum cost spanning tree algorithms and compare hashing methods on hash table data structure.

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

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1										3	3	2
CO2	3	3	2										3	3	1
CO3	3	3	1										3	3	2
CO4	3	3	2										3	3	1
CO5	3	3	2										3	3	1

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

TEXT BOOKS:

T1 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2ndedition

T2 Reema Thareja, Data Structures using c, Oxford Publications.

REFERENCE BOOKS:

R1 Langson, Augenstein &Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.

R2 RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

R3 Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition, Universities Press, 2011.

R4 Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, PHI, 2009.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

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	Text Book followed	HOD Sign Weekly
450.	Introduction	1	17-06-19		TLM1	CO1	T1,T2	
451.	Mathematical Background	1	18-06-19		TLM1	CO1	T1,R4	
452.	Model, Analysis and Run Time Calculations	2	19-06-19 & 21-06-19		TLM4	CO1	T1,R4	
453.	Introduction to Data Structure and Abstract Data Type(ADTs)	1	22-06-19		TLM1	CO1	T1,R3	
454.	List ADT: List implementation using arrays and its operations	2	24-06-19& 25-06-19		TLM1	CO1	T1,R3	
455.	Tutorial-1	1	26-06-19		TLM3	CO1	T1,R1	
456.	List ADT : List implementation using pointers(Linked list)	2	28-06-19 & 29-06-19		TLM1	CO1	T1,R2	
457.	Operations on singly linked list	2	01-07-19 &02-07-19		TLM1	CO1	T1,T2	
458.	Operations on Doubly linked list	2	03-07-19& 05-07-19		TLM1	CO1	T1	
459.	Operations on Circular linked list	2	06-07-19 & 08-07-19		TLM1	CO1	T1	
460.	Polynomial ADT .	1	09-07-19		TLM1	CO1	T1	

461.	Tutorial -2	1	10-07-19		TLM3	CO1	T1	
462.	Assignment/Quiz-1	1	12-07-19		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		19			No. of classes taken:			

UNIT-II: Stacks, Queues and its Applications.

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
463.	Stack: Definition and its operations, implementation using arrays	1	15-07-19		TLM1	CO2	T1,R1	
464.	Stack implementation Using Linked List	1	16-07-19		TLM1	CO2	T1,R1	
465.	Infix to postfix expression conversion	1	17-07-19		TLM1	CO2	T1,R2	
466.	Evaluation of Postfix expressions	1	19-07-18		TLM2	CO2	T1,R3	
467.	Balancing the symbols	1	20-07-18		TLM1	CO2	T1,R2	
468.	Tutorial-3	1	22-07-18		TLM3	CO2	T1,R2	
469.	Queue: definition and its operations	1	23-07-19		TLM5	CO2	T1,R3	
470.	implementation using arrays	1	24-07-19		TLM1	CO2	T1,R3	
471.	implementation using linked lists	1	26-07-19		TLM5	CO2	T1,R3	
472.	Circular queue: definition its operations, implementation	2	27-07-19 &29-07-19		TLM1	CO2	T1	
473.	DEQUEUE : Definition & its implementation.	2	30-07-19 &31-07-19		TLM2	CO2	T1	
474.	Tutorial-4	1	02-08-19		TLM3	CO2	T1,R1	
475.	Assignment/Quiz-2	1	03-08-19		TLM6	CO2		
No. of classes required to complete UNIT-II		15			No. of classes taken:			

UNIT-III: Searching & Sorting Techniques

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
476.	Searching: Linear Searching	1	05-08-19		TLM1	CO3	T1,R3	
477.	Binary Search	1	06-08-19		TLM1	CO3	T1	

478.	Fibonacci Search	1	07-08-19		TLM5	CO3	T1	
479.	Sorting: Bubble sort	1	09-08-19		TLM5	CO3	T1	
480.	Insertion Sort	1	13-08-19		TLM5	CO3	T1	
481.	Tutorial -5	1	14-08-19		TLM3	CO3	T1,R2	
482.	Merge Sort	2	16-08-19 &17-08-19		TLM5	CO3	T1	
483.	Quick Sort	2	19-08-19 &20-08-19		TLM1	CO3	T1	
484.	Heap Sort	2	21-08-19 &23-08-19		TLM1	CO3	T1	
485.	Tutorial - 6	1	26-08-19		TLM3	CO3	T1,R1	
486.	Assignment/Quiz-3	1	27-08-19		TLM6	CO3		
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: Trees, Traversals, Search Trees

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
487.	Trees: Terminology, Binary Trees: definition	1	28-08-19		TLM1	CO4	T1,R1	
488.	types of binary trees, Representation	1	30-08-19		TLM1	CO4	T1,R1	
489.	Implementation using linked list	1	31-08-19		TLM1	CO4	T1	
490.	Tree traversals: Recursive techniques	2	03-09-19 &04-09-19		TLM5	CO4	T1	
491.	Expression Tress	1	06-09-19		TLM1	CO4	T1,R2	
492.	Search Tree: Binary Search Tree-search operation	1	07-09-19		TLM1	CO4	T1,R2	
493.	insertion, Deletion (all the three cases	2	09-09-19 &11-09-19		TLM1	CO4	T1,R2	
494.	Balanced Tree - Introduction to AVL Tress	1	13-09-19		TLM1	CO4	T1,R1	
495.	AVL tree and Rotations	2	16-09-19 &17-09-19		TLM1	CO4	T1,R1	
496.	TUTORIAL-7	1	18-09-19		TLM3	CO4	T1,R2	
497.	Assignment/Quiz-4	1	20-09-19		TLM6	CO4		
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V: Graphs, Hashing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
498.	Graphs: Fundamentals, Representation of graphs	1	21-09-19		TLM2	CO5	T1,R3	
499.	Graph Traversals: BFS, DFS	2	23-09-19 &24-09-19		TLM2	CO5	T1,R3	
500.	Minimum Cost spanning tree: Definition, Prim's	1	25-09-19		TLM2	CO5	T1,R3	

	Algorithm							
501.	Tutorial -8	1	27-09-19		TLM3	CO5	T2,R4	
502.	Kruskal's algorithm	1	28-09-19		TLM1	CO5	T1,R4	
503.	Hashing: Hash Table and Hash Functions	1	30-09-19		TLM1	CO5	T1,R3	
504.	Collision resolution Techniques	1	01-10-19		TLM1	CO5	T1,R3	
505.	separate Chaining, Open addressing, rehashing.	2	04-10-19 & 05-10-19		TLM2	CO5	T1,R3	
506.	Tutorial- 9	1	07-10-19		TLM3	CO5	T1,R2	
507.	Assignment/Quiz-5				TLM6	CO5		
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
508.	Introduction to B Trees.	1	09-10-19		TLM1	CO4	T1,R2	
509.	Introduction to Splay Trees	1	11-10-19		TLM1	CO3	T2,R2	

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

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10
II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

61. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
62. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
63. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
64. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
65. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
66. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
67. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
68. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
69. **Individual and team work**: Function effectively as an individual, and as a member or

leader in diverse teams, and in multidisciplinary settings.

70. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

71. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

72. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr L V Krishna rao	Dr R Chandra Sekharam	Dr. D Veeraiah	Dr. Ch. Venkata Narayana
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-SEM, CSE-A

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : COMPUTER ARCHITECTURE– 17CI06

L-T-P STRUCTURE : 3-1-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Dr.O.RAMA DEVI**

COURSE COORDINATOR : **Dr.O.RAMA DEVI**

PRE-REQUISITE: **DIGITAL LOGIC DESIGN**

COURSE OBJECTIVE:. Understand the basic functional modules of a computer system and their interconnection mechanism.Understand the data path and control path organization in a general purpose CPU. Get the design knowledge of main memory and cache memory systems.Explore the methods of communication between CPU and I/O devices. A case study on standard I/O interfaces.

COURSE OUTCOMES (CO)

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

CO1: Identify the sequence of micro operations in the execution of one macro instruction and thereby gain the concepts of control steps, Instruction cycle, Register structure of CPU, Types of micro operations and RTL.

CO2: Analyze the internal organization of CPU for performing Integer Arithmetic, Floating point Arithmetic and logical operations.

CO3: Understand the features of hardwired and micro programmed control units leading to the comparative study of control path organization in these types.

CO4: Analyze the memory hierarchy system and performance improvement by cache memory organization and its principles.

CO5: Analyze the communication methods of I/O devices and standard I/O interfaces.

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

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

CO5			2										1	

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

BOS APPROVED TEXT BOOKS:

T1 M.Morris Mano, "**Computer Systems Architecture**", Pearson Education publishers, 3rd edition, 1992.

T2 Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "**Computer Organization**", TMH publications, 5th edition, 2002.

BOS APPROVED REFERENCE BOOKS:

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

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

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

R4 John D Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 1st edition, 2001.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : Basic Computer Organization and Design

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
510.	Block Diagram of a Computer, Basic Functional Units of a Computer	1	17.06.2019		**TLM1**	CO1	T1	
511.	Computer Architecture Models	1	18.06.2019		**TLM1**	CO1	T2	
512.	Internal Organization of a Central Processing Unit	1	19.06.2019		**TLM1**	CO1	T1	
513.	Register Structure	1	21.06.2019		**TLM1**	CO1	T1	
514.	Introduction to Sequence of Micro operations	1	24.06.2019		**TLM1**	CO1	T1	
515.	Introduction to Control steps	1	25.06.2019		**TLM1**	CO1	T2	
516.	Register Transfer language	1	26.06.2019		**TLM1**	CO1	R1	
517.	Tutorial - 1	1	28.06.2019		**TLM3**	CO1	T1	
518.	Classification of Micro operations- Arithmetic Micro Operations	1	01.07.2019		**TLM1**	CO1	T1	
519.	Logic Micro Operations and Shift Micro Operations	1	02.07.2019		**TLM1**	CO1	T1	
520.	Instruction cycle Instruction Set	1	03.07.2019		**TLM1**	CO1	T1	
521.	Basic Computer Instructions	1	05.07.2019		**TLM1**	CO1	T1	
522.	Assignment / Quiz - 1	1	08.07.2019		**TLM6**	CO1	T1	

No. of classes required to complete UNIT-I	13			No. of classes taken:

UNIT-II: Central Processing Unit

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
523.	Instruction formats	1	08.07.2019		**TLM1**	CO2	T1	
524.	Addressing modes	1	09.07.2019		**TLM1**	CO2	T1	
525.	Example for Addressing modes	1	10.07.2019		**TLM1**	CO2	T1	
526.	Data Transfer and Manipulation Instructions,	1	12.07.2019		**TLM1**	CO2	T1	
527.	Logical Instructions, Program control Instructions,	1	15.07.2019		**TLM1**	CO2	T1	
528.	Data Representation	1	16.07.2019		**TLM1**	CO2	T1	
529.	Tutorial - 2	1	17.07.2019		**TLM3**	CO2	T1	
530.	Addition and Subtraction	1	19.07.2019		**TLM4**	CO2	T1	
531.	Multiplication Algorithms	1	22.07.2019		**TLM4**	CO2	T1	
532.	Booth Multiplication Algorithm	2	23.07.2019/ 24.07.2019		**TLM4**	CO2	T1	
533.	Division Algorithms	2	26.07.2019/ 29.07.2019		**TLM4**	CO2	T1	
534.	Floating Point Arithmetic operations	2	30.08.2019/ 31.08.2019		**TLM1**	CO2	T1	
535.	Assignment / Quiz - 2	1	02.08.2019		**TLM6**	CO2	T1	
No. of classes required to complete UNIT-II		16			No. of classes taken:			

UNIT-III: Control Unit

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
536.	Control Memory	1	13.08.2019		**TLM1**	CO3	T1	
537.	Hard wired control	1	14.08.2019		**TLM1**	CO3	T1	
538.	Micro programmed control	1	16.08.2019		**TLM1**	CO3	T1	
539.	Micro Instruction Format	2	19.08.2019/ 20.08.2019		**TLM1**	CO3	T1	
540.	Tutorial – 3	1	21.08.2019		**TLM3**	CO3	T1	
541.	Address Sequencing	1	23.08.2019/		**TLM1**	CO3	T1	

			26.08.2019					
542.	Design of Control Unit.	1	27.08.2019/ 28.08.2019		**TLM1**	CO3	T1	
543.	Assignment / Quiz-3	1	30.08.2019		**TLM6**	CO3	T1	
No. of classes required to complete UNIT-III		09			No. of classes taken:			

UNIT-IV: Memory Organization

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
544.	Memory Hierarchy	1	03.09.2019		**TLM1**	CO4	T1	
545.	Primary Memory	1	04-09-2019		**TLM1**	CO4	T1	
546.	Introduction to Secondary Memory	1	06-09-2019		**TLM1**	CO4	T1	
547.	Associative Memory	1	09-09-2019		**TLM1**	CO4	T1	
548.	Tutorial - 4	1	11-09-2019		**TLM3**	CO4	T1	
549.	Cache Memory	1	13-09-2019		**TLM1**	CO4	T1	
550.	Hit Ratio and Mapping Techniques	1	16-09-2019		**TLM1**	CO4	T1	
551.	Example Problems	1	17-09-2019		**TLM4**	CO4	T1	
552.	Assignment / Quiz - 4	1	18-09-2019		**TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V: Input-Output Organization and Standard Input Output Interfaces

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
553.	Peripheral Devices	1	20-09-2019		**TLM1**	CO5	T1	
554.	Modes of Transfer	1	23-09-2019		**TLM1**	CO5	T1	
555.	Priority Interrupt	1	24-09-2019		**TLM1**	CO5	T1	
556.	Direct Memory Access	1	25-09-2019		**TLM1**	CO5	T1	
557.	Input Output Processor.	1	27-09-2019		**TLM1**	CO5	T1	
558.	Tutorial - 5	1	30-09-2019		**TLM3**	CO5	T1	
559.	Input Output Interface	1	01-10-2019		**TLM1**	CO5	T1	
560.	Synchronous data transfer and Asynchronous Data Transfer	1	04-10-2019		**TLM1**	CO5	T1	

561.	Timing diagrams for Synchronous and Asynchronous data transfers	1	07-10-2019		**TLM1**	CO5	T1	
562.	Serial communication	1	09-10-2019		**TLM1**	CO5	T1	
563.	Assignment / Quiz - 5	1	11-10-2019		**TLM6**	CO5	T1	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
564.	Introduction to Small Computer System Interface (SCSI)	1	11-10-2019		**TLM1**	CO2	T2	
565.	Universal Serial Bus(USB)	1	11-10-2019		**TLM1**	CO4	T2	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	11-06-2018	28-07-2018	7W
I Mid Examinations	30-07-2018	04-08-2018	1W
II Phase of Instructions	06-08-2018	06-10-2018	9W
II Mid Examinations	08-10-2018	13-10-2018	1W
Preparation and Practicals	15-10-2018	27-10-2018	2W
Semester End Examinations	29-10-2018	10-11-2018	2W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10
II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5

Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

73. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
74. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
75. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
76. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
77. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
78. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

79. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

80. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

81. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

82. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

83. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

84. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.O.Rama Devi	Dr.O.Rama Devi	Dr. R.Chandrasekharam	Dr.Ch.Venkata Narayana

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, NAAC Accredited with 'A' grade, Accredited by NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-SEM, CSE-B

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : COMPUTER ARCHITECTURE– 17CI06

L-T-P STRUCTURE : 3-1-0

COURSE CREDITS : 3

COURSE INSTRUCTOR : **Dr.O.RAMA DEVI**

COURSE COORDINATOR : **Dr.O.RAMA DEVI**

PRE-REQUISITE: **DIGITAL LOGIC DESIGN**

COURSE OBJECTIVE:. Understand the basic functional modules of a computer system and their interconnection mechanism.Understand the data path and control path organization in a general purpose CPU. Get the design knowledge of main memory and cache memory systems.Explore the methods of communication between CPU and I/O devices. A case study on standard I/O interfaces.

COURSE OUTCOMES (CO)

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

CO1: Identify the sequence of micro operations in the execution of one macro instruction and thereby gain the concepts of control steps, Instruction cycle, Register structure of CPU, Types of micro operations and RTL.

CO2: Analyze the internal organization of CPU for performing Integer Arithmetic, Floating point Arithmetic and logical operations.

CO3: Understand the features of hardwired and micro programmed control units leading to the comparative study of control path organization in these types.

CO4: Analyze the memory hierarchy system and performance improvement by cache memory organization and its principles.

CO5: Analyze the communication methods of I/O devices and standard I/O interfaces.

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

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

CO5			2										1	

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

BOS APPROVED TEXT BOOKS:

T1 M.Morris Mano, "**Computer Systems Architecture**", Pearson Education publishers, 3rd edition, 1992.

T2 Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "**Computer Organization**", TMH publications, 5th edition, 2002.

BOS APPROVED REFERENCE BOOKS:

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

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

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

R4 John D Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 1st edition, 2001.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I : Basic Computer Organization and Design

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
566.	Block Diagram of a Computer, Basic Functional Units of a Computer	1	17.06.2019		**TLM1**	CO1	T1	
567.	Computer Architecture Models	1	18.06.2019		**TLM1**	CO1	T2	
568.	Internal Organization of a Central Processing Unit	1	20.06.2019		**TLM1**	CO1	T1	
569.	Register Structure	1	22.06.2019		**TLM1**	CO1	T1	
570.	Introduction to Sequence of Micro operations	1	24.06.2019		**TLM1**	CO1	T1	
571.	Introduction to Control steps	1	25.06.2019		**TLM1**	CO1	T2	
572.	Register Transfer language	1	27.06.2019		**TLM1**	CO1	R1	
573.	Tutorial - 1	1	29.06.2019		**TLM3**	CO1	T1	
574.	Classification of Micro operations- Arithmetic Micro Operations	1	01.07.2019		**TLM1**	CO1	T1	
575.	Logic Micro Operations and Shift Micro Operations	1	02.07.2019		**TLM1**	CO1	T1	
576.	Instruction cycle Instruction Set	1	04.07.2019		**TLM1**	CO1	T1	
577.	Basic Computer Instructions	1	04.07.2019		**TLM1**	CO1	T1	
578.	Assignment / Quiz - 1	1	06.07.2019		**TLM6**	CO1	T1	

No. of classes required to complete UNIT-I	14			No. of classes taken:

UNIT-II: Central Processing Unit

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
579.	Instruction formats	1	08.07.2019		**TLM1**	CO2	T1	
580.	Addressing modes	1	09.07.2019		**TLM1**	CO2	T1	
581.	Example for Addressing modes	1	11.07.2019		**TLM1**	CO2	T1	
582.	Data Transfer and Manipulation Instructions,	1	13.07.2019		**TLM1**	CO2	T1	
583.	Logical Instructions, Program control Instructions,	1	15.07.2019		**TLM1**	CO2	T1	
584.	Data Representation	1	16.07.2019		**TLM1**	CO2	T1	
585.	Tutorial - 2	1	18.07.2019		**TLM3**	CO2	T1	
586.	Addition and Subtraction	1	20.07.2019		**TLM4**	CO2	T1	
587.	Multiplication Algorithms	1	22.07.2019		**TLM4**	CO2	T1	
588.	Booth Multiplication Algorithm	2	23.07.2019/ 25.07.2019		**TLM4**	CO2	T1	
589.	Division Algorithms	2	27.07.2019/ 29.07.2019		**TLM4**	CO2	T1	
590.	Floating Point Arithmetic operations	2	30.08.2019/ 01.09.2019		**TLM1**	CO2	T1	
591.	Assignment / Quiz - 2	1	03.09.2019		**TLM6**	CO2	T1	
No. of classes required to complete UNIT-II		16			No. of classes taken:			

UNIT-III: Control Unit

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
592.	Control Memory	1	13.08.2019		**TLM1**	CO3	T1	
593.	Hard wired control	1	17.08.2019		**TLM1**	CO3	T1	
594.	Micro programmed control	1	19.08.2019		**TLM1**	CO3	T1	
595.	Micro Instruction Format	2	20.08.2019/ 22.08.2019		**TLM1**	CO3	T1	
596.	Tutorial – 3	1	26.08.2019		**TLM3**	CO3	T1	
597.	Address Sequencing	1	27.08.2019/		**TLM1**	CO3	T1	

			29.08.2019					
598.	Design of Control Unit.	1	31.08.2019/ 03.09.2019		**TLM1**	CO3	T1	
599.	Assignment / Quiz-3	1	05.09.2019		**TLM6**	CO3	T1	
No. of classes required to complete UNIT-III		08			No. of classes taken:			

UNIT-IV: Memory Organization

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
600.	Memory Hierarchy	1	07.09.2019		**TLM1**	CO4	T1	
601.	Primary Memory	1	09-09-2019		**TLM1**	CO4	T1	
602.	Introduction to Secondary Memory	1	12-09-2019		**TLM1**	CO4	T1	
603.	Associative Memory	1	14-09-2019		**TLM1**	CO4	T1	
604.	Tutorial - 4	1	16-09-2019		**TLM3**	CO4	T1	
605.	Cache Memory	1	17-09-2019		**TLM1**	CO4	T1	
606.	Hit Ratio and Mapping Techniques	1	19-09-2019		**TLM1**	CO4	T1	
607.	Example Problems	1	21-09-2019		**TLM4**	CO4	T1	
608.	Assignment / Quiz - 4	1	23-09-2019		**TLM6**	CO4	T1	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V: Input-Output Organization and Standard Input Output Interfaces

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
609.	Peripheral Devices	1	24-09-2019		**TLM1**	CO5	T1	
610.	Modes of Transfer	1	23-09-2019		**TLM1**	CO5	T1	
611.	Priority Interrupt	1	26-09-2019		**TLM1**	CO5	T1	
612.	Direct Memory Access	1	28-09-2019		**TLM1**	CO5	T1	
613.	Input Output Processor.	1	30-09-2019		**TLM1**	CO5	T1	
614.	Tutorial - 5	1	01-10-2019		**TLM3**	CO5	T1	
615.	Input Output Interface	1	03-10-2019		**TLM1**	CO5	T1	

616.	Synchronous data transfer and Asynchronous Data Transfer	1	05-10-2019		**TLM1**	CO5	T1	
617.	Timing diagrams for Synchronous and Asynchronous data transfers	1	07-10-2019		**TLM1**	CO5	T1	
618.	Serial communication	1	10-10-2019		**TLM1**	CO5	T1	
619.	Assignment / Quiz - 5	1	12-10-2019		**TLM6**	CO5	T1	
No. of classes required to complete UNIT-V		11			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
620.	Introduction to Small Computer System Interface (SCSI)	1	07-10-2019		**TLM1**	CO2	T2	
621.	Universal Serial Bus(USB)	1	10-10-2019		**TLM1**	CO4	T2	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	11-06-2018	28-07-2018	7W
I Mid Examinations	30-07-2018	04-08-2018	1W
II Phase of Instructions	06-08-2018	06-10-2018	9W
II Mid Examinations	08-10-2018	13-10-2018	1W
Preparation and Practicals	15-10-2018	27-10-2018	2W
Semester End Examinations	29-10-2018	10-11-2018	2W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment –1	1	A1=5
Assignment –2	2	A2=5
Quiz-1	1,2	B1=10
I-Mid Examination	1,2	C1=20
Assignment –3	3	A3=5
Assignment –4	4	A4=5
Assignment --5	5	A5=5
Quiz-2	3,4,5	B2=10

II-Mid Examination	3,4,5	C2=20
Evaluation of Assignment Marks: A=(A1+A2+A3+A4+A5)/5	1,2,3,4,5	A=5
Evaluation of Quiz Marks: B=75% of Max(B1,B2)+25% of Min(B1,B2)	1,2,3,4,5	B=10
Evaluation of Mid Marks: C=75% of Max(C1,C2)+25% of Min(C1,C2)	1,2,3,4,5	C=20
Attendance	-	D=5
Cumulative Internal Examination : A+B+C+D	**1,2,3,4,5**	**A+B+C+D=40**
Semester End Examinations	**1,2,3,4,5**	**E=60**
Total Marks: A+B+C+D+E	**1,2,3,4,5**	**100**

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

85. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
86. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
87. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
88. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
89. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
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assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

91. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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96. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products

Course Instructor	Course Coordinator	Module Coordinator	HOD
Dr.O.Rama Devi	Dr.O.Rama Devi	Dr. R.Chandrasekharam	Dr.Ch.Venkata Narayana

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech. III-Sem., CSE-A

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Statistical Programming with R Lab (17FE66)

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr.G.V.Suresh**

COURSE COORDINATOR : **Mr.G.V.Suresh**

PRE-REQUISITES: Basics of Mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world.

COURSE OUTCOMES (COs): At the end of the course, the student will be able to:
CO1: Apply the different distributions

CO2: Use statistical tests in testing hypotheses on data

CO3: Describe the properties of discrete and continuous distribution functions

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

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

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
	Cycle1:Introduction to R Programming	2	20/06/2019		TLM4/TLM5	CO1	
	Cycle 2: Getting Used to R: Describing Data	2	27/06/2019 04/07/2019		TLM4/TLM5	CO1	

	• Viewing and Manipulating Data • Plotting Data • Reading in Your Own Data						
4	Cycle 3: Visualizing Data Tables, charts and plots. Visualizing Measures of Central Tendency, Variation, and Shape. Box plots, Pareto diagrams. How to find the mean median standard deviation and quantiles of a set of observations	2	11/07/2019 18/07/2019		TLM4/TLM5	CO1	
5	Cycle 4: Probability Distributions. Generate and Visualize Discrete and continuous distributions using the statistical environment. Demonstration of CDF and PDF uniform and normal, binomial Poisson distributions.	2	25/07/2019 01/08/2019		TLM4/TLM5	CO1	
6	Cycle 5: Densities of Random Variables • Off the Shelf Distributions in R • Matching a Density to Data • More About Making Histograms	2	22/08/2019 29/08/2019		TLM4/TLM5	CO1	
7	Cycle 6: Binomial Distribution Study of binomial distribution. Plots of density and distribution functions. Normal approximation to the Binomial distribution	2	05/09/2019		TLM4/TLM5	CO1	
9	Cycle7: Building Confidence in Confidence Intervals • Populations Versus Samples • Large Sample Confidence Intervals • Simulating Data Sets • Evaluating the Coverage of Confidence Intervals	2	12/09/2019		TLM4/TLM5	CO2	
10	Cycle8: Perform Tests of Hypotheses How to perform tests of hypotheses about the mean when the variance is	2	19/09/2019		TLM4/TLM5	CO2	

	known. How to compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value						
11	Cycle9:Correlation How to calculate the correlation between two variables. How to make scatter plots. Use the scatterplot to investigate the relationship between two variables	2	26/09/2019		TLM4/TLM5	CO2	
12	Cycle 10 : Estimating a Linear Relationship • A Statistical Model for a Linear Relationship • Least Squares Estimates • The R Function lm • Scrutinizing the Residuals	2	03/10/2019		TLM4/TLM5	CO3	
15	**LAB INTERNAL**		10/10/2019				

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.

PEO2: Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.

PEO3: Work effectively as individuals and as team members in multidisciplinary projects.

PEO4: Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

97. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

98. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of

mathematics, natural sciences, and engineering sciences.

99. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

100. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

101. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

102. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

103. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

104. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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106. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

107. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

108. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO-a: Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power.

PSO b: Design and analyze electrical machines, modern drive and lighting systems

PSO c: Specify, design, implement and test analog and embedded signal processing electronic systems.

PSO d: Design controllers for electrical and electronic systems to improve their performance

Course Instructor	Course Coordinator	Module Coordinator	HOD

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech. III-Sem., CSE-B

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Statistical Programming with R Lab (17FE66)

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr.G.V.Suresh**

COURSE COORDINATOR : **Mr.G.V.Suresh**

PRE-REQUISITES: Basics of Mathematics

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course provides a solid undergraduate foundation in both probability theory and mathematical statistics and at the same time provides an indication of the relevance and importance of the theory in solving practical problems in the real world.

COURSE OUTCOMES (COs): At the end of the course, the student will be able to:
CO1: Apply the different distributions

CO2: Use statistical tests in testing hypotheses on data

CO3: Describe the properties of discrete and continuous distribution functions

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

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

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
	Cycle1:Introduction to R Programming	2	21/06/2019		TLM4/TLM5	CO1	
	Cycle 2: Getting Used to R: Describing Data Viewing and Manipulating Data Plotting Data Reading in Your Own Data	2	28/06/2019 05/07/2019		TLM4/TLM5	CO1	
4	Cycle 3: Visualizing Data Tables, charts and plots. Visualizing Measures of Central Tendency, Variation, and Shape. Box plots, Pareto diagrams. How to find the mean median standard deviation and quantiles of a set of observations	2	12/07/2019 19/07/2019		TLM4/TLM5	CO1	
5	Cycle 4: Probability Distributions. Generate and Visualize Discrete and continuous distributions using the statistical environment. Demonstration of CDF and PDF uniform and normal, binomial Poisson distributions.	2	26/07/2019 02/08/2019		TLM4/TLM5	CO1	
6	Cycle 5: Densities of Random Variables Off the Shelf Distributions in R Matching a Density to Data More About Making Histograms	2	16/08/2019 23/08/2019		TLM4/TLM5	CO1	

7	Cycle 6: Binomial Distribution Study of binomial distribution. Plots of density and distribution functions. Normal approximation to the Binomial distribution	2	30/09/2019		TLM4/TLM5	CO1	
9	Cycle7: Building Confidence in Confidence Intervals Populations Versus Samples Large Sample Confidence Intervals Simulating Data Sets Evaluating the Coverage of Confidence Intervals	2	06/09/2019		TLM4/TLM5	CO2	
10	Cycle8: Perform Tests of Hypotheses How to perform tests of hypotheses about the mean when the variance is known. How to compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value	2	13/09/2019		TLM4/TLM5	CO2	
11	Cycle9:Correlation How to calculate the correlation between two variables. How to make scatter plots. Use the scatterplot to investigate the relationship between two variables	2	27/09/2019		TLM4/TLM5	CO2	
12	Cycle 10 : Estimating a Linear Relationship A Statistical Model for a Linear Relationship Least Squares Estimates	2	04/10/2019		TLM4/TLM5	CO3	

	The R Function lm Scrutinizing the Residuals						
15	**LAB INTERNAL**		11/10/2019				

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Design and develop innovative products and services in the field of Electrical and Electronics Engineering and allied engineering disciplines.

PEO2: Apply the knowledge of Electrical and Electronics Engineering to solve problems of social relevance, pursue higher education and research.

PEO3: Work effectively as individuals and as team members in multidisciplinary projects.
PEO4: Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO-a: Specify, design and analyze systems that efficiently generate, transmit and distribute electrical power.

PSO b: Design and analyze electrical machines, modern drive and lighting systems
PSO c: Specify, design, implement and test analog and embedded signal processing electronic systems.

PSO d: Design controllers for electrical and electronic systems to improve their performance

Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

(Autonomous & Affiliated to JNTUK, Kakinada & Approved by AICTE, New Delhi, Accredited by NAAC & NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-A

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PYTHON PROGRAMMING LAB – 17CI62

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr.K.SUNDEEP SARADHI**

COURSE COORDINATOR : **Mr.K.SUNDEEP SARADHI**

PRE-REQUISITE: **C Programming**

COURSE OBJECTIVE:. Python course leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, sets, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

COURSE OUTCOMES (CO)

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

CO1: Identify various data structures available in Python and apply them in solving computational problems.

CO2: Design and implement programs to process data.

CO3: Explore the usage of exception handling and database interaction.

CO4: Improve individual / team work skills, communication & report writing skills with ethical values.

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

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
17CI62	CO1	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO2	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO3	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
1 = Slight (Low) 2 = Moderate (Medium) 3-Substantial(High)																

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

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
622.	Introduction to Python Interpreter	2	21.06.2019		TLM8	
623.	Basic programs	2	28.06.2019		TLM4 / TLM5	
624.	Exercise programs on basic control structures and loops	2	05.07.2019		TLM4 / TLM5	
625.	Exercise programs on operators and I/O operations	2	12.07.2019		TLM4 / TLM5	
626.	Exercise programs on Python Scripts	2	19.07.2019		TLM4 / TLM5	
627.	Exercise programs on Lists	2	26.07.2019		TLM4 / TLM5	
628.	Exercise programs on Strings	2	02.08.2019		TLM4 / TLM5	
629.	Exercise programs on Functions	2	16.08.2019		TLM4 / TLM5	
630.	Exercise programs on Recursion	2	23.08.2019		TLM4 / TLM5	
631.	Exercise programs on Parameter Passing Techniques	2	30.08.2019		TLM4 / TLM5	
632.	Exercise programs on Tuples	2	06.09.2019		TLM4 / TLM5	
633.	Exercise programs on Files	2	13.09.2019		TLM4 / TLM5	
634.	Exercise programs on Searching and Sorting.	2	20.09.2019		TLM4 / TLM5	
635.	Exercise programs on Sorting.	2	27.09.2019		TLM4 / TLM5	
636.	Exercise programs on Exception handling		04.10.2019		TLM4 / TLM5	
637.	Revision on Programs		11.10.2019		TLM4 / TLM5	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7W
I Mid Examinations	05-08-2019	10-08-2019	1W
II Phase of Instructions	12-08-2019	12-10-2019	9W
II Mid Examinations	14-10-2019	19-10-2019	1W

Preparation and Practicals	21-10-2019	31-10-2019	1½ W
Semester End Examinations	01-11-2019	16-11-2019	2W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

109. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

110. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

111. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

112. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

113. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

114. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional

engineering practice.

115. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

116. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

117. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

118. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

119. **Project management and finance**: Demonstrate knowledge and understanding of the enginee**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.

120. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., CSE-B

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : PYTHON PROGRAMMING LAB – 17CI62

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr.K.SUNDEEP SARADHI**

COURSE COORDINATOR : **Mr.K.SUNDEEP SARADHI**

PRE-REQUISITE: **C Programming**

COURSE OBJECTIVE:. Python course leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, sets, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

COURSE OUTCOMES (CO)

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

CO1: Identify various data structures available in Python and apply them in solving computational problems.

CO2: Design and implement programs to process data.

CO3: Explore the usage of exception handling and database interaction.

CO4: Improve individual / team work skills, communication & report writing skills with ethical values.

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

Course Code	COs	Programme Outcomes												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
17CI62	CO1	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO2	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO3	3	3	3	1	3	-	-	-	-	-	-	-	3	1	-
	CO4	-	-	-	-	-	-	-	2	2	2	-	-	-	-	-
1 = Slight (Low) **2 = Moderate (Medium)** **3-Substantial(High)**																

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

S.No.	Programs to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
638.	Introduction to Python Interpreter	2	19.06.2019		TLM8	
639.	Basic programs	2	26.06.2019		TLM4 / TLM5	
640.	Exercise programs on basic control structures and loops	2	03.07.2019		TLM4 / TLM5	
641.	Exercise programs on operators and I/O operations	2	10.07.2019		TLM4 / TLM5	
642.	Exercise programs on Python Scripts	2	17.07.2019		TLM4 / TLM5	
643.	Exercise programs on Lists	2	24.07.2019		TLM4 / TLM5	
644.	Exercise programs on Strings	2	31.07.2019		TLM4 / TLM5	
645.	Exercise programs on Functions	2	14.08.2019		TLM4 / TLM5	
646.	Exercise programs on Recursion	2	21.08.2019		TLM4 / TLM5	
647.	Exercise programs on Parameter Passing Techniques	2	28.08.2019		TLM4 / TLM5	
648.	Exercise programs on Tuples	2	04.09.2019		TLM4 / TLM5	
649.	Exercise programs on Files	2	11.09.2019		TLM4 / TLM5	
650.	Exercise programs on Searching and Sorting.	2	18.09.2019		TLM4 / TLM5	
651.	Exercise programs on Sorting.	2	25.09.2019		TLM4 / TLM5	
652.	Exercise programs on Exception handling	2	09.10.2019		TLM4 / TLM5	

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	17-06-2019	03-08-2019	7W
I Mid Examinations	05-08-2019	10-08-2019	1W
II Phase of Instructions	12-08-2019	12-10-2019	9W
II Mid Examinations	14-10-2019	19-10-2019	1W
Preparation and Practicals	21-10-2019	31-10-2019	1½ W
Semester End Examinations	01-11-2019	16-11-2019	2W

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

121. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

122. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

123. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

124. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

125. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

126. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

127. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental

contexts, and demonstrate the knowledge of, and need for sustainable development.

128. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

129. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

130. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

131. **Project management and finance**: Demonstrate knowledge and understanding of the engineer**ing and management principles and apply these to one's own work, as a member and** leader in a team, to manage projects and in multidisciplinary environments.

132. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HOD
K.Sundeep Saradhi	K.Sundeep Saradhi	Dr. D.Veeraiah	Dr.Ch.Venkata Narayana

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L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., III-Sem., CSE - A

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Data Structures Lab- 17CI63

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr. L V Krishna rao**

COURSE COORDINATOR : **Dr. R Chandra sekharam**

PRE-REQUISITES: C language

COURSE EDUCATIONAL OBJECTIVES (CEOs): To make students familiar with writing algorithms to implement operations involved in different data structures like linked list & different types of trees and implement various searching and sorting techniques.

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

CO1: Implement & test the performance of data structures like linked list, stacks & queues .

CO2: Implement & test the performance of searching & sorting techniques.

CO3: Implement & test the performance of trees and graph traversal techniques.

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

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

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

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1	Practice session on Arrays, structures and pointers Practice session on Dynamic Memory allocation.	2	18-06-19		TLM4/TLM5	CO1	
2	Write a C program to implement various operations on List using arrays. Write a C program to implement various operations on Single linked List using pointers.	2	25-07-19		TLM4/TLM5	CO1	
3	Write an interactive C program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.	2	02-07-19		TLM4/TLM5	CO1	
4	Write a C program to create a circular linked list so that the input order of data items is maintained. Add the following functions to carry out the following operations on circular single linked lists. a) Count the number of nodes. b) insert a node c) delete a node	2	09-07-19		TLM4/TLM5	CO1	
5	Write a C program that will remove a specified node from a given doubly linked list and insert it at the end of the list on an existing list. Also write a function to display the contents of the list. Write a C program to implement a stack using array &linked list in which Push, Pop and display can be performed.	2	16-07-19		TLM4/TLM5	CO1	
6	Write a program to convert infix expression to post fix expressions using array implementation of stack Write a program for evaluating post fix expressions using array 2implementation of stack	2	23-07-19		TLM4/TLM5	CO1	
7	Write a C program to implement a queue using arrays and linked list in which insertions, deletions and display can be performed.	2	30-07-19		TLM4/TLM5	CO1	

8	Write a C program to implement insertion sort& shell sort	2	06-08-19		TLM4/TLM5	CO2	
9	Write a C program to implement Selection sort. Write a C Program to implement Merge Sort	2	13-08-19		TLM4/TLM5	CO2	
10	Sort a sequence of n integers using Quick sort technique and then search for a key in the sorted array using Binary search, linear search techniques.	2	20-08-19		TLM4/TLM5	CO2	
11	Write a C program to Heap sort	2	27-08-19		TLM4/TLM5	CO2	
12	Write a C program to construct a binary tree and do inorder, preorder and post order traversals, printing the sequence of nodes visited in each case.	2	03-09-19		TLM4/TLM5	CO3	
13	Write a C program to implement BST operations- insert, search and delete	2	17-09-19		TLM4/TLM5	CO3	
14	Write a C program to implement the following graph Traversals a) DFS b) BFS	2	24-09-19		TLM4/TLM5	CO3	
15	**Lab Internal Examination**		01-10-19				

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

133. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.

134. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

135. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

136. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

137. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

138. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

139. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

140. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms ofthe engineering practice.

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comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

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Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

	Course Instructor	**Course Coordinator**	**Module Coordinator**	**Head of the Department**
Name of the Faculty	Mr L V Krishna rao	Dr R Chandra Sekharam	Dr. D Veeraiah	Dr. Ch. Venkata Narayana
Signature				

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Autonomous &Affiliated to JNTUK, Kakinada& Approved by AICTE, New Delhi, Accredited by NAAC and NBA, Certified by ISO 9001:2015)
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., III-Sem., CSE-B

ACADEMIC YEAR : 2019-20

COURSE NAME & CODE : Data Structures Lab- 17CI63

L-T-P STRUCTURE : 0-0-2

COURSE CREDITS : 1

COURSE INSTRUCTOR : **Mr. L V Krishna rao**

COURSE COORDINATOR : **Dr. R Chandra sekharam**

PRE-REQUISITES: C language

COURSE EDUCATIONAL OBJECTIVES (CEOs): To make students familiar with writing algorithms to implement operations involved in different data structures like linked list & different types of trees and implement various searching and sorting techniques.

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

CO1: Implement & test the performance of data structures like linked list, stacks & queues .

CO2: Implement & test the performance of searching & sorting techniques.

CO3: Implement & test the performance of trees and graph traversal techniques.

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

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

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

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	HOD Sign Weekly
1	Practice session on Arrays, structures and pointers	2	20-06-19		TLM4/TLM5	CO1	
2	Practice session on Dynamic Memory allocation.	2	27-06-19		TLM4/TLM5	CO1	
3	Write a C program to implement various operations on List using arrays. Write a C program to implement various operations on Single linked List using pointers.	2	04-07-19		TLM4/TLM5	CO1	
4	Write an interactive C program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.	2	11-07-19		TLM4/TLM5	CO1	
5	Write a C program to create a circular linked list so that the input order of data items is maintained. Add the following functions to carry out the following operations on circular single linked lists. a) Count the number of nodes. b) insert a node c) delete a node	2	18-07-19		TLM4/TLM5	CO1	
6	Write a C program that will remove a specified node from a given doubly linked list and insert it at the end of the list on an existing list. Also write a function to display the contents of the list. Write a C program to implement a stack using array &linked list in which Push, Pop and display can be performed.	2	25-07-19		TLM4/TLM5	CO1	
7	Write a program to convert infix expression to post fix expressions using array implementation of stack Write a program for evaluating	2	01-08-19		TLM4/TLM5	CO1	

	post fix expressions using array 2implementation of stack						
8	Write a C program to implement a queue using arrays and linked list in which insertions, deletions and display can be performed.	2	08-08-19		TLM4/TLM5	CO1	
9	Write a C program to implement insertion sort& shell sort	2	22-08-19		TLM4/TLM5	CO2	
10	Write a C program to implement Selection sort. Write a C Program to implement Merge Sort	2	29-08-19		TLM4/TLM5	CO2	
11	Sort a sequence of n integers using Quick sort technique and then search for a key in the sorted array using Binary search, linear search techniques.	2	05-09-19		TLM4/TLM5	CO2	
12	Write a C program to Heap sort	2	12-09-19		TLM4/TLM5	CO2	
13	Write a C program to construct a binary tree and do inorder, preorder and post order traversals, printing the sequence of nodes visited in each case.	2	19-09-19		TLM4/TLM5	CO3	
14	Write a C program to implement BST operations-insert, search and delete	2	26-09-19		TLM4/TLM5	CO3	
15	Write a C program to implement the following graph Traversals a) DFS b) BFS	2	03-10-19		TLM4/TLM5	CO3	
	Lab Internal Examination		10-10-19				

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

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

145. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.

146. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

147. **Design/development of solutions**: Design solutions for complex engineering problems anddesign system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

148. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

149. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

150. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

151. **Environment and sustainability**: Understand the impact of the professional engineering solutionsin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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