

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., A-SECTION
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: NUMERICAL METHODS AND FOURIER ANALYSIS
L-T-P STRUCTURE	: 4-1-0
COURSE CREDITS	: 4
COURSE INSTRUCTOR	: Dr. A. Rami Reddy
COURSE COORDINATOR	: Y.P.C.S. Anil Kumar
PRE-REQUISITES	: None

COURSE EDUCATIONAL OBJECTIVES (CEOs): The main objective of this course is to enable the students learn numerical techniques for solving the equations, interpolation, differential equations and fitting of various curves. They will also learn about the Fourier analysis of single valued functions.

COURSE OUTCOMES (COs): After completion of the course, the student will be able to

- CO1:. Compare the rate of accuracy between various methods and approximating the root of the equation and distinguish among the criteria of section and procedures of various numerical integration rules.
- CO2: Estimate the best fit polynomial for the given tabulated data using the methods of Newton's interpolation formulae and Lagrange's interpolation.
- CO3: Apply various numerical methods in solving the initial value problem involving the ordinary differential equations.
- CO4: Estimate the unknown dependent variable using curve fitting methods.
- CO5: Generate the single valued functions in the form of Fourier series and obtained the Fourier Transforms.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2								1
CO2	3	2		2								1
CO3	3	2		2								1
CO4	3	2		2								1
CO5	3	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 S.S. Sastry, "Introductory methods of numerical analysis", 5th Edition, PHI, New Delhi, 2005

T2 Dr. B. V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

BOS APPROVED REFERENCE BOOKS:

- R1** Dr. B.S. Grewal, “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, New Delhi, 2012.
- R2** Steven. C. Chopra, Ra. P. Canale, “Numerical methods for engineers with programming and software application”, 4th edition, TMH, New Delhi, 2002.
- R3** M. K. Jain, S. R. K. Iyengar, M. K. Jain, “Numerical methods for scientific and engineering computation”, 5th Edition, New Age International Publishers, New Delhi, 2007

Part-B**COURSE DELIVERY PLAN (LESSON PLAN):****UNIT-I: Solution of Algebraic and Transcendental equations and Numerical Integration**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	12/6/18		TLM1			
2.	Course outcomes	1	13/6/18		TLM1			
3.	Algebraic and Transcendental Equation	1	15/6/18		TLM1	CO1	T1,T2	
4.	False Position method	2	19/6/18 20/6/18		TLM1	CO1	T1,T2	
5.	Newton- Raphson Method in one variable	2	22/6/18 23/6/18		TLM1	CO1	T1,T2	
6.	Numerical integration & Trapezoidal rule	1	26/6/18		TLM1	CO1	T1,T2	
7.	Simpson’s 1/3 Rule	2	27/6/18 30/6/18		TLM1	CO1	T1,T2	
8.	Simpson’s 3/8 Rule.	2	3/7/18 4/7/18		TLM1	CO1	T1,T2	
9.	TUTORIAL-1	1	29/6/18		TLM3	CO1	T1,T2	
10.	TUTORIAL-2	1	6/7/18		TLM3	CO1	T1,T2	
11.	Assignment/Quiz-1	1	7/7/18		TLM6	CO1	T1,T2	
No. of classes required to complete UNIT-I		15				No. of classes taken:		

UNIT-II: Interpolation and Finite Differences

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Introduction – Finite differences	1	10/7/18		TLM1	CO2	T1,T2	
13.	Forward Differences- Backward differences –Central differences	1	11/7/18		TLM1	CO2	T1,T2	
14.	Symbolic relations and separation of symbols	1	13/7/18		TLM1	CO2	T1,T2	

15.	Newton's formulae for interpolation	3	14/7/18 17/7/18 18/7/18		TLM1	CO2	T1,T2	
16.	Lagrange's Interpolation	2	21/7/18 24/7/18		TLM1	CO2	T1,T2	
17.	Problems	1	25/7/18		TLM1	CO2	T1,T2	
18.	TUTORIAL-3	1	20/7/18		TLM3	CO2	T1,T2	
19.	TUTORIAL-4	1	27/7/18		TLM3	CO2	T1,T2	
20.	Assignment/Quiz-2	1	28/7/18		TLM6	CO2	T1,T2	
No. of classes required to complete UNIT-II		12				No. of classes taken:		

UNIT-III: Numerical solution of Ordinary Differential Equations

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
21.	Introduction to Unit-III	1	7/8/18		TLM1	CO3	T1,T2	
22.	Solution by Taylor's series	1	8/8/18		TLM1	CO3	T1,T2	
23.	Picard's Method	1	10/8/18		TLM1	CO3	T1,T2	
24.	Euler's Method	1	11/8/18		TLM1	CO3	T1,T2	
25.	Modified Euler's Method	1	14/8/18		TLM1	CO3	T1,T2	
26.	Runge- Kutta Method	2	18/8/18 21/8/18		TLM1	CO3	T1,T2	
27.	TUTORIAL-5	1	17/8/18		TLM3	CO3	T1,T2	
28.	TUTORIAL-6	1	24/8/18		TLM3	CO3	T1,T2	
29.	Assignment/Quiz-3	1	25/8/18		TLM6	CO3	T1,T2	
No. of classes required to complete UNIT-III		10				No. of classes taken:		

UNIT-IV: Curve Fitting

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
30.	Introduction to UNIT IV	1	28/8/18		TLM1	CO4	T1,T2	
31.	Fitting of a Straight line	1	29/8/18		TLM1	CO4	T1,T2	
32.	Fitting of a second degree polynomial	2	1/9/18 4/9/18		TLM1	CO4	T1,T2	
33.	Fitting of exponential curves	1	5/9/18		TLM1	CO4	T1,T2	
34.	Fitting of a power curve	1	8/9/18		TLM1	CO4	T1,T2	
35.	TUTORIAL-7	1	31/8/18		TLM3	CO4	T1,T2	
36.	TUTORIAL-8	1	7/9/18		TLM3	CO4	T1,T2	
37.	Assignment/Quiz-4	1	11/9/18		TLM6	CO4	T1,T2	
No. of classes required to complete UNIT-IV		9				No. of classes taken:		

UNIT-V: Fourier series and Fourier Transforms

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
38.	Introduction to UNIT V	1	12/9/18		TLM1	CO5	T1,T2	
39.	Determination of Fourier coefficients	1	15/9/18		TLM1	CO5	T1,T2	
40.	Even and Odd Functions	1	18/9/18		TLM1	CO5	T1,T2	
41.	Fourier Cosine and Sine Series	1	19/9/18		TLM1	CO5	T1,T2	
42.	Fourier Series in an arbitrary interval	1	22/9/18		TLM1	CO5	T1,T2	
43.	Half-range Sine and Cosine series	1	25/9/18		TLM1	CO5	T1,T2	
44.	Half-range series in an arbitrary interval	1	26/9/18		TLM1	CO5	T1,T2	
45.	Fourier Integral theorem, Fourier sine and cosine integrals	1	29/9/18		TLM1	CO5	T1,T2	
46.	Fourier Transform, Inverse Transform	1	3/10/18		TLM1	CO5	T1,T2	
47.	Sine and cosine transforms, Properties	1	5/10/18		TLM1	CO5	T1,T2	
48.	TUTORIAL-9	1	14/9/18		TLM3	CO5	T1,T2	
49.	TUTORIAL-10	1	28/9/18		TLM3	CO5	T1,T2	
50.	Assignment/Quiz-5	1	6/10/18		TLM6	CO5	T1,T2	
No. of classes required to complete UNIT-V		13			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
51.	Finite Fourier Transforms				TLM1		T1,T2	

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COURSE CREDITS	: 4
COURSE INSTRUCTOR	: Dr. K.R. Kavitha
COURSE COORDINATOR	: Y.P.C.S. Anil Kumar
PRE-REQUISITES:	Nil

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COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1:. Compare the rate of accuracy between various methods and approximating the root of the equation and distinguish among the criteria of section and procedures of various numerical integration rules.

CO2: Estimate the best fit polynomial for the given tabulated data using the methods of Newton's interpolation formulae and Lagrange's interpolation.

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CO4: Estimate the unknown dependent variable using curve fitting methods.

CO5: Generate the single valued functions in the form of Fourier series and obtained the Fourier Transforms.

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

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2								1
CO2	3	2		2								1
CO3	3	2		2								1
CO4	3	2		2								1
CO5	3	2										1

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

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Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	11/06/18		TLM1			
2.	Course outcomes	1	12/06/18		TLM1			

UNIT-I: Solution of Algebraic and Transcendental equations and Numerical Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
3.	Algebraic and Transcendental Equation	1	14/06/18		TLM1	CO1	T1,T2	
4.	False Position method	1	18/06/18		TLM1	CO1	T1,T2	
5.	Newton- Raphson Method in one variable	1	19/06/18		TLM1	CO1	T1,T2	
6.	Related problems	1	21/06/18		TLM1	CO1	T1,T2	
7.	TUTORIAL-1	1	23/06/18		TLM3	CO1	T1,T2	
8.	Numerical integration	1	25/06/18		TLM1	CO1	T1,T2	
9.	Trapezoidal rule	1	26/06/18		TLM1	CO1	T1,T2	
10.	Simpson’s 1/3 Rule	1	28/06/18		TLM1	CO1	T1,T2	
11.	TUTORIAL-2	1	30/06/18		TLM3	CO1	T1,T2	
12.	Simpson’s 3/8 Rule.	1	02/07/18		TLM1	CO1	T1,T2	
13.	Related problems	1	03/07/18		TLM1	CO1	T1,T2	
14.	Assignment/Quiz-I	1	05/07/18		TLM6	CO1	T1,T2	
No. of classes required to complete UNIT-I		12		No. of classes taken:				

UNIT-II: Interpolation and Finite Differences

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
15.	Introduction – Finite differences	1	07/07/18		TLM1	CO2	T1,T2	
16.	Forward Differences-Backward differences –Central differences	1	09/07/18		TLM1	CO2	T1,T2	
17.	Symbolic relations and separation of symbols	1	10/07/18		TLM1	CO2	T1,T2	
18.	Newton’s formulae for forward interpolation	1	12/07/18		TLM1	CO2	T1,T2	

19.	TUTORIAL-3	1	14/07/18		TLM3	CO2	T1,T2	
20.	Newton's formulae for backward interpolation	1	16/07/18 17/07/18		TLM1	CO2	T1,T2	
21.	Related Problems	1	19/07/18		TLM1	CO2	T1,T2	
22.	TUTORIAL-4	1	21/07/18		TLM3	CO2	T1,T2	
23.	Lagrange's Interpolation	1	24/07/18		TLM1	CO2	T1,T2	
24.	Related Problems	1	26/07/18		TLM2	CO2	T1,T2	
25.	Assignment /Quiz-2	1	28/07/18		TLM6	CO2	T1,T2	
No. of classes required to complete UNIT-II		11			No. of classes taken:			

UNIT-III: Numerical solution of Ordinary Differential Equations

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
26.	Introduction to Unit-III	1	06/08/18		TLM1	CO3	T1,T2	
27.	Solution by Taylor's series	1	07/08/18		TLM1	CO3	T1,T2	
28.	Picard's Method	1	09/08/18		TLM1	CO3	T1,T2	
29.	TUTORIAL-5	1	11/08/18		TLM3	CO3	T1,T2	
30.	Euler's Method	1	13/08/18		TLM1	CO3	T1,T2	
31.	Modified Euler's Method	1	14/08/18		TLM1	CO3	T1,T2	
32.	Modified Euler's Method	1	16/08/18		TLM1	CO3	T1,T2	
33.	TUTORIAL-6	1	18/08/18		TLM3	CO3	T1,T2	
34.	Runge- Kutta Method	1	20/08/18		TLM1	CO3	T1,T2	
35.	Runge- Kutta Method	1	21/08/18		TLM1	CO3	T1,T2	
36.	Assignment /Quiz-3	1	23/08/18		TLM6	CO3	T1,T2	
No. of classes required to complete UNIT-III		11			No. of classes taken:			

UNIT-IV: Curve Fitting

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
37.	Introduction to UNIT IV	1	25/08/18		TLM1	CO4	T1,T2	
38.	Fitting of a Straight line	1	27/08/18		TLM1	CO4	T1,T2	
39.	Fitting of a second degree polynomial	1	28/08/18		TLM1	CO4	T1,T2	
40.	Fitting of a second degree polynomial	1	30/08/18		TLM1	CO4	T1,T2	
41.	TUTORIAL-7	1	31/08/18		TLM3	CO4	T1,T2	
42.	Fitting of exponential curves	1	04/09/18		TLM1	CO4	T1,T2	
43.	Fitting of exponential curves	1	06/09/18		TLM1	CO4	T1,T2	

44.	TUTORIAL-8	1	08/09/18		TLM3	CO4	T1,T2	
45.	Fitting of a power curve	1	10/09/18		TLM1	CO4	T1,T2	
46.	Assignment/Quiz-4	1	11/09/18		TLM6	CO4	T1,T2	
No. of classes required to complete UNIT-IV		10			No. of classes taken:			

UNIT-V: Fourier Series and Fourier Transforms

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.	Introduction to UNIT V	1	15/09/18		TLM1	CO5	T1,T2	
48.	Determination of Fourier coefficients	1	17/09/18		TLM1	CO5	T1,T2	
49.	Even and Odd Functions, Fourier Series	1	18/09/18		TLM1	CO5	T1,T2	
50.	Fourier Cosine and Sine Series	2	20/09/18		TLM1	CO5	T1,T2	
51.	TUTORIAL – 9	1	22/09/18		TLM3	CO5	T1,T2	
52.	Fourier Series in an arbitrary interval	1	24/09/18		TLM1	CO5	T1,T2	
53.	Half-range Sine and Cosine series, Half-range series in arbitrary interval.	1	25/09/18		TLM1	CO5	T1,T2	
54.	Fourier Integral theorem, Fourier Transform	1	27/09/18		TLM1	CO5	T1,T2	
55.	TUTORIAL - 10	1	29/09/18		TLM3	CO5	T1,T2	
56.	Sine and cosine Transforms, Inverse Transform.	1	01/10/18		TLM1	CO5	T1,T2	
57.	Assignment/Quiz-5	1	04/09/18		TLM6	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
58.	Finite Fourier Transforms	1	06/10/18		TLM1		T1,T2	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
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TLM2	PPT	TLM6	Assignment or Quiz
TLM3	Tutorial	TLM7	Group Discussion/Project
TLM4	Demonstration (Lab/Field Visit)		

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: $A = \text{Avg}(\text{Best of Four}(A1, A2, A3, A4, A5))$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B = 75\% \text{ of Max}(B1, B2) + 25\% \text{ of Min}(B1, B2)$	1,2,3,4,5	B=20
Evaluation of Online Quiz Marks: $C = 75\% \text{ of Max}(C1, C2) + 25\% \text{ of Min}(C1, C2)$	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 OUTCOMES (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dr. K.R. Kavitha	Y.P.C.S. Anil Kumar	Dr. A.Rami Reddy	Dr. A.Rami Reddy
Course Instructor	Course Coordinator	Module Coordinator	HOD

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PRE-REQUISITES	: None

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CO5: Generate the single valued functions in the form of Fourier series and obtained the Fourier Transforms.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		2								1
CO2	3	2		2								1
CO3	3	2		2								1
CO4	3	2		2								1
CO5	3	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 S.S. Sastry, "Introductory methods of numerical analysis", 5th Edition, PHI, New Delhi, 2005

T2 Dr. B. V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH, New Delhi, 2010.

BOS APPROVED REFERENCE BOOKS:

R1 Dr. B.S. Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, New Delhi, 2012.

R2 Steven. C. Chopra, Ra. P. Canale, "Numerical methods for engineers with programming and software application", 4th edition, TMH, New Delhi, 2002.

R3 M. K. Jain, S. R. K. Iyengar, M. K. Jain, "Numerical methods for scientific and engineering computation", 5th Edition, New Age International Publishers, New Delhi, 2007

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I: Solution of Algebraic and Transcendental equations and Numerical Integration

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the course	1	11/6/18		TLM1			
2.	Course outcomes	1	12/6/18		TLM1			
3.	Algebraic and Transcendental Equation	1	14/6/18		TLM1	CO1	T1,T2	
4.	False Position method	2	15/6/18 18/6/18		TLM1	CO1	T1,T2	
5.	Newton- Raphson Method in one variable	2	19/6/18 21/6/18		TLM1	CO1	T1,T2	
6.	Numerical integration & Trapezoidal rule	1	22/6/18		TLM1	CO1	T1,T2	
7.	Simpson's 1/3 Rule	2	25/6/18 28/6/18		TLM1	CO1	T1,T2	
8.	Simpson's 3/8 Rule.	2	29/6/18 2/7/18		TLM1	CO1	T1,T2	
9.	TUTORIAL-1	1	26/6/18		TLM3	CO1	T1,T2	
10.	TUTORIAL-2	1	3/7/18		TLM3	CO1	T1,T2	
11.	Assignment/Quiz-1	1	5/7/18		TLM6	CO1	T1,T2	
No. of classes required to complete UNIT-I		15				No. of classes taken:		

UNIT-II: Interpolation and Finite Differences

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Introduction – Finite differences	1	6/7/18		TLM1	CO2	T1,T2	
13.	Forward Differences-Backward differences –Central differences	1	9/7/18		TLM1	CO2	T1,T2	
14.	Symbolic relations and separation of symbols	1	10/7/18		TLM1	CO2	T1,T2	
15.	Newton's formulae for interpolation	3	12/7/18 13/7/18 16/7/18		TLM1	CO2	T1,T2	
16.	Lagrange's Interpolation	2	19/7/18 20/7/18		TLM1	CO2	T1,T2	
17.	Problems	1	23/7/18		TLM1	CO2	T1,T2	
18.	Revision	1	26/7/18		TLM1	CO2	T1,T2	
19.	TUTORIAL-3	1	17/7/18		TLM3	CO2	T1,T2	

20.	TUTORIAL-4	1	24/7/18		TLM3	CO2	T1,T2	
21.	Assignment/Quiz-2	1	27/7/18		TLM6	CO2	T1,T2	
No. of classes required to complete UNIT-II		13			No. of classes taken:			

UNIT-III: Numerical solution of Ordinary Differential Equations

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
22.	Introduction to Unit-III	1	6/8/18		TLM1	CO3	T1,T2	
23.	Solution by Taylor's series	1	7/8/18		TLM1	CO3	T1,T2	
24.	Picard's Method	1	9/8/18		TLM1	CO3	T1,T2	
25.	Euler's Method	1	10/8/18		TLM1	CO3	T1,T2	
26.	Modified Euler's Method	1	13/8/18		TLM1	CO3	T1,T2	
27.	Runge- Kutta Method	2	16/8/18 17/8/18		TLM1	CO3	T1,T2	
28.	TUTORIAL-5	1	14/8/18		TLM3	CO3	T1,T2	
29.	TUTORIAL-6	1	21/8/18		TLM3	CO3	T1,T2	
30.	Assignment/Quiz-3	1	20/8/18		TLM6	CO3	T1,T2	
No. of classes required to complete UNIT-III		10			No. of classes taken:			

UNIT-IV: Curve Fitting

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
31.	Introduction to UNIT IV	1	23/8/18		TLM1	CO4	T1,T2	
32.	Fitting of a Straight line	1	24/8/18		TLM1	CO4	T1,T2	
33.	Fitting of a second degree polynomial	2	27/8/18 30/8/18		TLM1	CO4	T1,T2	
34.	Fitting of exponential curves	1	31/8/18		TLM1	CO4	T1,T2	
35.	Fitting of a power curve	1	6/9/18		TLM1	CO4	T1,T2	
36.	TUTORIAL-7	1	28/8/18		TLM3	CO4	T1,T2	
37.	TUTORIAL-8	1	4/9/18		TLM3	CO4	T1,T2	
38.	Assignment/Quiz-4	1	7/9/18		TLM6	CO4	T1,T2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V: Fourier series and Fourier Transforms

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
39.	Determination of Fourier coefficients	1	10/9/18		TLM1	CO5	T1,T2	

40.	Even and Odd Functions	1	11/9/18		TLM1	CO5	T1,T2		
41.	Fourier Cosine and Sine Series	1	14/9/18		TLM1	CO5	T1,T2		
42.	Fourier Series in an arbitrary interval	1	17/9/18		TLM1	CO5	T1,T2		
43.	Half-range Sine and Cosine series	1	20/9/18		TLM1	CO5	T1,T2		
44.	Half-range series in an arbitrary interval	1	24/9/18		TLM1	CO5	T1,T2		
45.	Fourier Integral theorem, Fourier sine and cosine integrals	1	27/9/18		TLM1	CO5	T1,T2		
46.	Fourier Transform, Inverse Transform	1	28/9/18		TLM1	CO5	T1,T2		
47.	Sine and cosine transforms, Properties	1	1/10/18		TLM1	CO5	T1,T2		
48.	TUTORIAL-9	1	4/10/18		TLM3	CO5	T1,T2		
49.	TUTORIAL-10	1	18/9/18		TLM3	CO5	T1,T2		
50.	Assignment/Quiz-5	1	25/9/18		TLM6	CO5	T1,T2		
No. of classes required to complete UNIT-V		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
51.	Finite Fourier Transforms	1	5/10/18		TLM1		T1,T2	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM2	PPT	TLM6	Assignment or Quiz
TLM3	Tutorial	TLM7	Group Discussion/Project
TLM4	Demonstration (Lab/Field Visit)		

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)

PROGRAMME OUTCOMES (POs)

PSOs

Course Instructor	Course Coordinator	Module Coordinator	HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., I-Sem., ECE
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : COMPUTER PROGRAMMING – 17C101
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Dr.P.ASHOK REDDY
COURSE COORDINATOR : Dr.P.ASHOK REDDY
PRE-REQUISITE: NIL

COURSE OBJECTIVE: In this Course student will learn about- The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures. The derived data types like arrays, strings, various operations on them. Modular programming using functions and Memory management using pointers. User defined structures and various operations on it. The basics of files and its I/O operations.

COURSE OUTCOMES (CO):

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

CO1: Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and in view of using them in problem solving.

CO2: Apply various operations on derived data types like arrays and strings in problem solving.

CO3: Design and Implement Modular Programming and memory management using pointers.

CO4: Implement user defined data structures used in specific applications.

CO5: Compare different file I/O operations on text and binary files.

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	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	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 Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

BOS APPROVED REFERENCE BOOKS:

R1 N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010

R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

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
1.	Introduction to problem solving, problem specifications	1	11-06-2018		1,4,5	CO1	T1,R1	
2.	Algorithm / pseudo code, flowchart <i>Tutorial-1</i>	1	13-06-2018		1,4,5	CO1	T1,R1	
3.	Algorithm examples and flowchart examples	1	14-06-2018		1,4,5	CO1	T1,R1	
4.	Introduction to C- Programming, Structure of C program	1	16-06-2018		1,4,5	CO1	T1,R1	
5.	Identifiers, basic data types and sizes, Constants variables	1	18-06-2018		1,4,5	CO1	T1,R1	
6.	Input-output statements, A sample c program <i>Tutorial-2</i>	1	20-06-2018		1,4,5	CO1	T1,R1	
7.	Arithmetic, relational and logical operators with examples	1	21-06-2018		1,4,5	CO1	T1,R1	
8.	Increment and decrement operators, conditional operator with sample programs	1	23-06-2018		1,4,5	CO1	T1,R1	
9.	Bit-wise operators, assignment operators, expressions with sample programs	1	25-06-2018		1,4,5	CO1	T1,R1	
10.	Type conversions, conditional expressions, precedence of operators and order of evaluation With sample programs	1	27-06-2018		1,4,5	CO1	T1,R1	
11.	Conditional statements: if, if else, else if ladder with sample programs	1	28-06-2018		1,4,5	CO1	T1,R1	
12.	Switch statements, continue with sample code <i>Tutorial-3</i>	1	30-06-2018		1,4,5	CO1	T1,R1	

13.	goto and labels with sample code	1	02-07-2018		1,4,5	CO1	T1,R1	
14.	Loops: while, do-while	1	04-07-2018		1,4,5	CO1	T1,R1	
15.	Sample programs on while, do-while <i>Tutorial-4</i>	1	05-07-2018		1,4,5	CO1	T1,R1	
16.	For statement with example programs	1	07-07-2018		1,4,5	CO1	T1,R1	
17.	Break, programming examples	1	09-07-2018		1,4,5	CO1	T1,R1	
18.	Assignment/Quiz-1 <i>Tutorial-5</i>	1	11-07-2018		3,6	CO1	T1,R1	
No. of classes required to complete UNIT-I		17			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction to Arrays concept	1	12-07-2018		1,4,5	CO2	T1,R1	
20.	one dimensional arrays declaration, definition, accessing elements, storing elements	1	16-07-2018		1,4,5	CO2	T1,R1	
21.	Two dimensional and multi-dimensional arrays <i>Tutorial-6</i>	1	18-07-2018		1,4,5	CO2	T1,R1	
22.	Character Strings: declaration, initialization, reading	1	19-07-2018		1,4,5	CO2	T1,R1	
23.	writing strings, arithmetic operations on characters	1	21-07-2018		1,4,5	CO2	T1,R1	
24.	string handling functions programming examples	1	23-07-2018		1,4,5	CO2	T1,R1	
25.	Sample programs on arrays <i>Tutorial-7</i>	1	25-07-2018		1,4,5	CO2	T1,R1	
26.	Assignment/Quiz-2	1	26-07-2018		3,6	CO2	T1,R1	
No. of classes required to complete UNIT-II		7			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27.	Functions: Introduction, category of functions	1	28-07-2018		1,4,5	CO3	T1,R2	
28.	parameter passing techniques	1	28-07-2018		1,4,5	CO3	T1,R2	
29.	recursive functions-comparison with Iteration	1	06-08-2018		1,4,5	CO3	T1,R2	
30.	Functions with arrays <i>Tutorial-8</i>	1	08-08-2018		1,4,5	CO3	T1,R2	

31.	storage classes- extern, auto, and register, static, scope rules	1	09-08-2018		1,4,5	CO3	T21,R2	
32.	Standard library functions	1	11-08-2018		1,4,5	CO3	T1,R2	
33.	dynamic memory management functions <i>Tutorial-9</i>	1	13-08-2018		1,4,5	CO3	T1,R2	
34.	command line arguments	1	16-08-2018		1,4,5	CO3	T1,R2	
35.	Sample programs on functions	1	18-08-2018		1,4,5	CO3	T1,R2	
36.	Pointers - Introduction	1	20-08-2018		1,4,5	CO3	T1,R2	
37.	declaring & initialization of pointer variables, pointer expressions	1	22-08-2018		1,4,5	CO3	T1,R2	
38.	address arithmetic, pointers and arrays <i>Tutorial-10</i>	1	23-08-2018		1,4,5	CO3	T1,R2	
39.	pointers and character strings, pointers to pointers	1	25-08-2018		1,4,5	CO3	T1,R2	
40.	Pre-processor Directives	1	27-08-2018		1,4,5	CO3	T1,R2	
41.	Macros, sample programs	1	29-08-2018		1,4,5	CO3	T1,R2	
42.	Assignment/Quiz-3 & <i>Tutorial-11</i>	1	30-08-2018		3,6	CO3	T1,R2	
No. of classes required to complete UNIT-III		15			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
43.	Structures -Introduction to structures	1	01-09-2018		1,4,5	CO4	T1,R2	
44.	structures- declaration, definition and initialization of structures	1	05-09-2018		1,4,5	CO4	T1,R2	
45.	accessing structures, nested structures	1	06-09-2018		1,4,5	CO4	T1,R2	
46.	arrays of structures, structures and functions <i>Tutorial-12</i>	1	08-09-2018		1,4,5	CO4	T1,R2	
47.	pointers to structures	1	10-09-2018		1,4,5	CO4	T1,R2	
48.	self-referential structures	1	12-09-2018		1,4,5	CO4	T1,R2	
49.	Unions, sample programs <i>Tutorial-13</i>	1	15-09-2018		1,4,5	CO4	T1,R2	
50.	typedef, C program examples	1	17-09-2018		1,4,5	CO4	T1,R2	
51.	structure vs union with examples	1	19-09-2018		1,4,5	CO4	T1,R2	
52.	Assignment/Quiz-4 & <i>Tutorial-14</i>	1	20-09-2018		3,6	CO4	T1,R2	

No. of classes required to complete UNIT-IV	9		No. of classes taken:
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UNIT-V

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
53.	Files – concept of a file	1	22-09-2018		1,4,5	CO5	T1,R2	
54.	text files and binary files	1	24-09-2018		1,4,5	CO5	T1,R2	
55.	Streams <i>Tutorial-15</i>	1	26-09-2018		1,4,5	CO5	T1,R2	
56.	standard I/O	1	27-09-2018		1,4,5	CO5	T1,R2	
57.	Formatted I/O	1	29-09-2018		1,4,5	CO5	T1,R2	
58.	file I/O operations	1	31-09-2018		1,4,5	CO5	T1,R2	
59.	error handling	1	01-10-2018		1,4,5	CO5	T1,R2	
60.	Example programs on files <i>Tutorial-16</i>	1	03-10-2018		1,4,5	CO5	T1,R2	
61.	Assignment/Quiz-5	1	05-10-2018		3,6	CO5	T1,R2	
No. of classes required to complete UNIT-V		8			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
62.								
63.								
64.								
65.								
66.								

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/Quiz – 1	1	A1=5
Assignment/Quiz – 2	1,2	A2=5
I-Mid Examination	1,2	B1=20
Quiz -1	1,2	C1=10
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
Quiz -2	3,4,5	C2=10
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 $\text{Max}(B1,B2)+25\%$ of $\text{Min}(B1,B2)$	1,2,3,4,5	B=20
Evaluation of Quiz Marks: $C=75\%$ of $\text{Max}(C1,C2)+25\%$ of $\text{Min}(C1,C2)$	1,2,3,4,5	C=10
Attendance Marks: $D(>95\%=5, 90-95\%=4, 85-90\%=3, 80-85\%=2, 75-80\%=1)$		D=5
Cumulative Internal Examination : A+B+C+D	1,2,3,4,5	40
Semester End Examinations	1,2,3,4,5	E=60
Total Marks: A+B+C+D+E	1,2,3,4,5	100

PROGRAMME OUTCOMES (POs)

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
- PEO2: To Function professionally in the rapidly changing world with advances in technology
- PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
- PEO4: To Exercise leadership qualities, at levels appropriate to their experience, this addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
(P.ASHOK REDDY)	(P.ASHOK REDDY)	(P.ASHOK REDDY)	(I.RAJENDRA KUMAR)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE- B- Section
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : **COMPUTER PROGRAMMING – 17C101**
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : S.SRINIVASA REDDY
COURSE COORDINATOR : P.ASHOK REDDY
PRE-REQUISITE: NIL

COURSE OBJECTIVE: In this Course student will learn about- The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures. The derived data types like arrays, strings, various operations on them. Modular programming using functions and Memory management using pointers. User defined structures and various operations on it. The basics of files and its I/O operations.

COURSE OUTCOMES (CO):

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

CO1: Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and in view of using them in problem solving.

CO2: Apply various operations on derived data types like arrays and strings in problem solving.

CO3: Design and Implement Modular Programming and memory management using pointers.

CO4: Implement user defined data structures used in specific applications.

CO5: Compare different file I/O operations on text and binary files.

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	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	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 Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

BOS APPROVED REFERENCE BOOKS:

R1 N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010

R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

**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
1.	Introduction to problem solving, problem specifications and course outcomes	1	11-06-2018		1,4,5	CO1	T1,R1	
2.	Algorithm / pseudo code, flowchart, Algorithm examples and flowchart examples	1	13-06-2018		1,4,5	CO1	T1,R1	
3.	Tutorial-1	1	14-06-2018		1,4,5	CO1	T1,R1	
4.	Introduction to C- Programming, Structure of C program	1	16-06-2018		1,4,5	CO1	T1,R1	
5.	Identifiers, basic data types and sizes, Constants variables	1	18-06-2018		1,4,5	CO1	T1,R1	
6.	Input-output statements, A sample c program, Arithmetic, relational and logical operators with examples	1	20-06-2018		1,4,5	CO1	T1,R1	
7.	Tutorial-2	1	21-06-2018		1,4,5	CO1	T1,R1	
8.	Increment and decrement operators, conditional operator with sample programs	1	23-06-2018		1,4,5	CO1	T1,R1	
9.	Bit-wise operators, assignment operators, expressions with sample programs	1	25-06-2018		1,4,5	CO1	T1,R1	
10.	Type conversions, conditional expressions, precedence of operators and order of evaluationWith sample programs, Conditional statements: if, if else, else if ladder with sample programs	1	27-06-2018		1,4,5	CO1	T1,R1	
11.	Tutorial-3	1	28-06-2018		1,4,5	CO1	T1,R1	
12.	Switch statements, continue with sample code	1	30-06-2018		1,4,5	CO1	T1,R1	
13.	goto and labels with sample code	1	02-07-2018		1,4,5	CO1	T1,R1	
14.	Loops: while, do-while, Sample programs on while, do-while	1	04-07-2018		1,4,5	CO1	T1,R1	
15.	Tutorial-4	1	05-07-2018		1,4,5	CO1	T1,R1	
16.	For statement with example programs	1	07-07-2018		1,4,5	CO1	T1,R1	

17.	Break, programming examples	1	09-07-2018		1,4,5	CO1	T1,R1	
18.	Assignment/Quiz-1 & Tutorial-5	1	11-07-2018		3,6	CO1	T1,R1	
No. of classes required to complete UNIT-I		17			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction to Arrays concept	1t	12-07-2018		1,4,5	CO2	T1,R1	
20.	one dimensional arrays declaration, definition, accessing elements, storing elements	1	16-07-2018		1,4,5	CO2	T1,R1	
21.	Two dimensional and multi-dimensional arrays, Character Strings : declaration, initialization, reading	1	18-07-2018		1,4,5	CO2	T1,R1	
22.	Tutorial-6	1	19-07-2018		1,4,5	CO2	T1,R1	
23.	writing strings, arithmetic operations on characters	1	21-07-2018		1,4,5	CO2	T1,R1	
24.	string handling functions programming examples	1	23-07-2018		1,4,5	CO2	T1,R1	
25.	Sample programs on arrays	1	25-07-2018		1,4,5	CO2	T1,R1	
26.	Assignment/Quiz-2 & Tutorial-7	1	26-07-2018		3,6	CO2	T1,R1	
No. of classes required to complete UNIT-II		7			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27.	Functions : Introduction, category of functions	1	28-07-2018		1,4,5	CO3	T1,R2	
28.	parameter passing techniques	1	28-07-2018		1,4,5	CO3	T1,R2	
29.	recursive functions-comparison with Iteration	1	06-08-2018		1,4,5	CO3	T1,R2	
30.	Functions with arrays, storage classes- extern, auto, and register, static, scope rules	1	08-08-2018		1,4,5	CO3	T1,R2	
31.	Tutorial-8	1	09-08-2018		1,4,5	CO3	T21,R2	
32.	Standard library functions	1	11-08-2018		1,4,5	CO3	T1,R2	
33.	dynamic memory management functions, command line arguments	1	13-08-2018		1,4,5	CO3	T1,R2	
34.	Tutorial-9	1	16-08-2018		1,4,5	CO3	T1,R2	
35.	Sample programs on functions	1	18-08-2018		1,4,5	CO3	T1,R2	
36.	Pointers - Introduction	1	20-08-2018		1,4,5	CO3	T1,R2	
37.	declaring & initialization of pointer variables, pointer expressions, address arithmetic, pointers and arrays	1	22-08-2018		1,4,5	CO3	T1,R2	

38.	Tutorial-10	1	23-08-2018		1,4,5	CO3	T1,R2	
39.	pointers and character strings, pointers to pointers	1	25-08-2018		1,4,5	CO3	T1,R2	
40.	Pre-processor Directives	1	27-08-2018		1,4,5	CO3	T1,R2	
41.	Macros, sample programs	1	29-08-2018		1,4,5	CO3	T1,R2	
42.	Assignment/Quiz-3 & Tutorial-11	1	30-08-2018		3,6	CO3	T1,R2	
No. of classes required to complete UNIT-III		15			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
43.	Introduction to structures	1	01-09-2018		1,4,5	CO4	T1,R2	
44.	structures- declaration, definition and initialization of structures, accessing structures, nested structures	1	05-09-2018		1,4,5	CO4	T1,R2	
45.	Tutorial-12	1	06-09-2018		1,4,5	CO4	T1,R2	
46.	arrays of structures, structures and functions	1	08-09-2018		1,4,5	CO4	T1,R2	
47.	pointers to structures	1	10-09-2018		1,4,5	CO4	T1,R2	
48.	self-referential structures	1	12-09-2018		1,4,5	CO4	T1,R2	
49.	Unions, sample programs	1	15-09-2018		1,4,5	CO4	T1,R2	
50.	typedef, C program examples	1	17-09-2018		1,4,5	CO4	T1,R2	
51.	structure vs union with examples	1	19-09-2018		1,4,5	CO4	T1,R2	
52.	Assignment/Quiz-4 & Tutorial-13	1	20-09-2018		3,6	CO4	T1,R2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
53.	Files – concept of a file	1	22-09-2018		1,4,5	CO5	T1,R2	
54.	text files and binary files	1	24-09-2018		1,4,5	CO5	T1,R2	
55.	Streams, standard I/O	1	26-09-2018		1,4,5	CO5	T1,R2	
56.	Tutorial-14	1	27-09-2018		1,4,5	CO5	T1,R2	
57.	Formatted I/O	1	29-09-2018		1,4,5	CO5	T1,R2	
58.	file I/O operations	1	31-09-2018		1,4,5	CO5	T1,R2	
59.	error handling	1	01-10-2018		1,4,5	CO5	T1,R2	
60.	Example programs on files	1	03-10-2018		1,4,5	CO5	T1,R2	
61.	Assignment/Quiz-5 & Tutorial-15	1	05-10-2018		3,6	CO5	T1,R2	
No. of classes required to complete UNIT-V		8			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	Learning Outcome	Text Book	HOD Sign
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		Required	Completion	Completion	Methods	COs	followed	Weekly
62.								
63.								

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/Quiz – 1	1	A1=5
Assignment/Quiz – 2	1,2	A2=5
I-Mid Examination	1,2	B1=20
Quiz -1	1,2	C1=10
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
Quiz -2	3,4,5	C2=10
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Evaluation of Quiz Marks: $C=75\% \text{ of Max}(C1,C2)+25\% \text{ of Min}(C1,C2)$	1,2,3,4,5	C=10
Attendance Marks: $D(>95\%=5, 90-95\%=4,85-90\%=3,80-85\%=2,75-80\%=1)$		D=5
Cumulative Internal Examination : A+B+C+D	1,2,3,4,5	40
Semester End Examinations	1,2,3,4,5	E=60
Total Marks: A+B+C+D+E	1,2,3,4,5	100

PROGRAMME OUTCOMES (POs)

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

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PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
(S.SRINIVASA REDDY)	(P.ASHOK REDDY)	(P.ASHOK REDDY)	(I.RAJENDRA KUMAR)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE C-Section
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : COMPUTER PROGRAMMING – 17C101
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : S.SRINIVASA REDDY
COURSE COORDINATOR : P.ASHOK REDDY
PRE-REQUISITE: NIL

COURSE OBJECTIVE: In this Course student will learn about- The basic elements C programming structures like data types, expressions, control statements, various I/O functions and how to solve simple mathematical problems using control structures. The derived data types like arrays, strings, various operations on them. Modular programming using functions and Memory management using pointers. User defined structures and various operations on it. The basics of files and its I/O operations.

COURSE OUTCOMES (CO):

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

CO1: Identify basic elements of C programming structures like data types, expressions, control statements, various simple functions and in view of using them in problem solving.

CO2: Apply various operations on derived data types like arrays and strings in problem solving.

CO3: Design and Implement Modular Programming and memory management using pointers.

CO4: Implement user defined data structures used in specific applications.

CO5: Compare different file I/O operations on text and binary files.

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	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	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:

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R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

**COURSE DELIVERY PLAN (LESSON PLAN): Section-C
UNIT-I**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to problem solving, problem specifications and course outcomes	1	12-06-2018		1,4,5	CO1	T1,R1	
2.	Algorithm / pseudo code, flowchart	1	13-06-2018		1,4,5	CO1	T1,R1	
3.	Algorithm examples and flowchart examples	1	15-06-2018		1,4,5	CO1	T1,R1	
4.	Introduction to C- Programming, Structure of C program, Identifiers, basic data types and sizes, Constants variables	1	16-06-2018		1,4,5	CO1	T1,R1	
5.	Tutorial-1	1	19-06-2018		1,4,5	CO1	T1,R1	
6.	Input-output statements, A sample c program	1	20-06-2018		1,4,5	CO1	T1,R1	
7.	Arithmetic, relational and logical operators with examples	1	22-06-2018		1,4,5	CO1	T1,R1	
8.	Increment and decrement operators, conditional operator with sample programs, Bit-wise operators, assignment operators, expressions with sample programs	1	23-06-2018		1,4,5	CO1	T1,R1	
9.	Tutorial-2	1	26-06-2018		1,4,5	CO1	T1,R1	
10.	Type conversions, conditional expressions, precedence of operators and order of evaluationWith sample programs	1	27-06-2018		1,4,5	CO1	T1,R1	
11.	Conditional statements: if, if else, else if ladder with sample programs	1	29-06-2018		1,4,5	CO1	T1,R1	
12.	Switch statements, continue with sample code, goto and labels with sample code	1	30-06-2018		1,4,5	CO1	T1,R1	
13.	Tutorial-3	1	03-07-2018		1,4,5	CO1	T1,R1	
14.	Loops: while, do-while	1	04-07-2018		1,4,5	CO1	T1,R1	
15.	Sample programs on while, do-while	1	06-07-2018		1,4,5	CO1	T1,R1	

16.	For statement with example programs	1	07-07-2018		1,4,5	CO1	T1,R1	
17.	Break, programming examples	1	10-07-2018		1,4,5	CO1	T1,R1	
18.	Assignment/Quiz-1 & Tutorial-4	1	11-07-2018		3,6	CO1	T1,R1	
No. of classes required to complete UNIT-I		17			No. of classes taken:			

UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction to Arrays concept, one dimensional arrays declaration, definition, accessing elements, storing elements	1	13-07-2018		1,4,5	CO2	T1,R1	
20.	Tutorial-5	1	17-07-2018		1,4,5	CO2	T1,R1	
21.	Two dimensional and multi-dimensional arrays	1	18-07-2018		1,4,5	CO2	T1,R1	
22.	Character Strings: declaration, initialization, reading	1	10-07-2018		1,4,5	CO2	T1,R1	
23.	writing strings, arithmetic operations on characters	1	21-07-2018		1,4,5	CO2	T1,R1	
24.	string handling functions programming examples	1	24-07-2018		1,4,5	CO2	T1,R1	
25.	Sample programs on arrays	1	25-07-2018		1,4,5	CO2	T1,R1	
26.	Assignment/Quiz-2 & Tutorial-6	1	27-07-2018		3,6	CO2	T1,R1	
No. of classes required to complete UNIT-II		7			No. of classes taken:			

UNIT-III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27.	Functions: Introduction, category of functions , parameter passing techniques	1	28-07-2018		1,4,5	CO3	T1,R2	
28.	Tutorial-7	1	07-07-2018		1,4,5	CO3	T1,R2	
29.	recursive functions-comparison with Iteration	1	08-08-2018		1,4,5	CO3	T1,R2	
30.	Functions with arrays	1	10-08-2018		1,4,5	CO3	T1,R2	
31.	storage classes- extern, auto, and register, static, scope rules, Standard library functions	1	11-08-2018		1,4,5	CO3	T21,R2	
32.	Tutorial-8	1	14-08-2018		1,4,5	CO3	T1,R2	
33.	dynamic memory management functions	1	17-08-2018		1,4,5	CO3	T1,R2	
34.	command line arguments, Sample programs on functions	1	18-08-2018		1,4,5	CO3	T1,R2	
35.	Tutorial-9	1	21-08-2018		1,4,5	CO3	T1,R2	
36.	Pointers- Introduction	1	22-08-2018		1,4,5	CO3	T1,R2	
37.	declaring & initialization of	1	24-08-2018		1,4,5	CO3	T1,R2	

	pointer variables, pointer expressions							
38.	address arithmetic, pointers and arrays, pointers and character strings, pointers to pointers	1	25-08-2018		1,4,5	CO3	T1,R2	
39.	Tutorial-10	1	28-08-2018		1,4,5	CO3	T1,R2	
40.	Pre-processor Directives	1	29-08-2018		1,4,5	CO3	T1,R2	
41.	Macros, sample programs	1	31-08-2018		1,4,5	CO3	T1,R2	
42.	Assignment/Quiz-3 & Tutorial-11	1	01-08-2018		3,6	CO3	T1,R2	
No. of classes required to complete UNIT-III		15			No. of classes taken:			

UNIT-IV

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
43.	Introduction to structures	1	04-09-2018		1,4,5	CO4	T1,R2	
44.	structures- declaration, definition and initialization of structures	1	05-09-2018		1,4,5	CO4	T1,R2	
45.	accessing structures, nested structures	1	07-09-2018		1,4,5	CO4	T1,R2	
46.	arrays of structures, structures and functions, pointers to structures	1	08-09-2018		1,4,5	CO4	T1,R2	
47.	Tutorial-12	1	11-09-2018		1,4,5	CO4	T1,R2	
48.	self-referential structures	1	12-09-2018		1,4,5	CO4	T1,R2	
49.	Unions, sample programs	1	14-09-2018		1,4,5	CO4	T1,R2	
50.	typedef, C program examples	1	15-09-2018		1,4,5	CO4	T1,R2	
51.	structure vs union with examples	1	18-09-2018		1,4,5	CO4	T1,R2	
52.	Assignment/Quiz-4 & Tutorial-13	1	19-09-2018		3,6	CO4	T1,R2	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
53.	Files – concept of a file	1	21-09-2018		1,4,5	CO5	T1,R2	
54.	text files and binary files, streams	1	22-09-2018		1,4,5	CO5	T1,R2	
55.	Tutorial-14	1	25-09-2018		1,4,5	CO5	T1,R2	
56.	standard I/O	1	26-09-2018		1,4,5	CO5	T1,R2	
57.	Formatted I/O	1	28-09-2018		1,4,5	CO5	T1,R2	
58.	file I/O operations, error handling	1	29-09-2018		1,4,5	CO5	T1,R2	
59.	Tutorial-15	1	02-10-2018		1,4,5	CO5	T1,R2	
60.	Example programs on files	1	03-10-2018		1,4,5	CO5	T1,R2	
61.	Assignment/Quiz-5 & Tutorial-16	1	05-10-2018		3,6	CO5	T1,R2	

No. of classes required to complete UNIT-V	8		No. of classes taken:
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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
62.								
63.								

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/Quiz – 1	1	A1=5
Assignment/Quiz – 2	1,2	A2=5
I-Mid Examination	1,2	B1=20
Quiz -1	1,2	C1=10
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
Quiz -2	3,4,5	C2=10
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Evaluation of Quiz Marks: $C=75\% \text{ of Max}(C1,C2)+25\% \text{ of Min}(C1,C2)$	1,2,3,4,5	C=10
Attendance Marks: $D(>95\%=5, 90-95\%=4, 85-90\%=3, 80-85\%=2, 75-80\%=1)$		D=5
Cumulative Internal Examination : A+B+C+D	1,2,3,4,5	40
Semester End Examinations	1,2,3,4,5	E=60
Total Marks: A+B+C+D+E	1,2,3,4,5	100

PROGRAMME OUTCOMES (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex

- engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
- PEO2: To Function professionally in the rapidly changing world with advances in technology
- PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
- PEO4: To Exercise leadership qualities, at levels appropriate to their experience, this addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO1:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

**Course
Instructor**

**Course
Coordinator**

**Module
Coordinator**

HOD

(S.SRINIVASA REDDY) (P.ASHOK REDDY) (P.ASHOK REDDY) (I.RAJENDRA KUMAR)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE- A - Section
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: SIGNALS AND SYSTEMS – 17EC05
L-T-P STRUCTURE	: 2-2-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Prof.B.Ramesh Reddy
COURSE COORDINATOR	: Prof.B.Ramesh Reddy

PRE-REQUISITE: Vectors, Scalars, Approximation of a vector by another vector, Differentiation and Integration of signals.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course describes signals and how to perform mathematical operations on signals, representation of signals in both time and frequency domains, provides the concepts of sampling, the response of a linear system, the signal approximation using orthogonal functions and Fourier series, the Fourier Transform and its properties, Laplace Transforms and their properties, analysis of systems using Laplace Transforms.

COURSE OUTCOMES (COs):

CO 1:	Remember the classifications and properties of signals& systems, properties of Fourier & Laplace Transforms
CO 2:	Understand the fundamental characteristics of signals, systems and their classifications
CO 3:	Apply mathematical tools to model and examine signals and systems in both time and frequency domains
CO 4:	Analyze the concept of Fourier Series, Sampling Theorem, Region of convergence and convolution in time and frequency domain
CO 5:	Evaluate the systems for linearity, causality, time variance, stability, memorability and realizability

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	2		
CO2	3	3	-	-	3	-	-	-	-	-	-	3	2		3
CO3	3	3	3		-	-	-	-	-	2	-	3	3	-	3
CO4	3	3	3	3								3	3		3
CO5	3	3	3	3								3	3		3

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

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

BOS APPROVED TEXT BOOKS:

- T1** A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/Pearson publishers, 2nd Edition.
T2 B P Lathi, Signals, Systems and Communications, BSP, 2003, 3rd Edition.

BOS APPROVED REFERENCE BOOKS:

- R1** Simon Haykin, Signals and Systems, John Wiley, 2004
R2 HWEI P.HSU, Signals and Systems, Schaum's Outlines, Tata McGraw Hill, 2004.

PART-B**COURSE DELIVERY PLAN (LESSON PLAN): Section-A****UNIT-I : Signal Analysis**

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 Course and COs	1	12/6/2018					
2.	Introduction to Unit-I	1	13/6/2018					
3.	TUTORIAL-1	1	14/6/2018					
4.	Classification of signals	1	15/6/2018					
5.	Representation of Signals	2	19/6/2018 20/6/2018					
6.	TUTORIAL-2	1	21/6/2018					
7.	Operations on signals	2	22/6/2018 26/6/2018					
8.	Properties of signals	1	27/6/2018					
9.	TUTORIAL-3	1	28/6/2018					
10.	Properties of signals	2	29/6/2018 3/7/2018					
No. of classes required to complete UNIT-I							13	
No. of classes taken								

UNIT-II : Signal Approximation & Fourier series

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
11.	Introduction to Unit-II	1	4/7/2018					
12.	Approximation of signal by another signal	1	5/7/2018					
13.	Approximation of signal by a set of mutually orthogonal signals	1	6/7/2018					
14.	Orthogonality in complex signals	1	10/7/2018					
15.	Concept of Fourier series (FS)	1	11/7/2018					
16.	TUTORIAL-4	1	12/7/2018					
17.	Trigonometric FS	1	13/7/2018					
18.	Exponential FS	1	17/7/2018					
19.	Relation b/n TFS&EFS	1	18/7/2018					
20.	TUTORIAL-5	1	19/7/2018					
21.	Representation of Periodic Signal by FS	1	20/7/2018					
22.	Existence of FS	1	24/7/2018					
23.	Properties of FS	1	25/7/2018					
24.	TUTORIAL-6	1	26/7/2018					
25.	Parsevalls Theorem, Complex Fourier Spectrum	1	27/7/2018					
No. of classes required to complete UNIT-II							15	
No. of classes taken								

UNIT-III : Fourier Transforms and Sampling Theorem

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	
26.	Introduction to Unit-III	1	7/8/2018						
27.	Deriving FT from FS	1	8/8/2018						
28.	Properties of FT	3	9/8/2018 10/8/2018 14/8/2018						
29.	TUTORIAL-7	1	16/8/2018						
30.	FT of various types of signals	2	17/8/2018 21/8/2018						
31.	TUTORIAL-8	1	23/8/2018						
32.	FT of Periodic Signals	1	24/8/2018						
33.	Sampling Theorem	2	28/8/2018 29/8/2018						
No. of classes required to complete UNIT-I							12		
No. of classes taken									

UNIT-IV : Signal Transmission Through Linear Systems

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly	
34.	Introduction to Unit-IV	1	30/8/2018						
35.	System Definition & Classification	1	31/8/2018						
36.	Properties of Systems	1	4/9/2018						
37.	Response of Linear Systems (LS)	1	5/9/2018						
38.	TUTORIAL-9	1	6/9/2018						
39.	Signal and System BW, Distortionless transmission through system	1	7/9/2018						
40.	Filter Characteristics of LS, Ideal Filter Characteristics	1	11/9/2018						
41.	Physically realizable systems and Poly-Wiener Criterion	1	12/9/2018						
42.	TUTORIAL-10	1	13/9/2018						
43.	Autocorrelation Function (ACF) and Properties, ESD and PSD	1	14/9/2018						
44.	CCF and Properties	1	18/9/2018						
No. of classes required to complete UNIT-I							11		
No. of classes taken									

UNIT-V : Laplace Transforms

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
45.	Relation b/n LT & FT	1	19/9/2018					
46.	Properties of LT	2	20/9/2018 25/9/2018					
47.	LT of various types of signals	1	26/9/2018					
48.	TUTORIAL-11	1	27/9/2018					
49.	ROC and Properties	1	28/9/2018					
50.	Inverse LT	1	3/10/2018					
51.	TUTORIAL-12	1	4/10/2018					
52.	Applications of LT	1	5/10/2018					
No. of classes required to complete UNIT-I							9	

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

PART-B

EVALUATION PROCESS:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1:	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
PEO 2:	To Function professionally in the rapidly changing world with advances in technology.
PEO 3:	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO 4:	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME OUTCOMES (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	Communication: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	VLSI and Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Prof.B.Ramesh Reddy	Prof.B.Ramesh Reddy	Dr.M..Madhavi	Dr. Y.Amar Babu

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

COURSE HANDOUT

PART-A

PROGRAM	: B.Tech. III-Sem., ECE- B-Section
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: SIGNALS AND SYSTEMS – 17EC05
L-T-P STRUCTURE	: 2-2-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Prof.B.Ramesh Reddy
COURSE COORDINATOR	: Prof.B.Ramesh Reddy

PRE-REQUISITE: Vectors, Scalars, Approximation of a vector by another vector, Differentiation and Integration of signals.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course describes signals and how to perform mathematical operations on signals, representation of signals in both time and frequency domains, provides the concepts of sampling, the response of a linear system, the signal approximation using orthogonal functions and Fourier series, the Fourier Transform and its properties, Laplace Transforms and their properties, analysis of systems using Laplace Transforms.

COURSE OUTCOMES (COs):

CO 1:	Remember the classifications and properties of signals& systems, properties of Fourier & Laplace Transforms
CO 2:	Understand the fundamental characteristics of signals, systems and their classifications
CO 3:	Apply mathematical tools to model and examine signals and systems in both time and frequency domains
CO 4:	Analyze the concept of Fourier Series, Sampling Theorem, Region of convergence and convolution in time and frequency domain
CO 5:	Evaluate the systems for linearity, causality, time variance, stability, memorability and realizability

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	2		
CO2	3	3	-	-	3	-	-	-	-	-	-	3	2		3
CO3	3	3	3		-	-	-	-	-	2	-	3	3	-	3
CO4	3	3	3	3								3	3		3
CO5	3	3	3	3								3	3		3

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

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

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- R1** Simon Haykin, Signals and Systems, John Wiley, 2004
- R2** HWEI P.HSU, Signals and Systems, Schaum's Outlines, Tata McGraw Hill, 2004.

PART-B**COURSE DELIVERY PLAN (LESSON PLAN): Section-B****UNIT-I : Signal Analysis**

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 Course and COs	1	11/6/2018					
2.	Introduction to Unit-I	1	13/6/2018					
3.	Classification of signals	1	14/6/2018					
4.	TUTORIAL-1	1	15/6/2018					
5.	Representation of Signals	2	18/6/2018 20/6/2018					
6.	Operations on signals	1	21/6/2018					
7.	TUTORIAL-2		22/6/2018					
8.	Operations on signals	2	25/6/2018					
9.	Properties of signals	2	27/6/2018 28/6/2018					
10.	TUTORIAL-3	1	29/6/2018					
11.	Properties of signals	1	2/7/2018					
No. of classes required to complete UNIT-I							13	
No. of classes taken								

UNIT-II : Signal Approximation & Fourier series

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
12.	Introduction to Unit-II	1	4/7/2018					
13.	Approximation of signal by another signal	1	5/7/2018					
14.	Approximation of signal by a set of mutually orthogonal signals	1	6/7/2018					
15.	Orthogonality in complex signals	1	9/7/2018					
16.	Concept of Fourier series (FS)	1	11/7/2018					
17.	Trigonometric FS	1	12/7/2018					
18.	TUTORIAL-4	1	13/7/2018					
19.	Exponential FS	1	16/7/2018					
20.	Relation b/n TFS&EFS	1	18/7/2018					
21.	Representation of Periodic Signal by FS	1	19/7/2018					
22.	TUTORIAL-5	1	20/7/2018					
23.	Existence of FS	1	23/7/2018					
24.	Properties of FS	1	25/7/2018					
25.	Parsevalls Theorem, Complex Fourier Spectrum	1	26/7/2018					
26.	TUTORIAL-6	1	27/7/2018					
No. of classes required to complete UNIT-II							15	
No. of classes taken								

UNIT-III : Fourier Transforms and Sampling Theorem

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly	
27.	Introduction to Unit-III	1	6/8/2018						
28.	Deriving FT from FS	1	8/8/2018						
29.	Properties of FT	3	9/8/2018 10/8/2018 13/8/2018						
30.	FT of various types of signals	1	16/8/2018						
31.	TUTORIAL-7		17/8/2018						
32.	FT of various types of signals	1	20/8/2018						
33.	FT of Periodic Signals	1	23/8/2018						
34.	TUTORIAL-8	1	24/8/2018						
35.	Sampling Theorem	2	27/8/2018 29/8/2018						
No. of classes required to complete UNIT-I							12		
No. of classes taken									

UNIT-IV : Signal Transmission Through Linear Systems

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	
36.	Introduction to Unit-IV	1	30/8/2018						
37.	System Definition & Classification	1	31/8/2018						
38.	Properties of Systems	1	5/9/2018						
39.	Response of Linear Systems (LS)	1	5/9/2018						
40.	Signal and System BW, Distortionless transmission through system	1	6/9/2018						
41.	TUTORIAL-9	1	7/9/2018						
42.	Filter Characteristics of LS, Ideal Filter Characteristics	1	10/9/2018						
43.	Physically realizable systems and Poly-Wiener Criterion	1	12/9/2018						
44.	Autocorrelation Function (ACF) and Properties, ESD and PSD	1	13/9/2018						
45.	TUTORIAL-10	1	14/9/2018						
46.	CCF and Properties	1	17/9/2018						
No. of classes required to complete UNIT-I							11		
No. of classes taken									

UNIT-V : Laplace Transforms

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.	Relation b/n LT & FT	1	19/9/2018					
48.	Properties of LT	2	20/9/2018 24/9/2018					
49.	LT of various types of signals	1	26/9/2018					
50.	ROC and Properties	1	27/9/2018					
51.	TUTORIAL-11	1	28/9/2018					
52.	Inverse LT	1	1/10/2018 3/10/2018					
53.	Applications of LT	1	4/10/2018					

54.	TUTORIAL-12	1	5/10/2018					
No. of classes required to complete UNIT-I							9	
No. of classes taken								

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-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

PART-B

EVALUATION PROCESS:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1:	To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
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PEO 2:	To Function professionally in the rapidly changing world with advances in technology.
PEO 3:	To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
PEO 4:	To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner.

PROGRAMME OUTCOMES (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	Communication: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	VLSI and Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor	Course Coordinator	Module Coordinator	HOD
Prof.B.Ramesh Reddy	Prof.B.Ramesh Reddy	Dr.M..Madhavi	Dr.Y.Amar Babu

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE-C
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : SIGNALS AND SYSTEMS – 17EC05
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Smt.K.Lakshmi

COURSE COORDINATOR : Prof.B.Ramesh Reddy

PRE-REQUISITE: Vectors, Scalars, Approximation of a vector by another vector, Differentiation and Integration of signals.

COURSE EDUCATIONAL OBJECTIVES (CEOs): This course describe signals mathematically and how to perform mathematical operations on signals, represents the signals in both time and frequency domains, provides the concepts of sampling, the response of a linear system, the signal approximation using orthogonal functions and Fourier series, the Fourier Transform and its properties, Laplace Transforms and their properties, analysis of systems using Laplace Transforms.

COURSE OUTCOMES (CO)

CO1: **Remember** the classifications and properties of signals& systems, properties of Fourier & Laplace Transforms.

CO2: **Understand** the fundamental characteristics of signals, systems and their classifications.

CO3: **Apply** mathematical tools to model and examine signals and systems in both time and frequency domains.

CO4: **Analyze** the concept of Fourier Series, Sampling Theorem, Region of convergence and convolution in time and frequency domain.

CO5: **Evaluate** the systems for linearity, causality, time variance, stability, memorability and realizability.

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	2		
CO2	3	3	-	-	3	-	-	-	-	-	-	3	2		3
CO3	3	3	3		-	-	-	-	-	2	-	3	3	-	3
CO4	3	3	3	3								3	3		3
CO5	3	3	3	3								3	3		3

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

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

BOS APPROVED TEXT BOOKS:

T1 A V Oppenheim, A S Wilsky and IT Young, Signals and Systems, PHI/Pearson publishers, 2nd Edition.

T2 B P Lathi, Signals, Systems and Communications, BSP, 2003, 3rd Edition.

BOS APPROVED REFERENCE BOOKS:

R1 Simon Haykin, Signals and Systems, John Wiley, 2004

R2 HWEI P.HSU, Signals and Systems, Schaum's Outlines, Tata McGraw Hill, 2004.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN): Section-C

UNIT-I : Signal Analysis

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	11/6/2018					
2.	Concept of Signal, Classification of Signals:-C.T and D.T, Analog and Digital	1	12/6/2018					
3.	Causal, Anti-Causal and Non-Causal, Periodic and Aperiodic	1	14/6/2018					
4.	Energy and Power, Deterministic and Random	1	15/6/2018					
5.	Even and Odd, Real Exponential and Complex Exponential	1	18/6/2018					
6.	TUTORIAL-1	1	19/6/2018					
7.	Representation of Signals:-- Impulse, Unit Step, Unit Ramp, Signum, Exponential: Decaying, Raising And Double	2	21/6/2018 22/6/2018					
8.	Rectangular, Sinc and Sampling Signals	1	25/6/2018					
9.	TUTORIAL-2	1	26/6/2018					
10.	Operations on Signals- Time Shifting, Scaling, Reversal (Folding)	1	28/6/2018					
11.	Amplitude Scaling, Convolution- Graphical Method of Convolution.	2	29/6/2018 2/7/2018					
12.	TUTORIAL-3	1	3/7/2018					
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT-II : Signal Approximation& Fourier series

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly	
13.	Approximation of a Signal by another signal- MSE, Condition for orthogonal signals	1	5/7/2018						
14.	Approximation of a Signal by a set of mutually orthogonal signals- Evaluation of MSE, Gibbs Phenomena	1	6/7/2018						
15.	Orthogonality in complex signals, Approximation of a complex signal by another complex signal and a set of complex signals	1	9/7/2018						
16.	TUTORIAL-4	1	10/7/2018						
17.	Concept of Fourier series And Types	1	12/7/2018						
18.	Relations among coefficients of Trigonometric and Exponential F.S	1	13/7/2018						
19.	Representation of Periodic signal by Fourier series over the entire interval	1	16/7/2018						
20.	TUTORIAL-5	1	17/7/2018						
21.	Existence of FS , Symmetry conditions of Fourier series	3	19/7/2018 20/7/2018 23/7/2018						
22.	TUTORIAL-6	1	24/7/2018						
23.	Parsevalls Theorem, Complex Fourier Spectrum-Line and Power Spectrum	2	26/7/2018 27/7/2018						
No. of classes required to complete UNIT-II		14			No. of classes taken:				

UNIT-III : Fourier Transforms

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly	
24.	Need of Transform, deriving Fourier Transform from Fourier Series, Existence of Fourier Transform	1	6/8/2018						
25.	TUTORIAL-7	1	7/8/2018						
26.	Properties of F.T:Symmetry, Linearity, Scaling, Time Reversal Time Shifting, Frequency Shifting, Time Differentiation & Integration	2	9/8/2018 10/8/2018						
27.	Frequency Differentiation & Integration, Time Convolution, Frequency Convolution and Parseval's Theorem	1	13/8/2018						
28.	TUTORIAL-8	1	14/8/2018						
29.	Fourier Transform of Aperiodic and Periodic Signals	2	16/8/2018 17/8/2018						
30.	Sampling theorem with proof for band limited signals, Impulse sampling, Reconstruction of signal from its samples, effect of under sampling- Aliasing.	1	20/8/2018						
31.	TUTORIAL-9	1	21/8/2018						
No. of classes required to complete UNIT-III		10			No. of classes taken:				

UNIT-IV : Signal Transmission Through Linear Systems

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
32.	Definition of System & Classification Systems- Linear and Non Linear, Time-Invariant and Time- Variant	1	23/8/2018					
33.	Causal and Non Causal, Stable and Unstable, Static and Dynamic, Invertible and Non-invertible	2	24/8/2018 27/8/2018					
34.	TUTORIAL-10	1	28/8/2018					
35.	System Bandwidth, Response of Linear Systems:- Transfer Function, Impulse Response	1	30/8/2018					
36.	Response of Linear Systems with an arbitrary input, Distortion less Transmission through a system.	1	31/8/2018					
37.	Tutorial -11	1	4/9/2018					
38.	Filter Characteristics of Linear System, Ideal Filter characteristics of LPF, HPF, BPF and BEF	1	6/9/2018					
39.	Physically Realizable system and Poly-Wiener criterion	1	7/9/2018					
40.	Autocorrelation Function and	1	10/9/2018					

	Properties, Energy Spectral Density, Power Spectral Density							
41.	Tutorial -12	1	11/9/2018					
42.	Cross Correlation Function and Properties.	1	14/9/2018					
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V : Laplace Transforms

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
43.	Concept of Laplace Transform ,Relation between Laplace Transform and Fourier Transform, Existence of Laplace Transform	1	17/9/2018					
44.	Tutorial -13	1	18/9/2018					
45.	Properties of Laplace Transform- Linearity, Time Scaling, Time shifting, Shifting in S domain, Differentiation in time domain, Integration in time domain.	1	20/9/2018					
46.	Conjugation, Differentiation in S-domain, Integration in S-domain.	1	24/9/2018					
47.	Tutorial -14	1	25/9/2018					
48.	Convolution in time and S-domain,	1	27/9/2018					

	Initial value and Final value theorems							
49.	Laplace Transform of various classes of Signals Concept of ROC and Properties,	1	28/9/2018					
50.	Inverse Laplace Transform using Partial Fractions method	1	1/10/2018					
51.	Applications of Laplace Transforms	1	4/10/2018					
No. of classes required to complete UNIT-V		9			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
52.		1						

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
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II Mid Examinations	08-10-2018	13-10-2018	1 W
Preparation and Practicals	15-10-2018	27-10-2018	2 W
Semester End Examinations	29-10-2018	10-11-2018	2 W

Part - C

EVALUATION PROCESS:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

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PROGRAMME OUTCOMES (POs)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Smt.K.Lakshmi	Prof.B.Ramesh Reddy	Dr.M..Madhavi	
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., ECE - A
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Random Variables & Stochastic Process – 17EC06
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. G L N Murthy
COURSE COORDINATOR : Mr. G L N Murthy

PRE-REQUISITE: Set Theory, Probability Theory.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the knowledge on random variables and their statistical behavior. It also provides the complete information about temporal and spectral characteristics of random processes. The course also provides the information about evaluation of system response to random inputs. Further it introduces the noise as a random process.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to
CO1: Analyze the Statistical Properties of random variables through understanding of distribution and density functions
CO2: Evaluate the statistical parameters of Random Processes in temporal domain.
CO3: Estimate various spectral characteristics of random processes.
CO4: Apply the concept of Random Processes for analysis of linear systems.

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	-	2	-	-	-	-	-	-	-	2	3	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	-	2	-	-	-	-	-	-	-	-	3	-	2
CO5	3	3	-	2	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

- 1 Peyton Z. Peebles, Jr, "Probability, Random Variables and Random Signal Principles", Tata Mc Graw-Hill, 4th edition, New Delhi.

BOS APPROVED REFERENCE BOOKS:

- 1 Athanasios Papoulis, S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", Tata Mc Graw-Hill, 2002 edition, New Delhi.
- 2 Wim C. Van Etten, "Introduction to Random Signals and Noise", John Wiley and Sons Inc.
- 3 Taub and Schilling, "Principles of Communication Systems", Second Edition, Tata McGraw-Hill, Publishers, New Delhi.
- 4 H.Stark and J.W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson Education Publishers.
- 5 Hwei Hsu, "Probability, Random Variables and Random Processes", Schaum's Outline series, Tata McGraw-Hill Publishers, New Delhi.
- 6 Y Mallikarjuna Reddy, "Probability theory and Stochastic Processes", Universites Press (India), Pvt Ltd.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A**UNIT-I: The Random Variable**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the Course	1	12.06.2018		TLM1	CO1	T1,R6	
2.	Probability Concepts – Introduction	1	13.06.2018		TLM1	CO1	T1,R6	
3.	Total Probability Theorem, Baye's Theorem	1	15.06.2018		TLM1	CO1	T1,R6	
4.	Concept of Random Variable, Classification of Random Variable	1	19.06.2018		TLM1	CO1	T1,R6	
5.	Tutorial-I	1	20.06.2018		TLM3	CO1		
6.	Cumulative Distribution Function & its properties	1	22.06.2018		TLM1	CO1	T1,R6	
7.	Probability Density Function and its Properties	1	23.06.2018		TLM1	CO1	T1,R6	
8.	Uniform Distribution, Exponential Distribution, Rayleigh's Distribution, Gaussian Distribution, Binomial Distribution, Poisson Distribution	1	26.06.2018		TLM1	CO1	T1,R6	
9.	Tutorial-II	1	27.06.2018		TLM3	CO1	T1,R6	
10.	Moments(Moment about the origin, Central moment, Variance, Skew, Skewness)	1	29.06.2018		TLM1	CO1	T1, R6	
11.	Moment Generating Function Characteristics Function and Properties	1	30.06.2018		TLM1	CO1	T1 ,R6	

12.	Transformations of Random Variables	1	03.07.2018		TLM1	CO1	T1, R6	
13.	Tutorial-III	1	04.07.2018		TLM3	CO1	T1,R6	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II : Multiple 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
14.	Introduction - Joint Distribution function and its Properties	1	06.07.2018		TLM1	CO1	T1,R6	
15.	Joint Density function and its Properties	1	07.07.2018		TLM1	CO1	T1,R6	
16.	Marginal Distribution & Density functions	1	10.07.2018		TLM1	CO1	T1,R6	
17.	Tutorial-IV	1	11.07.2018		TLM3	CO1	T1,R6	
18.	Conditional Distribution Functions, Conditional Density Functions	1	13.07.2018		TLM1	CO1	T1,R6	
19.	Problems	1	14.07.2018		TLM4	CO1	T1,R6	
20.	Statistical Independence, Distribution and Density of sum of RV , Central limit theorem.	1	17.07.2018		TLM1	CO1	T1,R6	
21.	Joint moment, Central Moment, Covariance, Correlation coefficient	1	18.07.2018		TLM1	CO1	T1,R6	
22.	Tutorial-V	1	20.07.2018		TLM3	CO1	T1,R6	
23.	Joint Characteristics Function and properties	1	21.07.2018		TLM1	CO1	T1,R6	
24.	Jointly Gaussian Random Variables & Properties of Gaussian Random Variables	1	24.07.2018		TLM1	CO1	T1,R6	
25.	Tutorial-VI	1	25.07.2018		TLM3	CO1	T1,R6	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III : Stochastic Process-Temporal Characteristics

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
26.	Concept of Stochastic Processes	1	28.07.2018		TLM1	CO2	T1,R6	
27.	Classification of Stochastic Processes	1	07.08.2018		TLM1	CO2	T1,R6	
28.	Distribution & Density of Stochastic Processes	1	08.08.2018		TLM1	CO2	T1,R6	
29.	Tutorial-VII	1	10.08.2018		TLM3	CO2	T1,R6	
30.	Real Time Random Processes	1	11.08.2018		TLM2	CO2	T1,R6	

31.	First order Stationery Processes, Second order stationary Processes.	1	14.08.2018		TLM1	CO2	T1,R6	
32.	Wide-Sense Stationery Processes & Nth order and Strict-Sense stationery Processes	1	17.08.2018		TLM1	CO2	T1,R6	
33.	Time Averages and Ergodicity, Mean Ergodic processes, Correlation Ergodic Processes	1	18.08.2018		TLM1	CO2	T1,R6	
34.	Tutorial-VIII	1	21.08.2018		TLM3	CO2	T1,R6	
35.	Auto Correlation Function and its Properties	1	24.08.2018		TLM1	CO2	T1,R6	
36.	Cross Correlation Function and its Properties	1	25.08.2018		TLM1	CO2	T1,R6	
37.	Auto Covariance Function & Cross Covariance function	1	28.08.2018		TLM1	CO2	T1,R6	
38.	Tutorial-IX	1	29.08.2018		TLM3	CO2	T1,R6	
No. of classes required to complete UNIT-III		13			No. of classes taken:			

UNIT-IV : Stochastic Process-Spectral Characteristics

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
39.	Introduction to Spectral Characteristics	1	31.08.2018		TLM1	CO3	T1,R6	
40.	Power Spectral Density Properties & Bandwidth of Power Spectral Density	1	01.09.2018		TLM1	CO3	T1,R6	
41.	Wiener-Khintchine Relation	1	04.09.2018		TLM1	CO3	T1,R6	
42.	Tutorial-X	1	05.09.2018		TLM3	CO3	T1,R6	
43.	Cross Power Spectral Density and Properties,	1	07.09.2018		TLM1	CO3	T1,R6	
44.	Review	1	08.09.2018		TLM2	CO3	T1,R6	
45.	Relation between CCF and CPSD	1	11.09.2018		TLM1	CO3	T1,R6	
46.	Problems	1	12.09.2018		TLM1	CO3	T1,R6	
47.	Tutorial-XI	1	14.09.2018		TLM3	CO3	T1,R6	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V : Linear Systems with Random Inputs

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.	Concept of Linear Time Invariant System	1	15.09.2018		TLM1	CO4	T1,R6	
49.	Response of linear system & Mean of System response	1	18.09.2018		TLM1	CO4	T1,R6	
50.	Mean square of System response	1	19.09.2018		TLM1	CO4	T1,R6	
51.	Tutorial – XII	1	22.09.2018		TLM3	CO4	T1,R6	
52.	ACF of Response &CCF of input and output	1	25.09.2018		TLM1	CO4	T1,R6	
53.	PSD of response	1	26.09.2018		TLM1	CO4	T1,R6	
54.	CPSD of input and output	1	28.09.2018		TLM1	CO4	T1,R6	
55.	Tutorial – XIII	1	29.09.2018		TLM3	CO4	T1,R6	
56.	Introduction to Noise	1	03.10.2018		TLM1	CO4	T1,R6	
57.	Classification of Noise	1	05.10.2018		TLM1	CO4	T1,R6	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	Concept of random variables in Communications	1	06.10.2018		TLM2	

Teaching Learning Methods

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

ACADEMIC CALENDAR:

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

EVALUATION PROCESS:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

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PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PSO3: Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Mr. G L N Murthy
Course Instructor

Mr. G L N Murthy
Course Coordinator

Dr. M Madhavi
Module Coordinator

Dr. Y Amar Babu
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., ECE - B
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Random Variables & Stochastic Process – 17EC06
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. M.K. Linga Murthy
COURSE COORDINATOR : Mr. G L N Murthy

PRE-REQUISITE: Set Theory, Probability Theory.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the knowledge on random variables and their statistical behavior. It also provides the complete information about temporal and spectral characteristics of random processes. The course also provides the information about evaluation of system response to random inputs. Further it introduces the noise as a random process.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1: Analyze the Statistical Properties of random variables through understanding of distribution and density functions

CO2: Evaluate the statistical parameters of Random Processes in temporal domain.

CO3: Estimate various spectral characteristics of random processes.

CO4: Apply the concept of Random Processes for analysis of linear systems.

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	-	2	-	-	-	-	-	-	-	2	3	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	-	2	-	-	-	-	-	-	-	-	3	-	2
CO5	3	3	-	2	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1 Peyton Z. Peebles, Jr, "Probability, Random Variables and Random Signal Principles", Tata Mc Graw-Hill, 4th edition, New Delhi.

BOS APPROVED REFERENCE BOOKS:

R1 Athanasios Papoulis, S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", Tata Mc Graw-Hill, 2002 edition, New Delhi.

R2 Wim C. Van Etten, "Introduction to Random Signals and Noise", John Wiley and Sons Inc.

R3 Taub and Schilling, "Principles of Communication Systems", Second Edition, Tata McGraw-Hill, Publishers, New Delhi.

R4 H.Stark and J.W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson Education Publishers.

R5 Hwei Hsu, "Probability, Random Variables and Random Processes", Schaum's Outline series, Tata McGraw-Hill Publishers, New Delhi.

R6 Y Mallikarjuna Reddy, "Probability theory and Stochastic Processes", Universities Press (India), Pvt Ltd.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: The Random Variable

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the Course	1	13.06.2018		TLM1	CO1	T1,R6	
2.	Probability Concepts – Introduction	1	14.06.2018		TLM1	CO1	T1,R6	
3.	Total Probability Theorem, Baye’s Theorem	1	15.06.2018		TLM1	CO1	T1,R6	
4.	Concept of Random Variable, Classification of Random Variable	1	20.06.2018		TLM1	CO1	T1,R6	
5.	Tutorial-I	1	21.06.2018		TLM3	CO1		
6.	Cumulative Distribution Function & its properties	1	22.06.2018		TLM1	CO1	T1,R6	
7.	Probability Density Function and its Properties	1	23.06.2018		TLM1	CO1	T1,R6	
8.	Uniform Distribution, Exponential Distribution, Rayleigh’s Distribution, Gaussian Distribution, Binomial Distribution, Poisson Distribution	1	27.06.2018		TLM1	CO1	T1, R6	
9.	Tutorial-II	1	28.06.2018		TLM3	CO1	T1, R6	
10.	Moments(Moment about the origin, Central moment, Variance, Skew, Skewness)	1	29.06.2018		TLM1	CO1	T1, R6	
11.	Moment Generating Function Characteristics Function and Properties	1	30.06.2018		TLM1	CO1	T1 ,R6	
12.	Transformations of Random Variables	1	04.07.2018		TLM1	CO1	T1, R6	
13.	Tutorial-III	1	05.07.2018		TLM3	CO1	T1, R6	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II : Multiple 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
14.	Introduction - Joint Distribution function and its Properties	1	06.07.2018		TLM1	CO1	T1,R6	
15.	Joint Density function and its Properties	1	07.07.2018		TLM1	CO1	T1,R6	
16.	Marginal Distribution & Density functions	1	11.07.2018		TLM1	CO1	T1,R6	
17.	Tutorial-IV	1	12.07.2018		TLM3	CO1	T1,R6	
18.	Conditional Distribution Functions, Conditional Density Functions	1	13.07.2018		TLM1	CO1	T1,R6	

19.	Problems	1	14.07.2018		TLM4	CO1	T1,R6	
20.	Statistical Independence, Distribution and Density of sum of RV, Central limit theorem.	1	18.07.2018		TLM1	CO1	T1,R6	
21.	Joint moment, Central Moment, Covariance, Correlation coefficient	1	19.07.2018		TLM1	CO1	T1,R6	
22.	Tutorial-V	1	20.07.2018		TLM3	CO1	T1,R6	
23.	Joint Characteristics Function and properties	1	21.07.2018		TLM1	CO1	T1,R6	
24.	Jointly Gaussian Random Variables & Properties of Gaussian Random Variables	1	25.07.2018		TLM1	CO1	T1,R6	
25.	Tutorial-VI	1	26.07.2018		TLM3	CO1	T1,R6	
26.	Tutorial-VII	1	27.07.2018					
No. of classes required to complete UNIT-II		12				No. of classes taken:		

UNIT-III : Stochastic Process-Temporal Characteristics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27.	Concept of Stochastic Processes	1	28.07.2018		TLM1	CO2	T1,R6	
28.	Classification of Stochastic Processes	1	08.08.2018		TLM1	CO2	T1,R6	
29.	Distribution & Density of Stochastic Processes	1	09.08.2018		TLM1	CO2	T1,R6	
30.	Tutorial-VIII	1	10.08.2018		TLM3	CO2	T1,R6	
31.	Real Time Random Processes	1	11.08.2018		TLM2	CO2	T1,R6	
32.	First order Stationery Processes, Second order stationary Processes.	1	16.08.2018		TLM1	CO2	T1,R6	
33.	Wide-Sense Stationery Processes & Nth order and Strict-Sense stationery Processes	1	17.08.2018		TLM1	CO2	T1,R6	
34.	Time Averages and Ergodicity, Mean Ergodic processes, Correlation Ergodic Processes	1	18.08.2018		TLM1	CO2	T1,R6	
35.	Tutorial-IX	1	23.08.2018		TLM3	CO2	T1,R6	
36.	Auto Correlation Function and its Properties	1	24.08.2018		TLM1	CO2	T1,R6	

37.	Cross Correlation Function and its Properties	1	25.08.2018		TLM1	CO2	T1,R6	
38.	Auto Covariance Function & Cross Covariance function	1	29.08.2018		TLM1	CO2	T1,R6	
39.	Tutorial-X	1	30.08.2018		TLM3	CO2	T1,R6	
No. of classes required to complete UNIT-III		13			No. of classes taken:			

UNIT-IV : Stochastic Process-Spectral Characteristics

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.	Introduction to Spectral Characteristics	1	31.09.2018		TLM1	CO3	T1,R6	
41.	Power Spectral Density Properties & Bandwidth of Power Spectral Density	1	01.09.2018		TLM1	CO3	T1,R6	
42.	Wiener-Khintchine Relation	1	05.09.2018		TLM1	CO3	T1,R6	
43.	Tutorial-XI	1	06.09.2018		TLM3	CO3	T1,R6	
44.	Cross Power Spectral Density and Properties,	1	07.09.2018		TLM1	CO3	T1,R6	
45.	Review	1	08.09.2018		TLM2	CO3	T1,R6	
46.	Relation between CCF and CPSD	1	12.09.2018		TLM1	CO3	T1,R6	
47.	Problems	1	14.09.2018		TLM1	CO3	T1,R6	
48.	Tutorial-XII	1	15.09.2018		TLM3	CO3	T1,R6	
No. of classes required to complete UNIT-IV		9			No. of classes taken:			

UNIT-V : Linear Systems with Random Inputs

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
49.	Concept of Linear Time Invariant System	1	19.09.2018		TLM1	CO4	T1,R6	
50.	Response of linear system & Mean of System response	1	20.09.2018		TLM1	CO4	T1,R6	
51.	Mean square of System response	1	22.09.2018		TLM1	CO4	T1,R6	
52.	Tutorial – XIII	1	26.09.2018		TLM3	CO4	T1,R6	
53.	ACF of Response & CCF of input and output	1	27.09.2018		TLM1	CO4	T1,R6	
54.	PSD of response	1	28.09.2018		TLM1	CO4	T1,R6	
55.	CPSD of input and output	1	29.09.2018		TLM1	CO4	T1,R6	
56.	Tutorial – XIV	1	03.10.2018		TLM3	CO4	T1,R6	

57.	Introduction to Noise, Classification of Noise	1	05.10.2018		TLM1	CO4	T1,R6	
58.	Tutorial – XV	1	05.10.2018		TLM1	CO4	T1,R6	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.	Concept of random variables in Communications.	1	06.10.2018		TLM2	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
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Evaluation Task	COs	Marks
Assignment – 1	1	A1=5
Assignment – 2	1	A2=5
Quiz – 1	1	B1=10
I-Mid Examination	1	C1=20
Assignment – 3	2	A3=5
Assignment – 4	3	A4=5
Assignment – 5	4	A5=5
Quiz – 2	2,3,4	B2=10
II-Mid Examination	2,3,4	C2=20
Evaluation of Assignment Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4	A=5
Evaluation of Quiz Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4	B=10
Evaluation of Mid Marks: $C=75\% \text{ of Max}(C1,C2)+25\% \text{ of Min}(C1,C2)$	1,2,3,4	C=20
Attendance: D		D=5
Cumulative Internal Examination : A+B+C+D	1,2,3,4	A+B+C+D=40
Semester End Examinations	1,2,3,4	E=60
Total Marks: A+B+C+D+E	1,2,3,4	100

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COURSE HANDOUT

Part - A

PROGRAM : B.Tech. III-Sem., ECE - C
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Random Variables & Stochastic Process – 17EC06
L-T-P STRUCTURE : 2-2-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. G L N Murthy.
COURSE COORDINATOR : Mr. G L N Murthy.

PRE-REQUISITE: Set Theory, Probability Theory.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

This course provides the knowledge on random variables and their statistical behavior. It also provides the complete information about temporal and spectral characteristics of random processes. The course also provides the information about evaluation of system response to random inputs. Further it introduces the noise as a random process.

COURSE OUTCOMES (COs):

After completion of the course, the student will be able to
CO1: Analyze the Statistical Properties of random variables through understanding of distribution and density functions
CO2: Evaluate the statistical parameters of Random Processes in temporal domain.
CO3: Estimate various spectral characteristics of random processes.
CO4: Apply the concept of Random Processes for analysis of linear systems.

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	-	2	-	-	-	-	-	-	-	2	3	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO3	2	2	-	2	-	-	-	-	-	-	-	2	3	-	-
CO4	2	3	-	2	-	-	-	-	-	-	-	-	3	-	2
CO5	3	3	-	2	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1 Peyton Z. Peebles, Jr, "Probability, Random Variables and Random Signal Principles", Tata Mc Graw-Hill, 4th edition, New Delhi.

BOS APPROVED REFERENCE BOOKS:

R1 Athanasios Papoulis, S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", Tata Mc Graw-Hill, 2002 edition, New Delhi.

R2 Wim C. Van Etten, "Introduction to Random Signals and Noise", John Wiley and Sons Inc.

R3 Taub and Schilling, "Principles of Communication Systems", Second Edition, Tata McGraw-Hill, Publishers, New Delhi.

R4 H.Stark and J.W. Woods, "Probability and Random Processes with Applications to Signal Processing", Pearson Education Publishers.

R5 Hwei Hsu, "Probability, Random Variables and Random Processes", Schaum's Outline series, Tata McGraw-Hill Publishers, New Delhi.

R6 Y Mallikarjuna Reddy, "Probability theory and Stochastic Processes", Universities Press (India), Pvt Ltd.

COURSE DELIVERY PLAN (LESSON PLAN): Section-C**UNIT-I: The Random Variable**

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the Course	1	12.06.2018		TLM1	CO1	T1,R6	
2.	Probability Concepts –Introduction	1	13.06.2018		TLM1	CO1	T1,R6	
3.	Total Probability Theorem, Baye's Theorem	1	14.06.2018		TLM1	CO1	T1,R6	
4.	Concept of Random Variable, Classification of Random Variable	1	16.06.2018		TLM1	CO1	T1,R6	
5.	Tutorial-I	1	19.06.2018		TLM3	CO1	T1,R6	
6.	Cumulative Distribution Function & its properties	1	20.06.2018		TLM1	CO1	T1,R6	
7.	Probability Density Function and its Properties	1	21.06.2018		TLM1	CO1	T1,R6	
8.	Uniform Distribution, Exponential Distribution, Rayleigh's Distribution, Gaussian Distribution, Binomial Distribution, Poisson Distribution	1	23.06.2018		TLM1	CO1	T1,R6	
9.	Tutorial-II	1	26.06.2018		TLM3	CO1	T1,R6	
10.	Moments(Moment about the origin, Central moment, Variance, Skew,	1	27.06.2018		TLM1	CO1	T1, R6	

	Skewness)							
11.	Moment Generating Function Characteristics Function and Properties	1	28.06.2018		TLM1	CO1	T1 ,R6	
12.	Transformations of Random Variables	1	30.06.2018		TLM1	CO1	T1, R6	
13.	Tutorial-III	1	03.07.2018		TLM3	CO1	T1, R6	
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT-II : Multiple 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
14.	Introduction - Joint Distribution function and its Properties	1	04.07.2018		TLM1	CO1	T1,R6	
15.	Joint Density function and its Properties	1	07.07.2018		TLM1	CO1	T1,R6	
16.	Marginal Distribution & Density functions	1	10.07.2018		TLM1	CO1	T1,R6	
17.	Tutorial-IV	1	11.07.2018		TLM3	CO1	T1, R6	
18.	Conditional Distribution Functions, Conditional Density Functions	1	12.07.2018		TLM1	CO1	T1,R6	
19.	Problems	1	14.07.2018		TLM4	CO1	T1,R6	
20.	Statistical Independence, Distribution and Density of sum of RV , Central limit theorem.	1	17.07.2018		TLM1	CO1	T1,R6	
21.	Joint moment, Central Moment, Covariance, Correlation coefficient	1	18.07.2018		TLM1	CO1	T1,R6	
22.	Tutorial-V	1	19.07.2018		TLM3	CO1	T1, R6	
23.	Joint Characteristics Function and properties	1	21.07.2018		TLM1	CO1	T1,R6	
24.	Jointly Gaussian Random Variables & Properties of Gaussian Random Variables	1	24.07.2018		TLM1	CO1	T1,R6	

25.	Tutorial-VI	1	25.07.2018		TLM3	CO1	T1, R6	
No. of classes required to complete UNIT-II		12			No. of classes taken:			

UNIT-III : Stochastic Process-Temporal Characteristics

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
26.	Concept of Stochastic Processes	1	28.07.2018		TLM1	CO2	T1,R6	
27.	Classification of Stochastic Processes	1	07.08.2018		TLM1	CO2	T1,R6	
28.	Distribution & Density of Stochastic Processes	1	08.08.2018		TLM1	CO2	T1,R6	
29.	Tutorial-VII	1	10.08.2018		TLM3	CO2	T1, R6	
30.	Real time Random Processes	1	11.08.2018		TLM2	CO2	T1, R6	
31.	First order Stationery Processes, Second order stationary Processes	1	14.08.2018		TLM1	CO2	T1,R6	
32.	Wide-Sense Stationery Processes & Nth order and Strict-Sense stationery Processes	1	17.08.2018		TLM1	CO2	T1,R6	
33.	Time Averages and Ergodicity, Mean Ergodic processes, Correlation Ergodic Processes	1	18.08.2018		TLM1	CO2	T1,R6	
34.	Tutorial-VIII	1	21.08.2018		TLM3	CO2	T1,R6	
35.	Auto Correlation Function and its Properties	1	24.08.2018		TLM1	CO2	T1,R6	
36.	Cross Correlation Function and its Properties	1	25.08.2018		TLM1	CO2	T1,R6	
37.	Auto Covariance Function & Cross Covariance function	1	28.08.2018		TLM1	CO2	T1,R6	
38.	Tutorial-IX		29.08.2018		TLM3	CO2	T1,R6	

No. of classes required to complete UNIT-III	13	No. of classes taken:
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UNIT-IV : Stochastic Process-Spectral Characteristics

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
39.	Introduction to Spectral Characteristics	1	31.08.2018		TLM1	CO3	T1,R6	
40.	Power Spectral Density Properties & Bandwidth of Power Spectral Density	1	01.09.2018		TLM1	CO3	T1,R6	
41.	Wiener-Khintchine Relation	1	04.09.2018		TLM1	CO3	T1,R6	
42.	Tutorial-X	1	05.09.2018		TLM3	CO3		
43.	Cross Power Spectral Density and Properties	1	07.09.2018		TLM1	CO3	T1,R6	
44.	Problems	1	08.09.2018		TLM4	CO3	T1,R6	
45.	Relation between CCF and CPSD	1	11.09.2018		TLM1	CO3	T1,R6	
46.	Review	1	12.09.2018		TLM2	CO3	T1,R6	
47.	Tutorial-XI	1	14.09.2018		TLM3	CO3	T1,R6	
No. of classes required to complete UNIT-IV		09			No. of classes taken:			

UNIT-V : Linear Systems with Random Inputs

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.	Concept of Linear Time Invariant System	1	15.09.2018		TLM1	CO4	T1,R6	
49.	Response of linear system & Mean of System response	1	18.09.2018		TLM1	CO4	T1,R6	
50.	Mean square of System response	1	19.09.2018		TLM1	CO4	T1,R6	
51.	Tutorial – XII	1	22.09.2018		TLM3	CO4	T1,R6	
52.	ACF of Response & CCF of input and output	1	25.09.2018		TLM1	CO4	T1,R6	
53.	PSD of response	1	26.09.2018		TLM1	CO4	T1,R6	
54.	CPSD of input and output	1	28.09.2018		TLM1	CO4	T1,R6	
55.	Tutorial – XIII	1	29.09.2018		TLM3	CO4	T1,R6	
56.	Introduction to Noise	1	03.10.2018		TLM1	CO4	T1,R6	

57.	Classification of Noise	1	05.10.2018		TLM1	CO4	T1,R6	
No. of classes required to complete UNIT-V		10			No. of classes taken:			

Contents beyond the Syllabus

S. No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	Concept of random variables in Communications	1	06.10.2018		TML2	

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

Part - C

EVALUATION PROCESS:

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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs) :

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Communications: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: VLSI & Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO3: Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Mr. G L N Murthy
Course Instructor

Mr. G L N Murthy
Course Coordinator

Dr. M Madhavi
Module Coordinator

Dr. Y Amar Babu
HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE- A- Section
ACADEMIC YEAR : 2018 - 19
COURSE NAME & CODE : Pulse & Switching Circuits – [17EC07]
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. K. Sasi Bhushan
COURSE COORDINATOR : Mr. B.Siva Hari Prasad

PRE-REQUISITE : Electrical Circuit and Networks and Analog Electronic Circuits

Course Educational Objective: This course provides the knowledge on linear and nonlinear wave shaping circuits, switching characteristics of diode and transistor. This course also gives an idea about operation, analysis and design of different types of multi-vibrator circuits, time base generators and sampling gates.

COURSE OUTCOMES (CO):

CO1: **Analyze** the output characteristics of linear circuits for different test signals.

CO2: **Develop** nonlinear circuits like clippers and clampers using active and passive elements.

CO3: **Examine** the switching characteristics of nonlinear elements used in various digital circuits.

CO4: **Design** various multivibrator circuits.

CO5: **Illustrate** the operation of various time base generator circuits and sampling gates.

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

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

BOS APPROVED TEXT BOOKS:

T1	J.Millman and H.Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill Publishers, 2 nd Edition.
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BOS APPROVED

R1	A. Anand Kumar, "Pulse and Digital Circuits", PHI Publishers, 2005.
R2	K.Venkatarao, K.Rama Sudha and G.Manmadha rao, "Pulse and digital circuits", Pearson education Publishers.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A**UNIT-I : Linear Wave Shaping Circuits**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52.	Introduction to linear wave shaping	01	11-06-18		TLM1	CO1	T1 & R1	
53.	Low pass and High pass RC circuits.	01	14-06-18		TLM1	CO1	T1 & R1	
54.	Low pass circuit response for sinusoidal signal	01	15-06-18		TLM1	CO1	T1 & R1	
55.	Low pass circuit response for step & pulse signal	01	16-06-18		TLM1	CO1	T1 & R1	
56.	Low pass circuit response for square and ramp signals.	01	18-06-18		TLM1	CO1	T1 & R1	
57.	Tutorial - 1	01	21-06-18		TLM3	CO1	T1 & R1	
58.	High pass circuit response for sinusoidal signal	01	22-06-18		TLM1	CO1	T1 & R1	
59.	High pass circuit response for step & pulse signal	01	23-06-18		TLM1	CO1	T1 & R1	
60.	High pass circuit response for square and ramp signals.	01	25-06-18		TLM1	CO1	T1 & R1	
61.	Tutorial - 2	01	28-06-18		TLM3	CO1	T1 & R1	
62.	RC circuit as integrator	01	29-06-18		TLM4	CO1	T1 & R1	
63.	RC circuit as, integrator	01	30-06-18		TLM1	CO1	T1 & R1	
64.	Double differentiator.	01	02-07-18		TLM1&4	CO1	T1 & R1	
65.	Tutorial - 3	01	05-07-18		TLM3	CO1	T1 & R1	
No. of classes required to complete UNIT-I		14			No. of classes taken:			

UNIT- II : Non Linear Wave Shaping Circuits:

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 non-linear wave shaping	01	06-07-18		TLM1	CO2	T1 & R1	
2.	Clipper circuits using PN Junction,	01	07-07-18		TLM1	CO2	T1 & R1	
3.	Clipper circuits using Zener Diode	01	09-07-18		TLM1	CO2	T1 & R1	
4.	Transistor Clipper circuits	01	11-07-18		TLM1			
5.	Tutorial - 4	01	14-07-18		TLM3			
6.	Clipping at two independent levels.	01	15-07-18		TLM1	CO2	T1 & R1	

7.	Emitter coupled clipper	01	16-07-18		TLM1	CO2	T1 & R1	
8.	Tutorial - 5	01	19-07-18		TLM3	CO2	T1 & R1	
9.	Comparators & Voltage comparators,	01	20-07-18		TLM1	CO2	T1 & R1	
10.	Clamping operation,	01	21-07-18		TLM1	CO2	T1 & R1	
11.	Clamping circuits using diode with different inputs,	01	23-07-18		TLM1	CO2	T1 & R1	
12.	Clamping circuit theorem	01	23-07-18		TLM1	CO2	T1 & R1	
13.	Tutorial - 6	01	26-07-18		TLM3	CO2	T1 & R1	
14.	Practical clamping circuits	01	28-07-18		TLM1	CO2	T1 & R1	
No. of classes required to complete UNIT-II		14			No. of classes taken:			

UNIT- III : Switching Characteristics of Devices & Multivibrators-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
1.	Diode Modeling & Switching Times,	01	06-08-18		TLM1	CO3	T1 & R1	
2.	Tutorial - 7	01	09-08-18		TLM3	CO3	T1 & R1	
3.	Transistor as a switch,	01	10-08-18		TLM1	CO3	T1 & R1	
4.	Saturation parameters of Transistor and their variation with temperature.	01	11-08-18		TLM1	CO3	T1 & R1	
5.	Bistable Multivibrator-	01	13-08-18		TLM1	CO3	T1 & R1	
6.	Tutorial - 8	01	16-08-18		TLM3	CO3	T1 & R1	
7.	Fixed & Self-biased binary,	01	17-08-18		TLM1	CO3	T1 & R1	
8.	Principle of operation, analysis	01	18-08-18		TLM1	CO3	T1 & R1	
9.	Design of Bistable Multivibrator	01	20-08-18		TLM1	CO3	T1 & R1	
10.	Tutorial - 9	01	23-08-18		TLM3	CO3	T1 & R1	
No. of classes required to complete UNIT-III		10			No. of classes taken:			

UNIT- IV: Multivibrators-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Triggering types	01	24-08-18		TLM1	CO4	T1 & R1	
2.	Schmitt trigger circuit- Principle of operation, analysis	01	25-08-18		TLM1	CO4	T1 & R1	
3.	Schmitt trigger circuit design, calculation of UTP, LTP and	01	27-08-18		TLM1	CO4	T1 & R1	

	applications,							
4.	Tutorial - 10	01	30-08-18		TLM3	CO4	T1 & R1	
5.	Schmitt trigger circuit applications	01	31-08-18		TLM1	CO4	T1 & R1	
6.	Collector-coupled Monostable Multivibrator analysis	01	01-09-18		TLM1	CO4	T1 & R1	
7.	Collector-coupled Monostable Multivibrator design	01	03-09-18		TLM1	CO4	T1 & R1	
8.	Tutorial - 11	01	06-09-18		TLM3	CO4	T1 & R1	
9.	Astable Multivibrator Principle of operation, analysis	01	07-09-18		TLM1	CO4	T1 & R1	
10.	Astable Multivibrator design	01	08-09-18		TLM1	CO4	T1 & R1	
11.	Problems on Astable	01	10-09-18					
12.	Tutorial - 12	01	13-09-18		TLM3	CO4	T1 & R1	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT- V: Time Base Generators & Sampling Gates

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.	Features of Time Base Signals.	01	14-09-18		TLM1	CO5	T1 & R1	
2.	Types of errors and relation between them.	01	15-09-18		TLM1	CO5	T1 & R1	
3.	Methods of generating time based signals,	01	17-09-18		TLM1	CO5	T1 & R1	
4.	Tutorial - 13	01	20-09-18		TLM3	CO5	T1 & R1	
5.	UJT saw tooth generator	01	21-09-18		TLM1	CO5	T1 & R1	
6.	Bootstrap ramp generator.	01	22-09-18		TLM1	CO5	T1 & R1	
7.	Miller integrator ramp generator.	01	24-09-18		TLM1	CO5	T1 & R1	
8.	Tutorial - 14	01	27-09-18		TLM3	CO5	T1 & R1	
9.	Operating principles of sampling gates.	01	28-09-18		TLM1	CO5	T1 & R1	
10.	Unidirectional and Bi-directional sampling gates: (Two diode, Four diode)	01	29-09-18		TLM1	CO5	T1 & R1	
11.	Two transistor sampling gates.	01	01-10-18		TLM1	CO5	T1 & R1	
12.	Reduction of pedestal in sampling gate circuits.	01	04-10-18		TLM1	CO5	T1 & R1	
13.	Applications of sampling gates.	01	05-10-18		TLM1	CO5	T1 & R1	
14.	Revision	01	06-10-18		TLM4	CO5	T1 & R1	
No. of classes required to		14			No. of classes taken:			

complete UNIT-V				
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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: $B=(B1+B2)/2$	1,2,3,4,5	B=10
Evaluation of Mid Marks: $C=75\%$ of $\text{Max}(C1,C2)+25\%$ of $\text{Min}(C1,C2)$	1,2,3,4,5	C=20
Attendance: D		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

PROGRAMME OUTCOMES (POs):

PO 1:	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2:	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3:	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
PO 6:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO 7:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1:	Communication: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
PSO 2:	VLSI and Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
PSO 3:	Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Mr. K. Sasi Bhushan	Mr.B.Siva Hari Prasad	Dr. G.Sinivasa Rao	Dr. Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

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(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., ECE- B-Section
ACADEMIC YEAR : 2018 - 19
COURSE NAME & CODE : Pulse & Switching Circuits – 17EC07
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. B.Siva Hari Prasad
COURSE COORDINATOR : Mr.K.Sasibhushan

PRE-REQUISITE : Electrical Circuit and Networks and Analog Electronic Circuits

Course Educational Objective: This course provides the knowledge on linear and nonlinear wave shaping circuits, switching characteristics of diode and transistor. This course also gives an idea about operation, analysis and design of different types of multi-vibrator circuits, time base generators and sampling gates.

COURSE OUTCOMES (CO):

CO1: **Analyze** the output characteristics of linear circuits for different test signals.

CO2: **Develop** nonlinear circuits like clippers and clampers using active and passive elements.

CO3: **Examine** the switching characteristics of nonlinear elements used in various digital circuits.

CO4: **Design** various multivibrator circuits.

CO5: **Illustrate** the operation of various time base generator circuits and sampling gates.

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

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

BOS APPROVED TEXT BOOKS:

T1	J.Millman and H.Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill Publishers, 2 nd Edition.
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BOS APPROVED

R1	A. Anand Kumar, "Pulse and Digital Circuits", PHI Publishers, 2005.
R2	K.Venkatarao, K.Rama Sudha and G.Manmadha rao, "Pulse and digital circuits", Pearson education Publishers.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B**UNIT-I : Linear Wave Shaping Circuits**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
59.	Introduction to linear wave shaping	01	12-06-2018					
60.	Low pass and High pass RC circuits.	01	14-06-2018					
61.	Low pass circuit response for sinusoidal signal	01	15-06-2018					
62.	Low pass circuit response for step & pulse signal	01	19-06-2018					
63.	LP circuit response for square and ramp signals, integrator	02	21-06-2018					
64.	Tutorial - 1	01	22-06-2018					
65.	High pass circuit response for sinusoidal signal	01	23-06-2018					
66.	High pass circuit response for step & pulse signal	01	26-06-2018					
67.	High pass circuit response for square and ramp signals.	01	28-06-2018					
68.	Tutorial - 2	01	29-06-2018					
69.	Double differentiator.	01	30-06-2018					
70.	Tutorial - 3	01	03-07-2018					
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT- II : Non Linear Wave Shaping Circuits:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
15.	Introduction to non-linear wave shaping	01	06-07-2018					
16.	Clipper circuits using PN Junction.	02	07-07-2018					
			10-07-2018					
17.	Clipper circuits using Zener Diode and Transistor.	01	12-07-2018					
18.	Tutorial - 4	01	13-07-2018					
19.	Clipping at two independent levels.	01	14-07-2018					

20.	Emitter coupled clipper, Comparators.	02	17-07-2018 19-07-2018					
21.	Clamping operation.	01	20-07-2018					
22.	Clamping circuits using diode with different inputs.	02	21-07-2018 24-07-2018					
23.	Clamping circuit theorem	01	26-07-2018					
24.	Practical clamping circuits	01	27-07-2018					
25.	Tutorial - 5	01	28-07-2018					
No. of classes required to complete UNIT-II		14			No. of classes taken:			

UNIT- III : Switching Characteristics of Devices & Multivibrators-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
11.	Diode Modeling,	01	07-08-2018					
12.	Diode Switching Times,	01	09-08-2018					
13.	Transistor as a switch,	01	10-08-2018					
14.	Saturation parameters of Transistor and their variation with temperature.	01	11-08-2018					
15.	Tutorial - 6	01	14-08-2018					
16.	Bistable Multivibrator-.	01	16-08-2018					
17.	Fixed bias binary	01	17-08-2018					
18.	Self-biased binary,	01	18-08-2018					
19.	Principle of operation, analysis	01	21-08-2018					
20.	Design of Bistable Multivibrator	01	23-08-2018					
21.	Tutorial - 7	01	24-08-2018					
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT- IV: Multivibrators-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
13.	Triggering types	01	25-08-2018					

14.	Schmitt trigger circuit- Principle of operation, analysis	01	28-08-2018					
15.	Schmitt trigger circuit design,	01	30-08-2018					
16.	calculation of UTP, LTP and applications,	01	31-08-2018					
17.	Schmitt trigger circuit applications	01	01-09-2018					
18.	Tutorial - 8	01	04-09-2018					
19.	Collector-coupled Monostable Multivibrator analysis	01	06-09-2018					
20.	Collector-coupled Monostable Multivibrator design	01	07-09-2018					
21.	Tutorial - 9	01	08-09-2018					
22.	Astable Multivibrator Principle of operation, analysis	01	11-09-2018					
23.	Astable Multivibrator design	01	14-09-2018					
24.	Tutorial - 10	01	15-09-2018					
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT- V: Time Base Generators & Sampling Gates

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
15.	Features of Time Base Signals.	01	18-09-2018					
16.	Types of errors and relation between them.	01	20-09-2018					
17.	Methods of generating time based signals,	01	22-09-2018					
18.	UJT saw tooth generator.	01	25-09-2018					
19.	Bootstrap ramp generator.	01	27-09-2018					
20.	Miller integrator ramp generator.	01	28-09-2018					
21.	Tutorial - 11	01	29-09-2018					
22.	Operating principles of sampling gates.	01	04-10-2018					
23.	Unidirectional and Bi- directional sampling gates: (Two diode, Four diode)	01	05-10-2018					
24.	Two transistor sampling gates.	01	06-10-2018					

25.	Reduction of pedestal in sampling gate circuits.	01	09-10-2018					
26.	Applications of sampling gates.	01	11-10-2018					
27.	Tutorial - 12	01	12-10-2018					
28.	Advanced topics	01	13-10-2018					
No. of classes required to complete UNIT-V		14			No. of classes taken:			

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: $B=(B1+B2)/2$	1,2,3,4,5	B=10
Evaluation of Mid Marks: $C=75\%$ of $\text{Max}(C1,C2)+25\%$ of $\text{Min}(C1,C2)$	1,2,3,4,5	C=20
Attendance: D		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

B SIVA HARI PRASAD	B SIVA HARI PRASAD	Dr. G.Sinivasa Rao	Dr. E.V.Krishna Rao
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

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

COURSE HANDOUT

PROGRAM : B.Tech., III Sem., ECE- C-Section
ACADEMIC YEAR : 2018 - 19
COURSE NAME & CODE : Pulse & Switching Circuits – 17EC07
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. B.Siva Hari Prasad
COURSE COORDINATOR : Mr.K.Sasibhushan

PRE-REQUISITE : Electrical Circuit and Networks and Analog Electronic Circuits

Course Educational Objective: This course provides the knowledge on linear and nonlinear wave shaping circuits, switching characteristics of diode and transistor. This course also gives an idea about operation, analysis and design of different types of multi-vibrator circuits, time base generators and sampling gates.

COURSE OUTCOMES (CO):

CO1: **Analyze** the output characteristics of linear circuits for different test signals.

CO2: **Develop** nonlinear circuits like clippers and clampers using active and passive elements.

CO3: **Examine** the switching characteristics of nonlinear elements used in various digital circuits.

CO4: **Design** various multivibrator circuits.

CO5: **Illustrate** the operation of various time base generator circuits and sampling gates.

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

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

BOS APPROVED TEXT BOOKS:

T1	J.Millman and H.Taub, "Pulse, Digital and Switching Waveforms", McGraw-Hill Publishers, 2 nd Edition.
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BOS APPROVED

R1	A. Anand Kumar, "Pulse and Digital Circuits", PHI Publishers, 2005.
R2	K.Venkatarao, K.Rama Sudha and G.Manmadha rao, "Pulse and digital circuits", Pearson education Publishers.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B**UNIT-I : Linear Wave Shaping Circuits**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52.	Introduction to linear wave shaping	01	12-06-2018					
53.	Low pass and High pass RC circuits.	01	14-06-2018					
54.	Low pass circuit response for sinusoidal signal	01	15-06-2018					
55.	Low pass circuit response for step & pulse signal	01	19-06-2018					
56.	LP circuit response for square and ramp signals, integrator	02	21-06-2018					
57.	Tutorial - 1	01	22-06-2018					
58.	High pass circuit response for sinusoidal signal	01	23-06-2018					
59.	High pass circuit response for step & pulse signal	01	26-06-2018					
60.	High pass circuit response for square and ramp signals.	01	28-06-2018					
61.	Tutorial - 2	01	29-06-2018					
62.	Double differentiator.	01	30-06-2018					
63.	Tutorial - 3	01	03-07-2018					
No. of classes required to complete UNIT-I		13			No. of classes taken:			

UNIT- II : Non Linear Wave Shaping Circuits:

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
26.	Introduction to non-linear wave shaping	01	06-07-2018					
27.	Clipper circuits using PN Junction.	02	07-07-2018 10-07-2018					
28.	Clipper circuits using Zener Diode and Transistor.	01	12-07-2018					
29.	Tutorial - 4	01	13-07-2018					
30.	Clipping at two independent levels.	01	14-07-2018					

31.	Emitter coupled clipper, Comparators.	02	17-07-2018 19-07-2018					
32.	Clamping operation.	01	20-07-2018					
33.	Clamping circuits using diode with different inputs.	02	21-07-2018 24-07-2018					
34.	Clamping circuit theorem	01	26-07-2018					
35.	Practical clamping circuits	01	27-07-2018					
36.	Tutorial - 5	01	28-07-2018					
No. of classes required to complete UNIT-II		14			No. of classes taken:			

UNIT- III : Switching Characteristics of Devices & Multivibrators-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
22.	Diode Modeling,	01	07-08-2018					
23.	Diode Switching Times,	01	09-08-2018					
24.	Transistor as a switch,	01	10-08-2018					
25.	Saturation parameters of Transistor and their variation with temperature.	01	11-08-2018					
26.	Tutorial - 6	01	14-08-2018					
27.	Bistable Multivibrator-.	01	16-08-2018					
28.	Fixed bias binary	01	17-08-2018					
29.	Self-biased binary,	01	18-08-2018					
30.	Principle of operation, analysis	01	21-08-2018					
31.	Design of Bistable Multivibrator	01	23-08-2018					
32.	Tutorial - 7	01	24-08-2018					
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT- IV: Multivibrators-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25.	Triggering types	01	25-08-2018					

26.	Schmitt trigger circuit- Principle of operation, analysis	01	28-08-2018					
27.	Schmitt trigger circuit design,	01	30-08-2018					
28.	calculation of UTP, LTP and applications,	01	31-08-2018					
29.	Schmitt trigger circuit applications	01	01-09-2018					
30.	Tutorial - 8	01	04-09-2018					
31.	Collector-coupled Monostable Multivibrator analysis	01	06-09-2018					
32.	Collector-coupled Monostable Multivibrator design	01	07-09-2018					
33.	Tutorial - 9	01	08-09-2018					
34.	Astable Multivibrator Principle of operation, analysis	01	11-09-2018					
35.	Astable Multivibrator design	01	14-09-2018					
36.	Tutorial - 10	01	15-09-2018					
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT- V: Time Base Generators & Sampling Gates

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
29.	Features of Time Base Signals.	01	18-09-2018					
30.	Types of errors and relation between them.	01	20-09-2018					
31.	Methods of generating time based signals,	01	22-09-2018					
32.	UJT saw tooth generator.	01	25-09-2018					
33.	Bootstrap ramp generator.	01	27-09-2018					
34.	Miller integrator ramp generator.	01	28-09-2018					
35.	Tutorial - 11	01	29-09-2018					
36.	Operating principles of sampling gates.	01	04-10-2018					
37.	Unidirectional and Bi- directional sampling gates: (Two diode, Four diode)	01	05-10-2018					
38.	Two transistor sampling gates.	01	06-10-2018					

39.	Reduction of pedestal in sampling gate circuits.	01	09-10-2018					
40.	Applications of sampling gates.	01	11-10-2018					
41.	Tutorial - 12	01	12-10-2018					
42.	Advanced topics	01	13-10-2018					
No. of classes required to complete UNIT-V		14			No. of classes taken:			

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: $B=(B1+B2)/2$	1,2,3,4,5	B=10
Evaluation of Mid Marks: $C=75\%$ of $\text{Max}(C1,C2)+25\%$ of $\text{Min}(C1,C2)$	1,2,3,4,5	C=20
Attendance: D		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

B SIVA HARI PRASAD	B SIVA HARI PRASAD	Dr. G.Sinivasa Rao	Dr. E.V.Krishna Rao
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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(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., ECE-A
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: Analog Integrated Circuits – 17EC08
L-T-P STRUCTURE	: 3-1-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Mr. G.Venkata Rao.
COURSE COORDINATOR	: Mr. G.Venkata Rao.

COURSE OBJECTIVE: This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

CO1: **Remember** the fundamental concepts of Differential amplifiers and Transistor current sources.

CO2: **Understand** the Applications of Op-Amp.

CO3: **Design** different types of Active filters and waveform generators.

CO4: **Apply** the 555 Timer circuits and Phased Locked Loop for various applications.

CO5: **Evaluate** the performance of ADC and DAC.

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	-	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	2	-	-	3
CO3	-	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO4	3	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

T1. Ramakanth A.Gayakwad, Op-amps and Linear Integrated Circuits, PHI Publishers, 4th Edition.

BOS APPROVED REFERENCE BOOKS:

R1. D.Roy choudhury, Linear Integrated Circuits, New Age International (P) Ltd.

R2. M.H Rashid, “Microelectronic Circuits: Analysis and Design”, PWS Publishing Company, 2nd Edition.

R3. R.F. Coughlin and Fredrick Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI Publishers.

R4. K.Lal Kishore, Operational Amplifiers and Linear Integrated Circuits, Pearson education Publishers.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A**UNIT-I: INTRODUCTION, TRANSISTOR CURRENT SOURCE & DIFFERENTIAL AMPLIFIERS (DA)**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the Subject , Discussion about Syllabus and course outcomes	1	11-06-18		TLM1	CO1	T1, R1	
2.	Integrated circuit (IC) definition, & IC technologies	1	13-06-18		TLM1	CO1	T1, R1	
3.	Types of ICs, Differences between Analog IC and Digital IC	1	14-06-18		TLM1	CO1	T1, R1	
4.	Basic Current Source, Modified Basic Current Source and Widlar Current Source	1	15-06-18		TLM1	CO1	T1, R1	
5.	TUTORIAL- 01	1	18-06-18		TLM3	CO1	T1, R1	
6.	Cascode Current Source, Wilson Current Source	1	20-06-18		TLM2	CO1	T1, R1	
7.	Differential Amplifier (DA) overview and its Configurations and its	1	21-06-18		TLM2	CO1	T1, R1	

	DC Analysis							
8.	AC Analysis of Dual input DA	1	22-06-18		TLM1	CO1	T1, R1	
9.	TUTORIAL-02	1	25-06-18		TLM3	CO1	T1, R1	
10.	AC Analysis of single input balanced output & unbalanced output DA	1	27-06-18		TLM1	CO1	T1, R1	
11.	FET Differential amplifier	1	28-06-18		TLM1	CO1	T1, R1	
12.	DC Coupling and Cascade DA, Level Translator	1	29-06-18		TLM1	CO1	T1, R1	
13.	TUTORIAL-03	1	02-07-18		TLM3	CO1	T1, R1	
No. of classes required to complete UNIT-I		13	No. of classes taken:					

UNIT-II: OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
14.	OP- Amp Block Diagram, Package Types, IC741 and its Features, Power supply requirements	1	04-07-18		TLM1	CO2	T1, R1	
15.	Ideal & Practical Op- Amp and its characteristics, CMRR	1	05-07-18		TLM1	CO2	T1, R1	
16.	DC and AC Characteristics of Op- Amp	1	06-07-18		TLM1	CO2	T1, R1	
17.	TUTORIAL-04	1	09-07-18		TLM3	CO2	T1, R1	
18.	Inverting , Non inverting amplifier & voltage follower, Op- Amp adder, Subtractor & Adder-Subtractor	1	11-07-18		TLM1	CO2	T1, R1	
19.	V to I & I to V converters, Instrumentation Amplifier	1	12-07-18		TLM1	CO2	T1, R1	
20.	Integrator & Differentiator	1	13-07-18		TLM2	CO2	T1, R1	
21.	TUTORIAL-05	1	16-07-18		TLM3	CO2	T1, R1	
22.	AC amplifier, Log and Anti Log Amplifiers , Analog Multiplier, Four Quadrant Multiplier	1	18-07-18		TLM1	CO2	T1, R1	

23.	Squarer Circuit, Square root Circuit & Analog Divider	1	19-07-18		TLM1	CO2	T1, R1	
24.	Op-Amp circuits using Diodes, Sample & Hold Circuit, IC1496	1	20-07-18		TLM1	CO2	T1, R1	
25.	TUTORIAL-06	1	23-07-18		TLM3	CO2	T1, R1	
No. of classes required to complete UNIT-II		12	No. of classes taken:					

UNIT-III: OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP OSCILLATORS

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
26.	Introduction to Active Filters and their frequency responses	1	25-07-18		TLM1	CO3	T1, R1	
27.	1 st order Low pass and High pass filter using OP-Amp	1	26-07-18		TLM1	CO3	T1, R1	
28.	2 nd order Low pass and High pass filter using OP-Amp	1	27-07-18		TLM1	CO3	T1, R1	
29.	TUORIAL-07	1	06-08-18		TLM3	CO3	T1, R1	
30.	Band pass (wide band pass and Narrow band pass) filter	1	08-08-18		TLM2	CO3	T1, R1	
31.	Band reject filters and All pass filter	1	09-08-18		TLM2	CO3	T1, R1	
32.	Comparator circuit and Regenerative comparator (Schmitt trigger)	1	10-08-18		TLM1	CO3	T1, R1	
33.	TUTORIAL-08	1	13-08-18		TLM3	CO3	T1, R1	
34.	Square wave & Triangular wave Generators	1	16-08-18		TLM1	CO3	T1, R1	
35.	IC Function generator	1	17-08-18		TLM1	CO3	T1, R1	
36.	TUTORIAL-09	1	20-08-18		TLM3	CO3	T1, R1	
37.	Astable Multivibrator and Monostable Multivibrator	1	23-08-18		TLM1	CO3	T1, R1	
38.	RC phase shift oscillator using Op- Amp and Wein Bridge oscillator using Op-Amp	1	24-08-18		TLM1	CO3	T1, R1	
39.	TUTORIAL-10	1	27-08-18		TLM3	CO3	T1, R1	

No. of classes required to complete UNIT-III	14	No. of classes taken:
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UNIT-IV: 555 TIMER, PHASE LOCKED LOOPM& IC VOLTAGE REGULATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.	Pin , Functional diagram of 555 timer and Monostable Operation and its applications	1	29-08-18		TLM1	CO4	T1, R1	
41.	Astable Operation and its applications	1	30-08-18		TLM1	CO4	T1, R1	
42.	Schmitt trigger using IC 555	1	31-08-18		TLM1	CO4	T1, R1	
43.	TUTORIAL-11	1	05-09-18		TLM3	CO4	T1, R1	
44.	IC 565 PLL block schematic, Principle and description of PLL	1	06-09-18		TLM1	CO4	T1, R1	
45.	Applications of PLL	1	07-09-18		TLM1	CO4	T1, R1	
46.	TUTORIAL-12	1	10-09-18		TLM3	CO4	T1, R1	
47.	Fixed voltage regulators	1	12-09-18		TLM2	CO4	T1, R1	
48.	IC 723 voltage regulators	1	14-09-18		TLM2	CO4	T1, R1	
49.	TUTORIAL-13	1	17-09-18		TLM3	CO4	T1, R1	
No. of classes required to complete UNIT-IV		10	No. of classes taken:					

UNIT-V: DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

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
50.	Introduction to converters and Specifications of DAC and ADC	1	19-09-18		TLM1	CO5	T1, R1	
51.	Weighted Resistor DAC & R-2R Ladder DAC	1	20-09-18		TLM1	CO5	T1, R1	
52.	TUTORIAL-14	1	24-09-18		TLM3	CO5	T1, R1	
53.	Inverted R-2R DAC	1	26-09-18		TLM1	CO5	T1, R1	
54.	Flash(Comparator) type ADC, Counter type ADC	1	27-09-18		TLM2	CO5	T1, R1	
55.	Tracking converter, Successive	1	28-09-18		TLM2	CO5	T1, R1	

	Approximation ADC						
56.	TUTORIAL-15	1	01-10-18		TLM3	CO5	T1, R1
57.	Charge balancing ADC & Dual slope ADC	1	03-10-18		TLM1	CO5	T1, R1
No. of classes required to complete UNIT-V		08	No. of classes taken:				

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
58.	About VLSI	1	04-10-18		TLM2	
59.	Applications of VLSI	1	05-10-18		TLM2	

Teaching Learning Methods

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

ACADEMIC CALENDAR:

Description	From	To	Weeks
I Phase of Instructions-1	11/06/2018	20/07/2018	7 W
I Mid Examinations	30/08/2018	04/08/2018	1W
II Phase of Instructions	06/08/2018	06/10/2018	9W
II Mid Examinations	08/10/2018	13/10/2018	1 W
Preparation and Practicals	15/10/2018	27/10/2018	2 W
Semester End Examinations	29/10/2018	10/11/2018	2 W

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	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 $\text{Max}(B1,B2)+25\%$ of $\text{Min}(B1,B2)$	1,2,3,4,5	B=10
Evaluation of Mid Marks: $C=75\%$ of $\text{Max}(C1,C2)+25\%$ of $\text{Min}(C1,C2)$	1,2,3,4,5	C=20
Attendance: D		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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs) :

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Communications: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: VLSI & Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO3: Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Mr.G.Venkata Rao
Course Instructor

Mr.G.Venkata Rao
Course Coordinator

Dr.G.Srinivasa Rao
Module Coordinator

Dr. Y Amar Babu
HOD

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., ECE-B
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: Analog Integrated Circuits – 17EC08
L-T-P STRUCTURE	: 3-1-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Mr. G.Venkata Rao.
COURSE COORDINATOR	: Mr. G.Venkata Rao.

COURSE OBJECTIVE: This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

- CO1: **Remember** the fundamental concepts of Differential amplifiers and Transistor current sources.
- CO2: **Understand** the Applications of Op-Amp.
- CO3: **Design** different types of Active filters and waveform generators.
- CO4: **Apply** the 555 Timer circuits and Phased Locked Loop for various applications.
- CO5: **Evaluate** the performance of ADC and DAC.

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	-	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	2	-	-	3
CO3	-	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO4	3	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

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R2. M.H Rashid, “Microelectronic Circuits: Analysis and Design”, PWS Publishing Company, 2nd Edition.

R3. R.F. Coughlin and Fredrick Driscoll, Operational Amplifiers and Linear Integrated Circuits, PHI Publishers.

R4. K.Lal Kishore, Operational Amplifiers and Linear Integrated Circuits, Pearson education Publishers.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B**UNIT-I: INTRODUCTION, TRANSISTOR CURRENT SOURCE & DIFFERENTIAL AMPLIFIERS (DA)**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to the Subject , Discussion about Syllabus and course outcomes	1	11-06-18		TLM1	CO1	T1, R1	
2.	Integrated circuit (IC) definition, & IC technologies	1	12-06-18		TLM1	CO1	T1, R1	
3.	Types of ICs, Differences b/w Analog IC and Digital IC	1	14-06-18		TLM1	CO1	T1, R1	
4.	Basic Current Source, Modified Basic Current Source and Widlar Current Source	1	15-06-18		TLM1	CO1	T1, R1	
5.	Cascode Current Source, Wilson Current Source	1	18-06-18		TLM1	CO1	T1, R1	
6.	TUTORIAL-01	1	19-06-18		TLM3	CO1	T1, R1	
7.	Differential Amplifier (DA) overview and its Configurations and its DC Analysis	1	21-06-18		TLM2	CO1	T1, R1	
8.	AC Analysis of Dual input DA	1	22-06-18		TLM2	CO1	T1, R1	
9.	AC Analysis of single input balanced output & unbalanced output DA	1	25-06-18		TLM1	CO1	T1, R1	
10.	TUTORIAL-02	1	26-06-18		TLM3	CO1	T1, R1	
11.	FET Differential amplifier	1	28-06-18		TLM1	CO1	T1, R1	
12.	DC Coupling and Cascade DA, Level Translator	1	29-06-18		TLM1	CO1	T1, R1	
No. of classes required to complete UNIT-I		12	No. of classes taken:					

UNIT-II: OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
13.	OP- Amp Block Diagram, Package Types, IC741 and its Features, Power supply requirements	1	02-07-18		TLM1	CO2	T1, R1	
14.	TUTORIAL-03	1	03-07-18		TLM3	CO2	T1, R1	
15.	Ideal & Practical Op-Amp and its characteristics, CMRR	1	05-07-18		TLM1	CO2	T1, R1	
16.	DC and AC Characteristics of Op-Amp	1	06-07-18		TLM1	CO2	T1, R1	
17.	Inverting , Non inverting amplifier & voltage follower, Op-Amp adder, Subtractor & Adder-Subtractor	1	09-07-18		TLM1	CO2	T1, R1	
18.	TUTORIAL-04	1	10-07-18		TLM3	CO2	T1, R1	
19.	V to I & I to V converters, Instrumentation Amplifier	1	12-07-18		TLM1	CO2	T1, R1	
20.	Integrator & Differentiator	1	13-07-18		TLM2	CO2	T1, R1	
21.	AC amplifier, Log and Anti Log Amplifiers , Analog Multiplier, Four Quadrant Multiplier	1	16-07-18		TLM1	CO2	T1, R1	
22.	TUTORIAL-05	1	17-07-18		TLM3	CO2	T1, R1	
23.	Squarer Circuit, Square root Circuit & Analog Divider	1	19-07-18		TLM1	CO2	T1, R1	
24.	Op-Amp circuits using Diodes, Sample & Hold Circuit, IC 1496	1	20-07-18		TLM1	CO2	T1, R1	
No. of classes required to complete UNIT-II		12	No. of classes taken:					

UNIT-III: OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP OSCILLATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
25.	Introduction to Active Filters and their frequency responses	1	23-07-18		TLM1	CO3	T1, R1	
26.	TUTORIAL-06	1	24-07-18		TLM3	CO3	T1, R1	
27.	1 st order Low pass and High pass filter using OP-Amp	1	26-07-18		TLM1	CO3	T1, R1	
28.	2 nd order Low pass and High pass filter using OP-Amp	1	27-07-18		TLM2	CO3	T1, R1	
29.	Band pass (wide band pass and Narrow band pass) filter	1	06-08-18		TLM2	CO3	T1, R1	
30.	TUORIAL-07	1	07-08-18		TLM3	CO3	T1, R1	
31.	Band reject filters and All pass filter	1	09-08-18		TLM1	CO3	T1, R1	

32.	Comparator circuit and Regenerative comparator (Schmitt trigger)	1	10-08-18		TLM1	CO3	T1, R1
33.	Square wave & Triangular wave Generators	1	13-08-18		TLM1	CO3	T1, R1
34.	TUORIAL-08	1	14-08-18		TLM3	CO3	T1, R1
35.	IC Function generator	1	16-08-18		TLM1	CO3	T1, R1
36.	Astable Multivibrator and Monostable Multivibrator	1	17-08-18		TLM1	CO3	T1, R1
37.	RC phase shift oscillator using Op-Amp	1	20-08-18		TLM1	CO3	T1, R1
38.	TUORIAL-09	1	21-08-18		TLM3	CO3	T1, R1
39.	Wein Bridge oscillator using Op-Amp	1	23-08-18		TLM1	CO3	T1, R1
No. of classes required to complete UNIT-III		15	No. of classes taken:				

UNIT-IV: 555 TIMER, PHASE LOCKED LOOPM& IC VOLTAGE REGULATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
40.	Pin , Functional diagram of 555 timer and Monostable Operation and its applications	1	24-08-18		TLM1	CO4	T1, R1	
41.	Astable Operation and its applications, Schmitt trigger using IC 555	1	27-08-18		TLM1	CO4	T1, R1	
42.	TUTORIAL-10	1	28-08-18		TLM3	CO4	T1, R1	
43.	IC 565 PLL block schematic, Principle and description of PLL	1	30-08-18		TLM1	CO4	T1, R1	
44.	Applications of PLL	1	31-08-18		TLM1	CO4	T1, R1	
45.	TUTORIAL-11	1	04-09-18		TLM3	CO4	T1, R1	
46.	Fixed voltage regulators	1	06-09-18		TLM2	CO4	T1, R1	
47.	IC 723 voltage regulators	1	07-09-18		TLM2	CO4	T1, R1	
48.	IC 723 voltage regulators	1	10-09-18		TLM2	CO4	T1, R1	
49.	TUTORIAL-12	1	11-09-18		TLM3	CO4	T1, R1	
No. of classes required to complete UNIT-IV		10	No. of classes taken:					

UNIT-V: DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

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
50.	Introduction to converters and Weighted Resistor DAC	1	14-09-18		TLM1	CO5	T1, R1	
51.	R-2R Ladder DAC & Inverted R-2R DAC	1	17-09-18		TLM1	CO5	T1, R1	
52.	TUTORIAL-13	1	18-09-18		TLM3	CO5	T1, R1	
53.	Flash(Comparator) type ADC, Counter type ADC	1	20-09-18		TLM1	CO5	T1, R1	
54.	Tracking converter, Successive Approximation ADC	1	24-09-18		TLM2	CO5	T1, R1	
55.	TUTORIAL-14	1	25-09-18		TLM3	CO5	T1, R1	
56.	Charge balancing ADC,	1	27-09-18		TLM1	CO5	T1, R1	
57.	Dual slope ADC	1	28-09-18		TLM1	CO5	T1, R1	
58.	Specifications of DAC and ADC	1	01-10-18		TLM1	CO5	T1, R1	
No. of classes required to complete UNIT-V		09	No. of classes taken:					

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.	About VLSI	1	04-10-18			
60.	Applications of VLSI	1	05-10-18			

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	20/07/2018	7 W
I Mid Examinations	30/08/2018	04/08/2018	1W
II Phase of Instructions	06/08/2018	06/10/2018	9W
II Mid Examinations	08/10/2018	13/10/2018	1 W
Preparation and Practicals	15/10/2018	27/10/2018	2 W
Semester End Examinations	29/10/2018	10/11/2018	2 W

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	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		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

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

PEO1: To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.

PEO2: To Function professionally in the rapidly changing world with advances in technology

PEO3: To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4: To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs) :

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Communications: Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.

PSO2: VLSI & Embedded Systems: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools.

PSO3: Signal Processing: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications.

Mr.G.Venkata Rao
Course Instructor

Mr.G.Venkata Rao
Course Coordinator

Dr.G.Srinivasa Rao
Module Coordinator

Dr. Y Amar Babu
HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE- C-Section
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: Analog Integrated Circuits – 17EC08
L-T-P STRUCTURE	: 2-2-0
COURSE CREDITS	: 3
COURSE INSTRUCTOR	: Mr. M.Sivasankara Rao.
COURSE COORDINATOR	: Mr. G.Venkata Rao.

COURSE OBJECTIVE: This course provides the knowledge on basic Integrated Circuit (IC), Op-amp internal structure and various open-loop and closed loop applications of it. Design of Active Filters and different waveform generators. It provides the importance of 555 timer and its applications. It also explains the Phased Locked Loop, its applications and ADC and DAC converters.

COURSE OUTCOMES (CO)

CO1: **Remember** the Fundamental concepts of Differential amplifiers and Transistor current Sources.

CO2: **Understand** the Applications of Op-Amp.

CO3: **Design** different types of Active Filters and waveform Generators.

CO4: **Apply** the 555 Timer circuits and Phase Locked Loop for various Applications.

CO5: **Evaluate** the performance of ADC and DAC.

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

Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
At the end of the course, student will be able to															
CO1: Remember the fundamental concepts of Differential amplifiers and Transistor current sources.	3	-	-	2	-	-	-	-	-	-	1	-	-	-	3
CO2: Understand the Applications of Op-Amp.	3	3	-	-	-	-	-	-	-	-	-	2	-	-	3
CO3: Design different types of Active filters and waveform generators.	-	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO4: Apply the 555 Timer circuits and Phased Locked Loop for various applications.	3	-	3	-	-	-	-	-	-	-	-	2	-	2	3
CO5: Evaluate the performance of ADC and DAC.	2	-	-	-	-	-	-	-	-	-	-	-	-	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).

BOS APPROVED TEXT BOOKS:

- 1 A.V.Openheim, R.W.Schafer, Digital Signal Processing, PHI learning Pvt. Ltd, 1975, 11th Reprint
- 2 J.G.Proakis, Digital Signal Processing, Principles, Algorithms and Applications, Pearson Education, 4th edition, 2007.

BOS APPROVED REFERENCE BOOKS:

- 1 A.Nagoor Kani, Digital Signal Processing, RBA Publications, Chennai
- 2 P.Ramesh Babu, Digital Signal Processing, Scitech Publications, Chennai

COURSE DELIVERY PLAN (LESSON PLAN): Section-A**UNIT-I: INTRODUCTION, TRANSISTOR CURRENT SOURCE & DIFFERENTIAL AMPLIFIERS (DA)**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to the Subject , Discussion about Syllabus and course outcomes	1	13-06-18			
2.	Integrated circuit (IC) definition, & IC technologies	1	14-06-18			
3.	Types of ICs, Differences between Analog IC and Digital IC	1	15-06-18			
4.	Basic Current Source, Modified Basic Current Source and Widlar Current Source	1	20-06-18			
5.	Cascode Current Source, Wilson Current Source	1	21-06-18			
6.	Differential Amplifier (DA) overview and its Configurations and its DC Analysis	1	22-06-18			
7.	TUTORIAL-01	1	23-06-18			
8.	AC Analysis of Dual input DA	1	27-06-18			
9.	AC Analysis of single input balanced output & unbalanced output DA	1	28-06-18			
10.	DC Coupling and Cascade DA, Level Translator	1	29-06-18			
11.	TUTORIAL-02	1	30-06-18			
12.	FET Differential amplifier	1	04-07-18			
13.	Assignment/Quiz-1	1	05-07-18			
No. of classes required to complete UNIT-I		13	No. of classes taken:			

UNIT-II: OPERATIONAL AMPLIFIERS (OP-AMPS) & APPLICATIONS OF OP-AMPS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
14.	OP- Amp Block Diagram, Package Types, IC741 and its Features, Power supply requirements	1	06-07-18			
15.	Ideal & Practical Op-Amp and its characteristics, CMRR	1	07-07-18			
16.	DC and AC Characteristics of Op-Amp	1	11-07-18			

17.	Inverting , Non inverting amplifier & voltage follower, Op-Amp adder, Subtractor & Adder-Subtractor	1	12-07-18			
18.	V to I & I to V converters, Instrumentation Amplifier	1	13-07-18			
19.	TUTORIAL-03	1	14-07-18			
20.	Integrator & Differentiator	1	18-07-18			
21.	AC amplifier, Log and Anti Log Amplifiers , Analog Multiplier, Four Quadrant Multiplier	1	19-07-18			
22.	Squarer Circuit, Square root Circuit & Analog Divider	1	20-07-18			
23.	TUTORIAL-04	1	21-07-18			
24.	Op-Amp circuits using Diodes, Sample & Hold Circuit, IC 1496	1	25-07-18			
25.	Assignment/Quiz-2	1	26-07-18			
No. of classes required to complete UNIT-II		12	No. of classes taken:			

UNIT-III: OP-AMP ACTIVE FILTERS, OP-AMP WAVEFORM GENERATORS & OP-AMP OSCILLATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
26.	Introduction to Active Filters and their frequency responses	1	27-07-18			
27.	1 st order Low pass and High pass filter using OP-Amp	1	28-07-18			
28.	2 nd order Low pass and High pass filter using OP-Amp	1	08-08-18			
29.	Band pass (wide band pass and Narrow band pass) filter	1	09-08-18			
30.	Band reject filters and All pass filter	1	10-08-18			
31.	TUTORIAL-05	1	11-08-18			
32.	Comparator circuit and Regenerative comparator (Schmitt trigger)	1	16-08-18			
33.	Square wave & Triangular wave Generators	1	17-08-18			
34.	TUTORIAL-06	1	18-08-18			
35.	IC Function generator	1	22-08-18			
36.	Astable Multivibrator and Monostable Multivibrator	1	23-08-18			
37.	TUTORIAL-07	1	25-08-18			
38.	RC phase shift oscillator using Op-Amp	1	29-08-18			
39.	Wein Bridge oscillator using Op-Amp	1	30-08-18			
40.	Assignment/Quiz-3	1	31-08-18			
No. of classes required to complete UNIT-III		15	No. of classes taken:			

UNIT-IV: 555 TIMER, PHASE LOCKED LOOPM& IC VOLTAGE REGULATORS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
41.	TUTORIAL-08	1	01-09-18			
42.	Pin diagram and Functional block diagram of 555 timer, Monostable, Astable Operations of IC555.	1	05-09-18			
43.	Monostable&Astable applications, Schmitt trigger using IC 555	1	06-09-18			
44.	IC 565 PLL block schematic, Principle and description of PLL	1	07-09-18			
45.	TUTORIAL-09	1	08-09-18			
46.	Applications of PLL	1	12-09-18			
47.	Fixed voltage regulators	1	14-09-18			
48.	TUTORIAL-10	1	15-09-18			
49.	IC 723 voltage regulators	1	19-09-18			
50.	Assignment/Quiz-4	1	20-09-18			
No. of classes required to complete UNIT-IV		10	No. of classes taken:			

UNIT-V: DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
51.	Introduction to converters and Weighted Resistor DAC	1	21-09-18			
52.	R-2R Ladder DAC & Inverted R-2R DAC	1	22-09-18			
53.	Flash(Comparator) type ADC, Counter type ADC	1	26-09-18			
54.	Tracking converter, Successive Approximation ADC	1	27-09-18			
55.	Charge balancing ADC, Dual slope ADC and Specifications of DAC and ADC.	1	28-09-18			
56.	TUTORIAL-11	1	29-09-18			
57.	TUTORIAL-12	1	03-10-18			
58.	Assignment/Quiz-5	1	04-10-18			
No. of classes required to complete UNIT-V		08	No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
59.	About VLSI	1	05-10-18			
60.	Applications of VLSI	1	06-10-18			

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	1 W
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/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: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	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

Mr.M.SivasankaraRao.
Course Instructor

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Dr.Y.Amar Babu.
BOS Chairman&HOD

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

COURSE HANDOUT

PROGRAM	: B.Tech., I-Sem., ECE- A-Section-
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: CP Lab – 17C160
L-T-P STRUCTURE	: 0-0-2
COURSE CREDITS	: 1
COURSE INSTRUCTOR	: Dr.P.ASHOK REDDY
COURSE COORDINATOR	: Dr.P.ASHOK REDDY

COURSE OBJECTIVE: Software development tools like algorithm, Pseudo codes and programming structure. Basic elements C programming structures like data types, expressions, Control statements, various I/O functions and how to solve simple mathematical Problems using control structures. Design and implementation of various software components which solve real world problems.

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

CO	Statement	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	At the end of the course, student will be able to Apply and practice logical formulations to solve some simple problems leading to specific applications.	2	3	-	-	-	-	-	-	-	2	-	2	-	-	-
2	Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment.	2	3	-	-	-	-	-	-	-	2	-	2	-	-	-
3	Design effectively the required programming components that efficiently solve computing problems in real world.	2	3	-	-	-	-	-	-	-	2	-	2	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

BOS APPROVED REFERENCE BOOKS:

R1 N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010

R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

CP LAB SCHEDULE (LESSON PLAN): Section-A**BATCH-1**

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
61.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	21-06-2018		TLM5	
62.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	05-07-2018		TLM5	
63.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	19-07-2018		TLM5	
64.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	26-07-2018		TLM5	
65.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not c)To find reverse of the given number and to check whether it is palindrome (or) not.	2	09-08-2018		TLM5	
66.	a)To find whether given number is strong number (or) not. b)To check whether given number is Prime (or) not c)To display prime numbers with in the given range(Nesting of Loops). i) 1 1 2 ii) 5 4 3 2 1 4 3 2 1	2	16-08-2018		TLM5	

	<p>1 2 3 3 2 1</p> <p>1 2 3 4 2 1</p> <p>1 2 3 4 5 1</p>				
CYCLE-2					
67.	<p>a) Finding the sum and average of given numbers using Arrays.</p> <p>b) To display elements of array in reverse order</p> <p>c) To search whether the given element is in the array (or) not using linear search & binary search.</p>	2	23-08-2018		TLM5
68.	<p>i) Addition, subtraction and multiplication of Matrices</p> <p>ii) Transpose of given matrix</p>	2	30-08-2018		TLM5
9.	<p>a) Write a C program to find whether the given string is palindrome(or) not.</p> <p>b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.</p> <p>c) Write an example program to illustrate the use of any 5 string handling functions.</p>	2	30-08-2018		TLM5
10.	<p>a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.</p> <p>b) Write an example program to describe the usage of call by reference.</p> <p>c) Write a program to find sum of the elements of the array using functions.</p>	2	06-09-2018		TLM5
11.	<p>a) To find factorial of a given number using functions.</p> <p>b) Swap two numbers using functions.</p> <p>c) To find GCD of two numbers using recursion</p>	2	20-09-2018		TLM5
12.	<p>a) Write a recursive function to solve Towers of Honai problem.</p> <p>b) Write an example program to illustrate use of external & static storage classes.</p> <p>c) Write an example program to illustrate the usage of command line arguments.</p> <p>d) Program to illustrate the usage of dynamic memory management functions.</p>	2	20-09-2018		TLM5
13.	<p>a) Write an example program using structures to process the student record. Assume suitable</p>	2	27-09-2018		TLM5

	fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure					
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	27-09-2018		TLM5	
No. of classes required to complete LAB		28	No. of classes conducted:			

BATCH-2

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
1.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	18-06-2018		TLM5	
2.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	25-06-2018		TLM5	
3.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	02-07-2018		TLM5	
4.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	09-07-2018		TLM5	
5.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not c)To find reverse of the given number and to check whether it is palindrome (or) not.	2	09-07-2018		TLM5	

6.	<p>a) To find whether given number is strong number (or) not.</p> <p>b) To check whether given number is Prime (or) not</p> <p>c) To display prime numbers with in the given range (Nesting of Loops).</p> <p>i) 1 ii) 5 4 3 2 1 1 2 4 3 2 1 1 2 3 3 2 1 1 2 3 4 2 1 1 2 3 4 5 1</p>	2	16-07-2018 23-07-2018		TLM5
CYCLE-2					
7.	<p>a) Finding the sum and average of given numbers using Arrays.</p> <p>b) To display elements of array in reverse order</p> <p>c) To search whether the given element is in the array (or) not using linear search & binary search.</p>	2	06-08-2018		TLM5
8.	<p>ii) Addition, subtraction and multiplication of Matrices</p> <p>ii) Transpose of given matrix</p>	2	13-08-2018		TLM5
9.	<p>a) Write a C program to find whether the given string is palindrome (or) not.</p> <p>b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.</p> <p>c) Write an example program to illustrate the use of any 5 string handling functions.</p>	2	13-08-2018		TLM5
10.	<p>a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.</p> <p>b) Write an example program to describe the usage of call by reference.</p> <p>c) Write a program to find sum of the elements of the array using functions.</p>	2	20-08-2018		TLM5
11.	<p>a) To find factorial of a given number using functions.</p> <p>b) Swap two numbers using functions.</p> <p>c) To find GCD of two numbers using recursion</p>	2	27-08-2018		TLM5
12.	<p>a) Write a recursive function to solve Towers of Hanoi problem.</p> <p>b) Write an example program to illustrate use of external & static storage classes.</p>	2	10-09-2018		TLM5

	c) Write an example program to illustrate the usage of command line arguments. d) Program to illustrate the usage of dynamic memory management functions.				
13.	a) Write an example program using structures to process the student record. Assume suitable fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure	2	17-09-2018		TLM5
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	24-09-2018		TLM5
No. of classes required to complete LAB		28	No. of classes conducted:		

Contents beyond the Syllabus

- Programs on macros
- Programs on SLL
- Programs on memory management functions
- Programs on searching & sorting

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 Task	Marks
Day to Day work	10
Record Writing	10
Internal Lab Examination	10
Attendance	5
Viva – Voce During Regular Lab Sessions	5
Cumulative Internal Examination :	40
Semester End Examinations	60
Total Marks:	100

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Dr.P.Ashok Reddy)	(Dr.P.Ashok Reddy)	(Dr.P.Ashok Reddy)	(Mr I.RajendraKumar)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE- B.Section
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: CP Lab – 17C160
L-T-P STRUCTURE	: 0-0-2
COURSE CREDITS	: 1
COURSE INSTRUCTOR	: S.SRINIVASA REDDY
COURSE COORDINATOR	: P.ASHOK REDDY

COURSE OBJECTIVE: Software development tools like algorithm, Pseudo codes and programming structure. Basic elements C programming structures like data types, expressions, Control statements, various I/O functions and how to solve simple mathematical Problems using control structures. Design and implementation of various software components which solve real world problems.

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

CO	Statement At the end of the course, student will be able to	PO												PSO			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
1	Apply and practice logical formulations to solve some simple problems leading to specific applications.	2	3	-	-	-	-	-	-	-	-	2		2	-	-	-
2	Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment.	2	3	-	-	-	-	-	-	-	-	2		2	-	-	-
3	Design effectively the required programming components that efficiently solve computing problems in real world.	2	3	-	-	-	-	-	-	-	-	2		2	-	-	-

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

BOS APPROVED TEXT BOOKS:

T1 Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, Pearson Publishers, 7th Edition, 2013

BOS APPROVED REFERENCE BOOKS:

R1 N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010

R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

CP LAB SCHEDULE (LESSON PLAN): Section-B**BATCH-1**

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
64.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	22-06-2018		TLM5	
65.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	29-06-2018		TLM5	
66.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	06-07-2018		TLM5	
67.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	13-07-2018		TLM5	
68.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not c)To find reverse of the given number and to check whether it is palindrome (or) not.	2	20-07-2018		TLM5	
69.	a)To find whether given number is strong number (or) not. b)To check whether given number is Prime (or) not c)To display prime numbers with in the given range(Nesting of Loops). i) 1 1 2 ii) 5 4 3 2 1 4 3 2 1	2	27-07-2018		TLM5	

	<p style="text-align: center;">1 2 3 3 2 1</p> <p style="text-align: center;">1 2 3 4 2 1</p> <p style="text-align: center;">1 2 3 4 5 1</p>				
CYCLE-2					
70.	<p>a) Finding the sum and average of given numbers using Arrays.</p> <p>b) To display elements of array in reverse order</p> <p>c) To search whether the given element is in the array (or) not using linear search & binary search.</p>	2	10-08-2018		TLM5
71.	<p>iii) Addition, subtraction and multiplication of Matrices</p> <p>ii) Transpose of given matrix</p>	2	17-08-2018		TLM5
9.	<p>a) Write a C program to find whether the given string is palindrome(or) not.</p> <p>b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.</p> <p>c) Write an example program to illustrate the use of any 5 string handling functions.</p>	2	24-08-2018		TLM5
10.	<p>a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.</p> <p>b) Write an example program to describe the usage of call by reference.</p> <p>c) Write a program to find sum of the elements of the array using functions.</p>	2	31-08-2018		TLM5
11.	<p>a) To find factorial of a given number using functions.</p> <p>b) Swap two numbers using functions.</p> <p>c) To find GCD of two numbers using recursion</p>	2	07-09-2018		TLM5
12.	<p>a) Write a recursive function to solve Towers of Hanoi problem.</p> <p>b) Write an example program to illustrate use of external & static storage classes.</p> <p>c) Write an example program to illustrate the usage of command line arguments.</p> <p>d) Program to illustrate the usage of dynamic memory management functions.</p>	2	14-09-2018		TLM5
13.	<p>a) Write an example program using structures to process the student</p>	2	28-09-2018		TLM5

	record. Assume suitable fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure					
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	05-10-2018		TLM5	
No. of classes required to complete LAB		28	No. of classes conducted:			

BATCH-2

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
9.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	12-06-2018		TLM5	
10.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	19-06-2018		TLM5	
11.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	26-06-2018		TLM5	
12.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	03-07-2018		TLM5	
13.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not	2	10-07-2018		TLM5	

	c) To find reverse of the given number and to check whether it is palindrome (or) not.				
14.	<p>a) To find whether given number is strong number (or) not.</p> <p>b) To check whether given number is Prime (or) not</p> <p>c) To display prime numbers with in the given range (Nesting of Loops).</p> <p>i)</p> <pre> 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 </pre> <p>ii) 5 4 3 2 1 4 3 2 1 3 2 1 2 1 1</p>	2	17-07-2018		TLM5
CYCLE-2					
15.	<p>a) Finding the sum and average of given numbers using Arrays.</p> <p>b) To display elements of array in reverse order</p> <p>c) To search whether the given element is in the array (or) not using linear search & binary search.</p>	2	24-07-2018		TLM5
16.	<p>iv) Addition, subtraction and multiplication of Matrices</p> <p>ii) Transpose of given matrix</p>	2	07-08-2018		TLM5
9.	<p>a) Write a C program to find whether the given string is palindrome (or) not.</p> <p>b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.</p> <p>c) Write an example program to illustrate the use of any 5 string handling functions.</p>	2	14-08-2018		TLM5
10.	<p>a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.</p> <p>b) Write an example program to describe the usage of call by reference.</p> <p>c) Write a program to find sum of the elements of the array using functions.</p>	2	21-08-2018		TLM5
11.	<p>a) To find factorial of a given number using functions.</p> <p>b) Swap two numbers using functions.</p> <p>c) To find GCD of two numbers using recursion</p>	2	28-08-2018		TLM5
12.	a) Write a recursive function to solve Towers of Honai problem.	2	04-09-2018		TLM5

	b) Write an example program to illustrate use of external & static storage classes. c) Write an example program to illustrate the usage of command line arguments. d) Program to illustrate the usage of dynamic memory management functions.				
13.	a) Write an example program using structures to process the student record. Assume suitable fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure	2	11-09-2018 & 18-09-2018		TLM5
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	25-09-2018		TLM5
No. of classes required to complete LAB		28	No. of classes conducted:		

Contents beyond the Syllabus

- Programs on macros
- Programs on SLL
- Programs on memory management functions
- Programs on searching & sorting

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 Task	Marks
Day to Day work	10
Record Writing	10
Internal Lab Examination	10
Attendance	5
Viva – Voce During Regular Lab Sessions	5
Cumulative Internal Examination :	40
Semester End Examinations	60
Total Marks:	100

**Course
Instructor**

**Course
Coordinator**

**Module
Coordinator**

HOD

(Mr. S.SRINIVASAREDDY) (Mr P.Ashok Reddy) (Mr P.Ashok Reddy) (Mr I.RajendraKumar)

LAKIREDDY 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., ECE- C-Section
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : CP Lab – 17C160
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS : 1
COURSE INSTRUCTOR : S.SRINIVASA REDDY
COURSE COORDINATOR : P.ASHOK REDDY

COURSE OBJECTIVE: Software development tools like algorithm, Pseudo codes and programming structure. Basic elements C programming structures like data types, expressions, Control statements, various I/O functions and how to solve simple mathematical Problems using control structures. Design and implementation of various software components which solve real world problems.

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

CO	Statement	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	At the end of the course, student will be able to Apply and practice logical formulations to solve some simple problems leading to specific applications.	2	3	-	-	-	-	-	-	-	2		2	-	-	-
2	Demonstrate C programming development environment, compiling, debugging, linking and executing a program using the development environment.	2	3	-	-	-	-	-	-	-	2		2	-	-	-
3	Design effectively the required programming components that efficiently solve computing problems in real world.	2	3	-	-	-	-	-	-	-	2		2	-	-	-

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

BOS APPROVED TEXT BOOKS:

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BOS APPROVED REFERENCE BOOKS:

R1 N.B.Venkateswarlu and E.V.Prasad, C and Data Structures, S.Chand Publishing, 1st Edition, 2010

R2 ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

CP LAB SCHEDULE (LESSON PLAN): Section-C**BATCH-1**

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
72.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	16-06-2018		TLM5	
73.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	23-06-2018		TLM5	
74.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	30-06-2018		TLM5	
75.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	07-07-2018		TLM5	
76.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not c)To find reverse of the given number and to check whether it is palindrome (or) not.	2	14-07-2018		TLM5	
77.	a)To find whether given number is strong number (or) not. b)To check whether given number is Prime (or) not c)To display prime numbers with in the given range(Nesting of Loops). i) 1 1 2 1 2 3 ii) 5 4 3 2 1 4 3 2 1 3 2 1	2	21-07-2018		TLM5	

	1 2 3 4 1 2 3 4 5	2 1 1			
CYCLE-2					
78.	a) Finding the sum and average of given numbers using Arrays. b) To display elements of array in reverse order c) To search whether the given element is in the array (or) not using linear search & binary search.	2	28-07-2018		TLM5
79.	v) Addition, subtraction and multiplication of Matrices ii) Transpose of given matrix	2	18-08-2018		TLM5
9.	a) Write a C program to find whether the given string is palindrome(or) not. b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it. c) Write an example program to illustrate the use of any 5 string handling functions.	2	25-08-2018		TLM5
10.	a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic. b) Write an example program to describe the usage of call by reference. c) Write a program to find sum of the elements of the array using functions.	2	01-09-2018		TLM5
11.	a) To find factorial of a given number using functions. b) Swap two numbers using functions. c) To find GCD of two numbers using recursion	2	15-09-2018		TLM5
12.	a) Write a recursive function to solve Towers of Honai problem. b) Write an example program to illustrate use of external & static storage classes. c) Write an example program to illustrate the usage of command line arguments. d) Program to illustrate the usage of dynamic memory management functions.	2	22-09-2018		TLM5
13.	a) Write an example program using structures to process the student record. Assume suitable	2	29-09-2018		TLM5

	fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure					
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	06-10-2018		TLM5	
No. of classes required to complete LAB		28	No. of classes conducted:			

BATCH-2

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
17.	a)Example program which shows the usage of various preliminary data types available in C Language. b)Example program which shows the usage of various Operators available in C Language.	2	13-06-2018		TLM5	
18.	a) Example programs to illustrate the order of evaluation. b)To check whether the given year is leap year (or) not c) Roots of Quadratic Equation.	2	20-06-2018		TLM5	
19.	a)Finding smallest& biggest number from the given set of 4 numbers using 'if' statement. b)Calculate the student grade in the examination – assume suitable constraints. c)Prepare electricity bill for the consumed units – assume suitable constraints.	2	27-06-2018		TLM5	
20.	a)Converting given two digit number into words using switch statement b)To illustrate the usage of 'goto' statement.	2	04-07-2018		TLM5	
21.	a)To Display first N natural numbers b)To find whether the given number is Armstrong (or) not c)To find reverse of the given	2	11-07-2018		TLM5	

	number and to check whether it is palindrome (or) not.				
22.	<p>a) To find whether given number is strong number (or) not.</p> <p>b) To check whether given number is Prime (or) not</p> <p>c) To display prime numbers with in the given range (Nesting of Loops).</p> <p>i)</p> <pre> 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 </pre> <p>ii) 5 4 3 2 1</p> <pre> 4 3 2 1 3 2 1 2 1 1 </pre>	2	18-07-2018		TLM5
CYCLE-2					
23.	<p>a) Finding the sum and average of given numbers using Arrays.</p> <p>b) To display elements of array in reverse order</p> <p>c) To search whether the given element is in the array (or) not using linear search & binary search.</p>	2	25-07-2018		TLM5
24.	<p>vi) Addition, subtraction and multiplication of Matrices</p> <p>ii) Transpose of given matrix</p>	2	01-08-2018		TLM5
9.	<p>a) Write a C program to find whether the given string is palindrome (or) not.</p> <p>b) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.</p> <p>c) Write an example program to illustrate the use of any 5 string handling functions.</p>	2	08-08-2018		TLM5
10.	<p>a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.</p> <p>b) Write an example program to describe the usage of call by reference.</p> <p>c) Write a program to find sum of the elements of the array using functions.</p>	2	29-08-2018		TLM5
11.	<p>a) To find factorial of a given number using functions.</p> <p>b) Swap two numbers using functions.</p> <p>c) To find GCD of two numbers using recursion</p>	2	05-09-2018		TLM5
12.	<p>a) Write a recursive function to solve Towers of Hanoi problem.</p> <p>b) Write an example program to</p>	2	12-09-2018		TLM5

	illustrate use of external & static storage classes. c) Write an example program to illustrate the usage of command line arguments. d) Program to illustrate the usage of dynamic memory management functions.				
13.	a) Write an example program using structures to process the student record. Assume suitable fields for student structures b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program). c) Write a program to handle a structure variable using pointers and implement self referential structure	2	19-09-2018 & 26-09-2018		TLM5
14.	a) Accessing content from files and writing content in to it b) Copy the contents of one file into another	2	03-10-2018		TLM5
No. of classes required to complete LAB		28	No. of classes conducted:		

Contents beyond the Syllabus

- Programs on macros
- Programs on SLL
- Programs on memory management functions
- Programs on searching & sorting

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 Task	Marks
Day to Day work	10
Record Writing	10
Internal Lab Examination	10
Attendance	5
Viva – Voce During Regular Lab Sessions	5
Cumulative Internal Examination :	40
Semester End Examinations	60
Total Marks:	100

Course Instructor	Course Coordinator	Module Coordinator	HOD
(Mr. S.SRINIVASAREDDY)	(Mr P.Ashok Reddy)	(Mr P.Ashok Reddy)	(Mr I.RajendraKumar)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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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., ECE – A Section
ACADEMIC YEAR	: 2016-17
COURSE NAME & CODE	: Pulse & Switching Circuits Lab – 17EC63
L-T-P STRUCTURE	: 2-0-0
COURSE CREDITS	: 2
COURSE INSTRUCTOR	: Mr. K. Sasi Bhushan
COURSE COORDINATOR	: Mr. B.Siva Hari Prasad

COURSE OBJECTIVE:

This course provides practical exposure on linear, non linear wave shaping circuits and switching behaviour of non linear devices. It also demonstrates the generation of non sinusoidal signals, as well as realization of sampling circuits.

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

CO1	Analyze the response of linear and non linear wave shaping circuits.
CO2	Examine the switching behavior of a transistor.
CO3	Synthesize numerous non-sinusoidal waveform generators.

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

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

LAB SCHEDULE (LESSON PLAN): Section-A

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
1.	Introduction Lab experiments	2	12-06-18		TLMS	
2.	Linear Wave Shaping Circuits- RC Low Pass	2	19-06-18		TLMS	
3.	Linear Wave Shaping Circuits- RCHigh Pass	2	26-06-18		TLMS	
4.	Non Linear Wave shaping Circuits - Clippers	2	04-07-18		TLMS	
5.	Non Linear Wave shaping Circuits – Clampers	2	11-07-18		TLMS	
6.	Clamping Circuit Theorem	2	18-07-18		TLMS	
7.	Switching behaviour of Transistor	2	25-07-18		TLMS	
CYCLE-2						
8.	Bistable Multivibrator	2	08-08-18		TLMS	
9.	Monostable Multivibrator	2	15-08-18		TLMS	
10.	Astable Multivibrator	2	22-08-18		TLMS	
11.	Schmitt Trigger	2	29-08-18		TLMS	
12.	Bootstrap Time Base Generator	2	05-09-18		TLMS	
13.	Miller Time Base Generator	2	12-09-18		TLMS	
14.	UJT Relaxation Oscillator	2	19-09-18		TLMS	
15.	Sampling gates	2	26-09-18		TLMS	
	Revision	2	26-09-18		TLMS	
	Internal Exam	2	03-10-18		TLMS	
No. of classes required to complete:		34	No. of classes conducted:			

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
Day to Day work	1,2,3,4	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3,4	A3=5
Internal Lab Examination	1,2,3,4	B=10
Total Internal Marks(A1+A2+A3+B)		C=40
Semester End Examinations	1,2,3,4	D=60
Total Marks: C+D	1,2,3,4	100

Mr. K. Sasi Bhushan	Mr.B.Siva Hari Prasad	Dr. G.Sinivasa Rao	Dr. Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

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

COURSE HANDOUT

PROGRAM	: B.Tech., III-Sem., ECE – B Section
ACADEMIC YEAR	: 2016-17
COURSE NAME & CODE	: Pulse & Switching Circuits Lab – 17EC63
L-T-P STRUCTURE	: 2-0-0
COURSE CREDITS	: 2
COURSE INSTRUCTOR	: Mr. B.Siva Hari Prasad
COURSE COORDINATOR	: Mr. B.Siva Hari Prasad

COURSE OBJECTIVE:

This course provides practical exposure on linear, non linear wave shaping circuits and switching behaviour of non linear devices. It also demonstrates the generation of non sinusoidal signals, as well as realization of sampling circuits.

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

CO1	Analyze the response of linear and non linear wave shaping circuits.
CO2	Examine the switching behavior of a transistor.
CO3	Synthesize numerous non-sinusoidal waveform generators.

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

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

LAB SCHEDULE (LESSON PLAN): Section-B

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
80.	Introduction Lab experiments	2	13-06-2018		TLMS	
81.	Linear Wave Shaping Circuits- RC Low Pass	2	20-06-2018		TLMS	
82.	Linear Wave Shaping Circuits- RCHigh Pass	2	27-06-2018		TLMS	
83.	Non Linear Wave shaping Circuits - Clippers	2	04-07-2018		TLMS	
84.	Non Linear Wave shaping Circuits – Clampers	2	11-07-2018		TLMS	
85.	Clamping Circuit Theorem	2	18-07-2018		TLMS	
86.	Switching behaviour of Transistor	2	25-07-2018		TLMS	
CYCLE-2						
87.	Bistable Multivibrator	2	08-08-2018		TLMS	
88.	Monostable Multivibrator	2	29-08-2018		TLMS	
89.	Astable Multivibrator	2	05-09-2018		TLMS	
90.	Schmitt Trigger	2	12-09-2018		TLMS	
91.	Bootstrap Time Base Generator	2	19-09-2018		TLMS	
92.	UJT Relaxation Oscillator	2	26-09-2018		TLMS	
93.	Sampling gates	2	03-10-2018		TLMS	
	Revision	2	10-10-2018			
	Internal Exam	2	-----			
No. of classes required to complete:		30	No. of classes conducted:			

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
Day to Day work	1,2,3,4	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3,4	A3=5
Internal Lab Examination	1,2,3,4	B=10
Total Internal Marks(A1+A2+A3+B)		C=40
Semester End Examinations	1,2,3,4	D=60
Total Marks: C+D	1,2,3,4	100

Mr.B.Siva Hari Prasad	Mr.B.Siva Hari Prasad	Dr. G.Sinivasa Rao	Dr. Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

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

COURSE HANDOUT

PROGRAM	: B.Tech., III-Sem., ECE – C Section
ACADEMIC YEAR	: 2016-17
COURSE NAME & CODE	: Pulse & Switching Circuits Lab – 17EC63
L-T-P STRUCTURE	: 2-0-0
COURSE CREDITS	: 2
COURSE INSTRUCTOR	: Mr. B.Siva Hari Prasad
COURSE COORDINATOR	: Mr. B.Siva Hari Prasad

COURSE OBJECTIVE:

This course provides practical exposure on linear, non linear wave shaping circuits and switching behaviour of non linear devices. It also demonstrates the generation of non sinusoidal signals, as well as realization of sampling circuits.

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

CO1	Analyze the response of linear and non linear wave shaping circuits.
CO2	Examine the switching behavior of a transistor.
CO3	Synthesize numerous non-sinusoidal waveform generators.

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

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

LAB SCHEDULE (LESSON PLAN): Section-C

LIST OF EXPERIMENTS (Minimum 12 Experiments to be conducted)

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
CYCLE-1						
1.	Introduction Lab experiments	2	11-06-2018		TLMS	
2.	Linear Wave Shaping Circuits- RC Low Pass	2	18-06-2018		TLMS	
3.	Linear Wave Shaping Circuits- RCHigh Pass	2	25-06-2018		TLMS	
4.	Non Linear Wave shaping Circuits - Clippers	2	02-07-2018		TLMS	
5.	Non Linear Wave shaping Circuits – Clampers	2	09-07-2018		TLMS	
6.	Clamping Circuit Theorem	2	16-07-2018		TLMS	
7.	Switching behaviour of Transistor	2	23-07-2018		TLMS	
CYCLE-2						
8.	Bistable Multivibrator	2	06-08-2018		TLMS	
9.	Monostable Multivibrator	2	13-08-2018		TLMS	
10.	Astable Multivibrator	2	20-08-2018		TLMS	
11.	Schmitt Trigger	2	27-08-2018		TLMS	
12.	Bootstrap Time Base Generator	2	10-09-2018		TLMS	
13.	UJT Relaxation Oscillator	2	17-09-2018		TLMS	
14.	Sampling gates	2	24-09-2018		TLMS	
	Revision	2	01-10-2018			
	Internal Exam	2	08-10-2018			
No. of classes required to complete:		32	No. of classes conducted:			

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
Day to Day work	1,2,3,4	A1=20
Attendance (>95%=5, 90-95%=4,85-90%=3,80-85%=2,75-80%=1)		A2=5
Viva-Voce	1,2,3,4	A3=5
Internal Lab Examination	1,2,3,4	B=10
Total Internal Marks(A1+A2+A3+B)		C=40
Semester End Examinations	1,2,3,4	D=60
Total Marks: C+D	1,2,3,4	100

Mr.B.Siva Hari Prasad	Mr.B.Siva Hari Prasad	Dr. G.Sinivasa Rao	Dr. Y.Amar Babu
Course Instructor	Course Coordinator	Module Coordinator	HOD, ECE

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

COURSE HANDOUT

PROGRAM	: B.Tech. III-Sem., ECE-A
ACADEMIC YEAR	: 2018-19
COURSE NAME & CODE	: ANALOG INTEGRATED CIRCUITS LAB (17EC64)
L-T-P STRUCTURE	: 0-0-2
COURSE CREDITS	: 1
COURSE INSTRUCTOR	: Mr. G.Venkata Rao
COURSE COORDINATOR	: Mr. G.Venkata Rao

COURSE OBJECTIVE: Course Educational Objective: This course provides the practical knowledge on Op-Amp applications like arithmetic circuits, filters and oscillators also provides knowledge on IC555 timer and IC723.

COURSE OUTCOMES (CO)

- CO1** : Implement arithmetic circuit using 741 OP-Amp
- CO2** : Design filters, oscillators and DAC using IC 741 Op-Amp
- CO3** : Design of multivibrators using IC 555 Timer

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	-	-	3	2	-	3	-	-	1	2	-	3	-	-
CO2	1	-	-	3	2	-	3	-	-	1	2	-	3	-	-
CO3	1	-	-	3	2	-	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).

BOS APPROVED TEXT BOOKS:

T1 Ramakanth A. Gayakwad, Op-Amps and Linear Integrated Circuits, PHI Publishers, 4th Edition.

BOS APPROVED REFERENCE BOOKS:

R1 D Roy Choudhury, Linear integrated circuits, New age International(P) Ltd.

ANALOG INTEGRATED CIRCUITS LAB SCHEDULE: Section-A

BATCH-1

S.No.	Experiments to be conducted	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
CYCLE-1								
69.	Introduction to Lab	2	11-06-18		TLM8			
70.	OP-AMP Arithmetic Applications: Adder, Subtractor and Adder-Subtractor	2	18-06-18		TLM5	CO1	T1	
71.	Integrator and Differentiator	2	25-06-18		TLM5	CO1	T1	
72.	Function Generator using OP-AMP	2	02-07-18		TLM5	CO2	T1	
73.	Active filters : Low Pass Filter and High Pass Filter	2	09-07-18		TLM5	CO2	T1	
74.	Band Pass Filter using OP-AMP	2	16-07-18		TLM5	CO2	T1	
75.	Band Stop Filter using OP-AMP	2	23-07-18		TLM5	CO2	T1	
CYCLE-2								
76.	RC Phase shift Oscillator using OP-AMP	2	06-08-18		TLM5	CO2	T1	
77.	Wien Bridge Oscillator using OP-AMP	2	13-08-18		TLM5	CO2	T1	
78.	IC-555 Timer Monostable and Astable Multivibrator	2	20-08-18		TLM5	CO3	T1	
79.	Voltage Controlled Oscillator	2	27-08-18		TLM5	CO3	T1	
80.	Voltage Regulator using IC 723	2	03-09-18		TLM5	CO3	T1	
81.	Digital to Analog Converter Using OP-AMP	2	10-09-18		TLM5	CO3	T1	
82.	Internal exam	2	24-09-18					
No. of classes required to complete LAB		30	No. of classes conducted:					

BATCH-2

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
CYCLE-1								
1.	Introduction to Lab	2	14-06-18		TLM8		T1	
2.	OP-AMP Arithmetic Applications: Adder, Subtractor and Adder-Subtractor	2	21-06-18		TLM5	CO1	T1	
3.	Integrator and Differentiator	2	28-06-18		TLM5	CO1	T1	
4.	Function Generator using OP-AMP	2	05-07-18		TLM5	CO2	T1	
5.	Active filters : Low Pass Filter and High Pass Filter	2	12-07-18		TLM5	CO2	T1	
6.	Band Pass Filter using OP-AMP	2	19-07-18		TLM5	CO2	T1	
7.	Band Stop Filter using OP-AMP	2	26-07-18		TLM5	CO2	T1	
CYCLE-2								
8.	RC Phase shift Oscillator using OP-AMP	2	09-08-18		TLM5	CO2	T1	
9.	Wien Bridge Oscillator using OP-AMP	2	16-08-18		TLM5	CO2	T1	
10.	IC-555 Timer Monostable and Astable Multivibrator	2	23-08-18		TLM5	CO3	T1	
11.	Voltage Controlled Oscillator	2	30-08-18		TLM5	CO3	T1	
12.	Voltage Regulator using IC 723	2	06-09-18		TLM5	CO3	T1	
13.	Digital to Analog Converter Using OP-AMP	2	20-09-18		TLM5	CO3	T1	
14.	Internal exam	2	04-10-18					
No. of classes required to complete LAB		30	No. of classes conducted:					

Contents beyond the Syllabus

S.No	Name of the Experiment	Tentative Date of Completion	Actual Date of Completion
1	Wave form Generator	17-09-18 (Batch-I)	
		27-09-18 (Batch-II)	

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	20/07/2018	7 W
I Mid Examinations	30/08/2018	04/08/2018	1W
II Phase of Instructions	06/08/2018	06/10/2018	9W
II Mid Examinations	08/10/2018	13/10/2018	1 W
Preparation and Practicals	15/10/2018	27/10/2018	2 W
Semester End Examinations	29/10/2018	10/11/2018	2 W

EVALUATION PROCESS:

Evaluation Task	Marks
Day to Day work	A1=10
Record Writing	A2=5
Internal Lab Examination	B=10
Cumulative Internal Examination : A1+A2+B	25
Semester End Examinations : C	50
Total Marks: A1+A2+B+C	75

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1 : To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
- PEO2 : To Function professionally in the rapidly changing world with advances in technology.
- PEO3 : To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.

PEO4 : To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs)

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO1:** Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.
- PSO2:** Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
- PSO3:** Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Mr. G.Venkata Rao
Course Instructor

Mr. G.Venkata Rao
Course Coordinator

Dr.G.Srinivasa Rao
Module Coordinator

Mr.Y.Amar Babu
HOD

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

COURSE HANDOUT

PROGRAM : B.Tech., III-Sem., ECE- B- Section
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Analog Integrated Circuits Lab-17EC64
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mrs.K.Lakshmi
COURSE COORDINATOR : Mr. M.Siva Sankara Rao
PRE-REQUISITE: Electrical Circuits and Networks-I, Analog Electronic Circuits

COURSE OBJECTIVE: This course provides the practical knowledge on Analog IC's like IC741, 555 timer, IC1496, IC723, IC565, IC566 and provide the exposure on IC's applications. Once this course is completed students are able to operate all types of analog IC's.

COURSE OUTCOMES (CO)

- CO1** : Verify the basic Applications of Op-Amp, VCO and PLL.
- CO2** : Design filters, Oscillators and DAC using IC-741 Op-Amp.
- CO3** : Implement Multivibrators and voltage regulator using ICs.

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	2	-	3	2	-	-	-	-	-	-	2	3	2	3	-
CO2	2	-	3	2	-	-	-	-	-	-	2	3	2	3	-
CO3	2	-	3	2	-	-	-	-	-	-	2	3	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).

BOS APPROVED TEXT BOOKS:

T1 Ramakanth A. Gayakwad, Op-Amps and Linear Integrated Circuits, PHI Publishers, 4th Edition.

BOS APPROVED REFERENCE BOOKS:

R1 D Roy Choudhury, Linear integrated circuits, New age International(P) Ltd.

Part-B**COURSE DELIVERY PLAN (LESSON PLAN): Section-A****BATCH-1**

S.No.	Experiments 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 lab	2	12-6-2018		TLM8	CO1		
2.	Study of integrated circuits 78XX, 79XX, 741,723, 555Timer.	2	19-6-2018		TLM5	CO1	T1,R1	
3.	Arithmetic circuits using using op-amp.	2	26-6-2018		TLM5	CO1	T1,R1	
4.	Design and analysis of integrator and differentiator circuits using op-amp.	2	03-7-2018		TLM5	CO1	T1,R1	
5.	Function generator using op-amp.	2	10-7-2018		TLM5	CO1	T1,R1	
6.	Design of low pass and high pass filters using op-amp.	2	17-7-2018		TLM5	CO1	T1,R1	
7.	Design of band pass filter using op-amp.	2	24-7-2018		TLM5	CO1	T1,R1	
8.	Design of band stop filter using op-amp.	2	31-7-2018		TLM5	CO1	T1,R1	
9.	Design of RC phase shift oscillator using op-amp.	2	07-8-2018		TLM5	CO1	T1,R1	
10.	Design of wein bridge oscillator using op-amp.	2	14-8-2018		TLM5	CO1	T1,R1	
11.	Design of astable & monostable multivibrator using IC555 timer.	2	21-8-2018		TLM5	CO2	T1,R1	
12.	Design voltage controlled oscillator & PLL	2	28-8-2018		TLM5	CO2	T1,R1	
13.	Implementation of 3 bit DAC	2	4-9-2018		TLM5	CO1	T1,R1	
14.	IC723 voltage regulator	2	11-9-2018		TLM5	CO3	T1,R1	
15.	Revision	2	18-9-2018		TLM5			
16.	Internal Examination	2	25-9-2018					
No. of classes required to complete		32			No. of classes taken:			

BATCH-2

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 lab	2	15-6-2018		TLM8	CO1		
2.	Study of integrated circuits 78XX, 79XX, 741,723, 555Timer.	2	22-6-2018		TLM5	CO1	T2,R1	
3.	Arithmetic circuits using using op-amp.	2	29-6-2018		TLM5	CO1	T2,R1	
4.	Design and analysis of integrator and differentiator circuits using op-amp.	2	6-7-2018		TLM5	CO1	T2,R1	
5.	Function generator using op-amp.	2	13-7-2018		TLM5	CO1	T2,R1	
6.	Design of low pass and high pass filters using op-amp.	2	20-7-2018		TLM5	CO1	T2,R1	
7.	Design of band pass filter using op-amp.	2	27-7-2018		TLM5	CO1	T2,R1	
8.	Design of band stop filter using op-amp.	2	10-8-2018		TLM5	CO1	T2,R1	
9.	Design of RC phase shift oscillator using op-amp.	2	17-8-2018		TLM5	CO1	T2,R1	
10.	Design of wein bridge oscillator using op-amp.	2	24-8-2018		TLM5	CO2	T2,R1	
11.	Design of astable & monostable multivibrator using IC555 timer.	2	31-8-2018		TLM5	CO1	T2,R1	
12.	Design voltage controlled oscillator & PLL	2	7-9-2018		TLM5	CO3	T2,R1	
13.	Implementation of 3 bit DAC	2	14-9-2018					
14.	IC723 voltage regulator	2	28-9-2018					
15.	Internal Examination	2	5-10-2018					
No. of classes required to complete		30			No. of classes taken:			

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	11-6-2018	28-7-2018	7W
I Mid Examinations	30-7-2018	4-8-2018	1W
II Phase of Instructions	6-8-2018	6-10-2018	9W
II Mid Examinations	8-10-2018	13-10-2018	1W
Preparation and Practicals	15-10-2018	27-10-2018	2W
Semester End Examinations	29-10-2018	10-11-2018	2W

Part - C**EVALUATION PROCESS:**

Evaluation Task	Marks
Day to Day work	A1=10
Record Writing	A2=5
Internal Lab Examination	B=10
Cumulative Internal Examination : A1+A2+B	25
Semester End Examinations : C	50
Total Marks: A1+A2+B+C	75

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1 : To Attain a solid foundation in Electronics & Communication Engineering fundamentals with an attitude to pursue continuing education.
- PEO2 : To Function professionally in the rapidly changing world with advances in technology.
- PEO3 : To Contribute to the needs of the society in solving technical problems using Electronics & Communication Engineering principles, tools and practices.
- PEO4 : To Exercise leadership qualities, at levels appropriate to their experience, which addresses issues in a responsive, ethical, and innovative manner

PROGRAMME OUTCOMES (POs)

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to

assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Design and develop modern communication technologies for building the interdisciplinary skills to meet current and future needs of industry.

PSO2: Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools

PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor

Course Coordinator

Module Coordinator

HOD

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE-C/Section
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Analog Integrated Circuits Lab-17EC64
L-T-P STRUCTURE : 0-0-2
COURSE CREDITS : 1
COURSE INSTRUCTOR : Mr.M.Sivasankara Rao
COURSE COORDINATOR : Mr.G.Venkatrao
PRE-REQUISITE: **Electrical Circuits and Networks-I, Analog Electronic Circuits**

COURSE OBJECTIVE: This course provides the practical knowledge on Analog IC's like IC741, 555 timer, IC1496, IC723, IC565, IC566 and provide the exposure on IC's applications. Once this course is completed students are able to operate all types of analog IC's.

COURSE OUTCOMES (CO)

- CO1** : **Verify** the basic Applications of Op-Amp, VCO and PLL.
- CO2** : **Design** filters, Oscillators and DAC using IC-741 Op-Amp.
- CO3** : **Implement** Multivibrators and voltage regulator using ICs.

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	2	-	3	2	-	-	-	-	-	-	2	3	2	3	-
CO2	2	-	3	2	-	-	-	-	-	-	2	3	2	3	-
CO3	2	-	3	2	-	-	-	-	-	-	2	3	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).

BOS APPROVED TEXT BOOKS:

T1 Ramakanth A. Gayakwad, Op-Amps and Linear Integrated Circuits, PHI Publishers, 4th Edition.

BOS APPROVED REFERENCE BOOKS:

R1 D Roy Choudhury, Linear integrated circuits, New age International(P) Ltd.

Part-B**COURSE DELIVERY PLAN (LESSON PLAN):****BATCH-1**

S.No.	Experiments 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 lab	2	13-06-2018		TLM8	CO1		
2.	Arithmetic circuits using using op-amp.	2	20-06-2018		TLM5	CO1	T1,R1	
3.	Design and analysis of integrator and differentiator circuits using op-amp.	2	27-06-2018		TLM5	CO1	T1,R1	
4.	Function generator using op-amp.	2	04-07-2018		TLM5	CO1	T1,R1	
5.	Design of low pass and high pass filters using op-amp.	2	11-07-2018		TLM5	CO1	T1,R1	
6.	Design of band pass filter using op-amp.	2	18-07-2018		TLM5	CO1	T1,R1	
7.	Design of band stop filter using op-amp.	2	25-07-2018		TLM5	CO1	T1,R1	
8.	Design of RC phase shift oscillator using op-amp.	2	01-07-2018		TLM5	CO1	T1,R1	
9.	Design of wein bridge oscillator using op-amp.	2	08-08-2018		TLM5	CO1	T1,R1	
10.	Design of astable & monostable multivibrator using IC555 timer.	2	22-08-2018		TLM5	CO1	T1,R1	
11.	Obtain Free running Frequency of VCO(IC-566).	2	29-08-2018		TLM5	CO2	T1,R1	
12.	Obtain Lock frequency of IC-565 (PLL).	2	05-09-2018		TLM5	CO2	T1,R1	
13.	Design Low & High voltage regulators Using IC-723	2	12-09-2018		TLM5	CO1	T1,R1	
14.	Implementation of 3 bit DAC	2	19-09-2018		TLM5	CO3	T1,R1	
15.	Revision	2	26-09-2018		TLM5			
16.	Internal Examination	2	03-10-2018					
No. of classes required to complete		32			No. of classes taken:			

BATCH-2

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 lab	2	16-06-2018		TLM8	CO1		
2.	Arithmetic circuits using using op-amp.	2	23-06-2018		TLM4/TLM5	CO1	T2,R1	
3.	Design and analysis of integrator and differentiator circuits using op-amp.	2	30-06-2018		TLM4/TLM5	CO1	T2,R1	
4.	Function generator using op-amp.	2	07-07-2018		TLM4/TLM5	CO1	T2,R1	
5.	Design of low pass and high pass filters using op-amp.	2	14-07-2018		TLM4/TLM5	CO1	T2,R1	
6.	Design of band pass filter using op-amp.	2	21-07-2018		TLM4/TLM5	CO1	T2,R1	
7.	Design of band stop filter using op-amp.	2	28-07-2018		TLM4/TLM5	CO1	T2,R1	
8.	Design of RC phase shift oscillator using op-amp.	2	04-08-2018		TLM4/TLM5	CO1	T2,R1	
9.	Design of wein bridge oscillator using op-amp.	2	11-08-2018		TLM4/TLM5	CO1	T2,R1	
10.	Design of astable & monostable multivibrator using IC555 timer.	2	18-08-2018		TLM4/TLM5	CO2	T2,R1	
11.	Obtain Free running Frequency of VCO (IC-566).	2	25-08-2018		TLM4/TLM5	CO1	T2,R1	
12.	Obtain Lock frequency of IC-565 (PLL).	2	01-09-2018		TLM4/TLM5	CO1	T2,R1	
13.	Design Low & High voltage regulators Using IC-723	2	08-09-2018		TLM4/TLM5	CO2	T2,R1	
14	Implementation of 3 bit DAC	2	15-09-2018		TLM4/TLM5	CO3	T2,R1	
15	Revision	2	22-09-2018		TLM4/TLM5		T2,R1	
16	Internal Exam	2	29-09-2018/ 06-10-2018					
No. of classes required to complete		32			No. of classes taken:			

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	11-6-2018	28-7-2018	7W
I Mid Examinations	30-7-2018	4-8-2018	1W
II Phase of Instructions	6-8-2018	6-10-2018	9W
II Mid Examinations	8-10-2018	13-10-2018	1W
Preparation and Practicals	15-10-2018	27-10-2018	2W
Semester End Examinations	29-10-2018	10-11-2018	2W

Part - C**EVALUATION PROCESS:**

Evaluation Task	Marks
Day to Day work	A1=10
Record Writing	A2=5
Internal Lab Examination	B=10
Cumulative Internal Examination : A1+A2+B	25
Semester End Examinations : C	50
Total Marks: A1+A2+B+C	75

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PSO3: Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

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

COURSE HANDOUT

Part-A

PROGRAM : B.Tech, III-Sem., ECE-A
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Professional Ethics & Human Values – 17PD03
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 0
COURSE INSTRUCTOR : T.Chandrasekhar Yadav
COURSE COORDINATOR : T.Chandrasekhar Yadav
PRE-REQUISITES: Ethics & Values

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- ❖ To create an awareness on engineering ethics and human values.
- ❖ To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
- ❖ To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
- ❖ To explicate the professional and societal responsibilities of the engineers.
- ❖ To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

- Acquires the basic concepts of human values & also gain the connotations of ethical theories.
- Knows the basic concepts of Professional ethics and handling Dilemma in decision making.
- Knows the duties and rights towards the society in an engineering profession
- Would realize the importance and necessity of intellectual property rights.
- Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

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

CO's / PO's	R17-Professional Ethics & Human Values-S355											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1								3				
CO2			1					3				
CO3		1	2					3	2			
CO4				1		2		3	1			
CO5						1	2	3				1
3 = High (100%) (40%)			2= Moderate (70%)					1= Slight (Low)				

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 R.S.Nagarajan, a Textbook on “Professional Ethics and Human Values”, New Age Publishers – 2006.

T2 Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.

BOS APPROVED REFERENCE BOOKS:

R1 Govindarajan M, Natarajan S, Senthil Kumar V. S, “ Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

R2 Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)

Part-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Engineering Ethics

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
83.	Introduction to Subject	1	11-06-18		TLM1	CO1	T1	
84.	Course Outcomes	1	13-06-18		TLM1		T1	
85.	UNIT-I Introduction about engineering ethics	1	18-06-18		TLM1		T1	
86.	Senses of engineering ethics, Variety of moral issues	1	20-06-18		TLM1		T1	
87.	Moral dilemmas moral autonomy	1	23-06-18		TLM1		T1	
88.	Kohlberg's theory	1	25-06-18		TLM1		T1	
89.	Gilligan theory, Consensus and controversy	1	27-06-18		TLM1		T1	
90.	Models of professional roles about right action, self interest	1	30-06-18		TLM1		T1	
91.	Customs and religion, uses of ethical theories	1	02-07-18		TLM1		T1	
92.	Uses of ethical theories	1	04-07-18		TLM1		T1	
93.	TUTORIAL-1	1	07-07-18		TLM3			
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II: Human Values

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
94.	Introduction about values	1	09-07-18		TLM1	CO2	T1	
95.	Morals ethics and values, Integrity	1	11-07-18		TLM1		T1	
96.	Work ethic, Service learning, Civic virtue	1	16-07-18		TLM1		T1	
97.	Respect for others, living peacefully, Caring, sharing,	1	18-07-18		TLM1		T1	
98.	Honesty, courage, Valuing time, cooperation	1	21-07-18		TLM1		T1	
99.	Commitment, Empathy, self confidence	1	23-07-18		TLM1		T1	
100.	Character, spirituality	1	25-07-18		TLM1		T1	
101.	TUTORIAL-2	1	28-07-18		TLM3			
No. of classes required to complete UNIT-II		08			No. of classes taken:			
I-MID EXAMS:30-07-2018 to 04-08-2018								

Unit-III Engineering as Social Experimentation

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
102.	Engineering as experimentation introduction	1	06-08-18		TLM1	CO3	T1	
103.	Engineering Projects VS. Standard Experiments	1	08-08-18		TLM1		T1	
104.	Engineers as responsible experimenters	1	13-08-18		TLM1		T1	
105.	Codes of ethics, Industrial Standards	1	18-08-18		TLM1		T1	
106.	A balanced outlook on law	1	20-08-18		TLM1		T1	
107.	The challenger case study	1	25-08-18		TLM1		T1	
108.	Tutorial-3	1	27-08-18		TLM3			
No. of classes required to complete UNIT-III		07			No. of classes taken:			

Unit – IV Safety, Responsibilities and Rights

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
109.	Introduction about Safety, and rights	1	29-08-18		TLM1	CO4	T1	
110.	Assessment of safety and risk	1	01-09-18		TLM1		T1	
111.	Risk benefit analysis and reducing risk ,Three Mile Island and Chernobyl case study	1	05-09-18		TLM1		T1	
112.	Collegiality and loyalty, Respect for authority,	1	10-09-18		TLM1		T1	
113.	Collective bargaining-Confidentiality	1	12-09-18		TLM1		T1	
114.	Conflicts of interest, Occupational crime	1	15-09-18		TLM1		T1	
	Professional Rights, Employee rights		15-09-18		TLM1		T1	
115.	Intellectual Property Rights (IPR)	1	17-09-18		TLM1		T1	
116.	TUTORIAL-4	1	19-09-18		TLM3			
No. of classes required to complete UNIT-IV		08			No. of classes taken:			

Unit –V GLOBAL ISSUES

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
117.	MNC's, Environmental ethics,	1	22-09-18		TLM1	CO5	T1	
118.	Computer ethics.	1	24-09-18		TLM1		T1	
	Weapons development		24-09-18		TLM1		T1	
119.	Engineers as managers, consulting engineers	1	26-09-18		TLM1		T1	
120.	Engineers as expert witnesses	1	29-09-18		TLM1		T1	
121.	Engineers as advisors	1	01-10-18		TLM1		T1	
	Moral leadership		01-10-18		TLM1		T1	
122.	TUTORIAL-5	1	03-10-18		TLM3			
123.	Sample code of Ethics	1	06-10-18		TLM1		T1	
No. of classes required to complete UNIT-V		7			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
124.								
125.								
126.								

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	COs	Marks
I-Mid Examination (Descriptive) = A	1,2	A=20
II-Mid Examination (Descriptive) = B	3,4,5	B=20
Evaluation of Mid Marks: A+B =75% of Max(A,B)+25% of Min(A,B)	1,2,3,4,5	A+B=20
Evaluation of Report Writing and Seminar Presentation = C	1,2,3,4,5	C=5
Cumulative Internal Examination : A+B+C	1,2,3,4,5	A+B+C=25
Semester End Examinations =D	1,2,3,4,5	D=75
Total Marks: A+B+C+D	1,2,3,4,5	100

Course Instructor	Course Coordinator	Module Coordinator	HOD
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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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., ECE-B
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Professional Ethics & Human Values – 17PD03
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 0
COURSE INSTRUCTOR : T.Chandrasekhar Yadav
COURSE COORDINATOR : T.Chandrasekhar Yadav
PRE-REQUISITES: Ethics & Values

COURSE EDUCATIONAL OBJECTIVES (CEOs):

- ❖ To create an awareness on engineering ethics and human values.
- ❖ To adumbrate the inevitability of different intellectual property rights like patents, copyrights, trademarks, and trade secret.
- ❖ To give an impetus on achieving higher positions in profession, with ethical and human values as a base and support for the growth.
- ❖ To explicate the professional and societal responsibilities of the engineers.
- ❖ To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

- Acquires the basic concepts of human values & also gain the connotations of ethical theories.
- Knows the basic concepts of Professional ethics and handling Dilemma in decision making.
- Knows the duties and rights towards the society in an engineering profession
- Would realize the importance and necessity of intellectual property rights.
- Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

CO's / PO's	R17-Professional Ethics & Human Values-S355											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1								3				
CO2			1					3				
CO3		1	2					3	2			
CO4				1		2		3	1			
CO5						1	2	3				1
3 = High (100%) (40%)			2= Moderate (70%)					1= Slight (Low)				

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

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 R.S.Nagarajan, a Textbook on “Professional Ethics and Human Values”, New Age Publishers – 2006.

T2 Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw Hill, New York 1996.

BOS APPROVED REFERENCE BOOKS:

R1 Govindarajan M, Natarajan S, Senthil Kumar V. S, “ Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

R2 Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey,2004 (Indian Reprint now available)

Part-B

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I: Engineering Ethics

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	1	12-06-18		TLM1	CO1	T1		
2.	Course Outcomes	1	15-06-18		TLM1		T1		
3.	UNIT-I Introduction about engineering ethics	1	19-06-18		TLM1		T1		
4.	Senses of engineering ethics, Variety of moral issues	1	22-06-18		TLM1		T1		
5.	Moral dilemmas moral autonomy	1	23-06-18		TLM1		T1		
6.	Kohlberg's theory	1	26-06-18		TLM1		T1		
7.	Gilligan theory, Consensus and controversy	1	29-06-18		TLM1		T1		
8.	Models of professional roles about right action, self interest	1	30-06-18		TLM1		T1		
9.	Customs and religion, uses of ethical theories	1	03-07-18		TLM1		T1		
10.	Uses of ethical theories	1	06-07-18		TLM1		T1		
11.	TUTORIAL-1	1	07-07-18		TLM3				
No. of classes required to complete UNIT-I		11			No. of classes taken:				

UNIT-II : Human Values

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly	
12.	Introduction about values	1	10-07-18		TLM1	CO2	T1		
13.	Morals ethics and values, Integrity	1	13-07-18		TLM1		T1		
14.	Work ethic, Service learning, Civic virtue	1	17-07-18		TLM1		T1		
15.	Respect for others, living peacefully, Caring, sharing,	1	20-07-18		TLM1		T1		
16.	Honesty, courage, Valuing time, cooperation	1	21-07-18		TLM1		T1		
17.	Commitment, Empathy, self confidence	1	24-07-18		TLM1		T1		
18.	Character, spirituality	1	27-07-18		TLM1		T1		
19.	TUTORIAL-2	1	28-07-18		TLM3				
No. of classes required to complete UNIT-II		08			No. of classes taken:				

I-MID EXAMS:30-07-2018 to 04-08-2018

Unit-III Engineering as Social Experimentation

S.No	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
20.	Engineering as experimentation introduction	1	07-08-18		TLM1	CO3	T1	
21.	Engineering Projects VS. Standard Experiments	1	10-08-18		TLM1		T1	
22.	Engineers as responsible experimenters	1	14-08-18		TLM1		T1	
23.	Codes of ethics, Industrial Standards	1	17-08-18		TLM1		T1	
24.	A balanced outlook on law	1	18-08-18		TLM1		T1	
25.	The challenger case study	1	21-08-18		TLM1		T1	
26.	Tutorial-3	1	24-08-18		TLM3			
No. of classes required to complete UNIT-III		07			No. of classes taken:			

Unit – IV Safety, Responsibilities and Rights

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
27.	Introduction about Safety, and rights	1	25-08-18		TLM1	CO4	T1	
28.	Assessment of safety and risk	1	28-08-18		TLM1		T1	
29.	Risk benefit analysis and reducing risk ,Three Mile Island and Chernobyl case study	1	31-08-18		TLM1		T1	
30.	Collegiality and loyalty, Respect for authority,	1	01-09-18		TLM1		T1	
31.	Collective bargaining-Confidentiality	1	04-09-18		TLM1		T1	
	Conflicts of interest, Occupational crime		04-09-18		TLM1		T1	
32.	Professional Rights, Employee rights	1	07-09-18		TLM1		T1	
33.	Intellectual Property Rights (IPR)	1	11-09-18		TLM1		T1	
34.	TUTORIAL-4	1	14-09-18		TLM3			
No. of classes required to complete UNIT-IV		08			No. of classes taken:			

Unit –V GLOBAL ISSUES

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.	MNC's, Environmental ethics,	1	15-09-18		TLM1	CO5	T1	
36.	Computer ethics.	1	18-09-18		TLM1		T1	
37.	Weapons development	1	22-09-18		TLM1		T1	
38.	Engineers as managers, consulting engineers	1	25-09-18		TLM1		T1	
39.	Engineers as expert witnesses	1	28-09-18		TLM1		T1	
40.	Engineers as advisors	1	29-09-18		TLM1		T1	
	Moral leadership		29-09-18		TLM1		T1	
41.	TUTORIAL-5	1	05-10-18		TLM3			
42.	sample code of Ethics	1	06-10-18		TLM1		T1	
No. of classes required to complete UNIT-V		08			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
43.								
44.								
45.								

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	COs	Marks
I-Mid Examination (Descriptive) =A	1,2	A=20
II-Mid Examination (Descriptive) =B	3,4,5	B=20
Evaluation of Mid Marks: A+B =75% of Max(A,B)+25% of Min(A,B)	1,2,3,4,5	A+B=20
Evaluation of Report Writing and Seminar Presentation =C	1,2,3,4,5	C=5
Cumulative Internal Examination : A+B+C	1,2,3,4,5	A+B+C=25
Semester End Examinations =D	1,2,3,4,5	D=75
Total Marks: A+B+C+D	1,2,3,4,5	100

Course Instructor	Course Coordinator	Module Coordinator	HOD

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COURSE HANDOUT

Part-A

PROGRAM : B.Tech, III-Sem., ECE-C
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Professional Ethics & Human Values – 17PD03
L-T-P STRUCTURE : 3-1-0
COURSE CREDITS : 0
COURSE INSTRUCTOR : T.Chandrasekhar Yadav
COURSE COORDINATOR : T.Chandrasekhar Yadav
PRE-REQUISITES: Ethics & Values

COURSE EDUCATIONAL OBJECTIVES (CEOs):

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- ❖ To make the student realize the sensitiveness associated with experimentation process

COURSE OUTCOMES (COs)

After completion of the course, the student will be able to

- Acquires the basic concepts of human values & also gain the connotations of ethical theories.
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- Knows the duties and rights towards the society in an engineering profession
- Would realize the importance and necessity of intellectual property rights.
- Can take all the necessary precautions while conducting the experiments, which may reduce the risk.

CO's / PO's	R17-Professional Ethics & Human Values-S355											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1								3				
CO2			1					3				
CO3		1	2					3	2			
CO4				1		2		3	1			
CO5						1	2	3				1
3 = High (100%) (40%)			2= Moderate (70%)						1= Slight (Low)			

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

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

COURSE DELIVERY PLAN (LESSON PLAN)

UNIT-I : Engineering Ethics

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
46.	Introduction to Subject	1	11-06-18		TLM1	CO1	T1	
47.	Course Outcomes	1	12-06-18		TLM1		T1	
48.	UNIT-I Introduction about engineering ethics	1	13-06-18		TLM1		T1	
49.	Senses of engineering ethics, Variety of moral issues	1	18-06-18		TLM1		T1	
50.	Moral dilemmas moral autonomy	1	19-06-18		TLM1		T1	
51.	Kohlberg's theory	1	20-06-18		TLM1		T1	
52.	Gilligan theory, Consensus and controversy	1	25-06-18		TLM1		T1	
53.	Models of professional roles about right action, self interest	1	26-06-18		TLM1		T1	
54.	Customs and religion, uses of ethical theories	1	27-06-18		TLM1		T1	
55.	Uses of ethical theories	1	02-07-18		TLM1		T1	
56.	TUTORIAL-1	1	03-07-18		TLM3			
No. of classes required to complete UNIT-I		11			No. of classes taken:			

UNIT-II : Human Values

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
57.	Introduction about values	1	04-07-18		TLM1	CO2	T1	
58.	Morals ethics and values, Integrity	1	09-07-18		TLM1		T1	
59.	Work ethic, Service learning, Civic virtue	1	10-07-18		TLM1		T1	
60.	Respect for others, living peacefully, Caring, sharing,	1	11-07-18&16-06018		TLM1		T1	
61.	Honesty, courage, Valuing time, cooperation	1	17-07-18&18-07-18		TLM1		T1	
62.	Commitment, Empathy, self confidence	1	23-07-18		TLM1		T1	
63.	Character, spirituality	1	24-07-18		TLM1		T1	
64.	TUTORIAL-2	1	25-07-18		TLM3			
No. of classes required to complete UNIT-II		10			No. of classes taken:			

Unit-III Engineering as Social Experimentation

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
65.	Engineering as experimentation introduction	1	06-08-18		TLM1	CO3	T1	
66.	Engineering Projects VS. Standard Experiments	1	07-08-18		TLM1		T1	
67.	Engineers as responsible experimenters	1	08-08-18		TLM1		T1	
68.	Codes of ethics, Industrial Standards	1	13-08-18		TLM1		T1	
69.	A balanced outlook on law	1	14-08-18		TLM1		T1	
70.	The challenger case study	1	20-08-18		TLM1		T1	
71.	Tutorial-3	1	21-08-18		TLM3			
No. of classes required to complete UNIT-III		07			No. of classes taken:			

Unit – IV Safety, Responsibilities and Rights

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
72.	Introduction about Safety, and rights	1	27-08-18		TLM1	CO4	T1	
73.	Assessment of safety and risk	1	28-08-18		TLM1		T1	
74.	Risk benefit analysis and reducing risk ,Three Mile Island and Chernobyl case study	1	29-08-18		TLM1		T1	
75.	Collegiality and loyalty, Respect for authority,	1	04-09-18		TLM1		T1	
76.	Collective bargaining-Confidentiality	1	05-09-18		TLM1		T1	
	Conflicts of interest, Occupational crime		05-09-18		TLM1		T1	
77.	Professional Rights, Employee rights	1	10-09-18		TLM1		T1	
78.	Intellectual Property Rights (IPR)	1	11-09-18		TLM1		T1	
79.	TUTORIAL-4	1	12-09-18		TLM3			
No. of classes required to complete UNIT-IV		08			No. of classes taken:			

Unit –V GLOBAL ISSUES

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
80.	MNC's, Environmental ethics,	1	17-09-18		TLM1	CO5	T1	
81.	Computer ethics.	1	18-09-18		TLM1		T1	
82.	Weapons development	1	19-09-18		TLM1		T1	
83.	Engineers as managers, consulting engineers	1	24-09-18		TLM1		T1	
84.	Engineers as expert witnesses	1	25-09-18		TLM1		T1	
	Engineers as advisors		25-09-18		TLM1		T1	
85.	Moral leadership	1	26-09-18		TLM1		T1	
86.	TUTORIAL-5	1	01-10-18		TLM3			
87.	sample code of Ethics	1	03-10-18		TLM1		T1	
No. of classes required to complete UNIT-V		08			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
88.								
89.								
90.								

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	COs	Marks
I-Mid Examination (Descriptive) = A	1,2	A=20
II-Mid Examination (Descriptive) = B	3,4,5	B=20
Evaluation of Mid Marks: A+B =75% of Max(A,B)+25% of Min(A,B)	1,2,3,4,5	A+B=20
Evaluation of Report Writing and Seminar Presentation = C	1,2,3,4,5	C=5
Cumulative Internal Examination : A+B+C	1,2,3,4,5	A+B+C=25
Semester End Examinations =D	1,2,3,4,5	D=75
Total Marks: A+B+C+D	1,2,3,4,5	100

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Course Instructor	Course Coordinator	Module Coordinator	HOD
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