Academic Course Description

BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Electrical and Electronics Engineering **BEE403 & LINEAR INTEGRATED CIRCUITS** Fourthsemester (EvenSemester)

Course (catalog) description

Ability to understand and analyze linear and digital electronic circuits.

Compulsory/Elective course:Compulsory for EEE students

Credit hours& contact hours : 3 & 45 hours

Course Coordinator ٠ Dr.V.Jayalakshmi

Instructors :Dr.V.Jayalakshmi

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr.V.Jayalakshmi	Second year	KS 101	04422290125	Jayalakshmi.eee@	12:30pm-
	EEE			bharathuniv.ac.in	1:30pm

Relationship to other courses:

Pre – requisites :BEE306 DIGITAL ELECTRONICS

Assumed knowledge :Basic knowledge in circuit analysis

Following courses : BEE605 Measurement And Instrumentation

Syllabus Contents

INTEGRATED CIRCUITS UNIT I

Classification, chip size and circuit complexity, basic information of Op-amp, differential op-amp, ideal and practical Op-amp, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, Slew rate- Methods of improving slew rate.

UNIT II **OP-AMP APPLICATIONS**

Basic application of Op-amp, instrumentation amplifier, V to I and I to V converters, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, Log and antilog amplifiers, Non-Linear Function Generator, Triangle Wave Generat 9

TIMERS & PHASE LOCKED LOOPS UNIT III

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Voltage Controlled Oscillator, PLL - introduction, block schematic, Principles and description of individual blocks of 565- Applications.

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UNIT IV D-A AND A-D CONVERTERS

Introduction ,High speed sample and hold circuit , basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications, voltage to time and voltage to frequency converters.

UNIT V SPECIAL FUNCTION ICS

Voltage regulators-linear and switched mode types, Frequency to voltage converters, Tuned amplifiers, Power amplifiers, Video amplifiers, Fiber optics ICs and optocouplers

Text book(s) and/or required materials

T1. D. Roy Chowdhury, "Linear Integrated Circuits", New Age International (p) Ltd, 2ndedition, 2003

T2. Ramakanth A. Gayakwad "Op-Amps & Linear ICs", PHI, 4th edition, 1987.

Reference Books:

R1. R.F. Coughlin and Fredrick F. Driscoll, "Operational Amplifiers and Linear IntegratedCircuits", PHI, 6th edition 1977

R2David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.

R3Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd edition, 2002.

Computer usage: PSpice

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area :Electrical Machines | Electronics | Power system | Control & Instrumentation

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 2 nd week	Session 1 to 18	2 Periods
2	Cycle Test-2	March 2nd week	Session 19 to 36	2 Periods
3	Model Test	April 3rd week	Session 1 to 45	3 Hrs
Л	University	ТВА	All sessions / Units	3 Hrs.
-	Examination			

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	C	orrelates	to	
Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems:		program outcome		
		Μ	L	
	a,d,e,h,i	b,c,g,m,l	j,k	
CO1: Understand the DC and AC characteristics of operational amplifiers and its				
effect on output and their compensation techniques.				
CO2: Understand & demonstrate different applications based on operational-	a,d,e,h,i	b,c,g,l	j,k	
amplifier				
CO3: Understand Timer IC 555 and PLL & demonstrate different applications	a,d,e,h,i	b,g,l	j,k	
based on it.				
CO4: Differentiate A/D and D/A converter, understand their types and analyze	a,d,e,h,i	b,g,l	j,k	
their applications.				
CO5: Demonstrate the various applications of special Function ICs such as	a,d,e,h,i	b,c,g,l	j,k	
Voltage regulators and amplifiers				

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	INTEGRATED CIRCUITS		
1.	Classification, chip size and circuit complexity	No	T1
2.	basic information of Op-amp, differential op-amp	No	Ta
3.	ideal and practical Op-amp	No	
4.	Op-amp DC characteristics and AC characteristics	Yes	
5.	Op-amp AC characteristics	Yes	-
6.	modes of operation-inverting	Yes	Τ1
7.	modes of operation - non-inverting	Yes	
8.	Slew rate equation	Yes	
9.	Slew rate- Methods of improving slew rate.	Yes	
UNIT II	OP-AMP APPLICATIONS		
10.	Basic application of Op-amp	Yes	
11.	instrumentation amplifier	No	
12.	V to I and I to V converters	Yes	-
13.	Differentiators and Integrators	Yes	-
14.	Comparators	Yes	
15.	Schmitt trigger	Yes	T1
16.	Multi vibrators, Log and antilog amplifiers	Yes	

17.	Non-Linear Function Generator	Yes	
18.	Triangle Wave Generator	Yes	
UNIT III	TIMERS & PHASE LOCKED LOOPS		
19.	Introduction to 555 timer	No	
20.	functional diagram	No	
21.	monostable and astable operations and applications	No	
22.	Voltage Controlled Oscillator	No	
23.	PLL - introduction	No	T1
24.	block schematic	No	
25.	block schematic	No	
26.	Principles and description of individual blocks of 565- Applications.	No	
27.	Principles and description of individual blocks of 565- Applications.	No	
UNIT IV	D-A AND A- D CONVERTERS		
28.	Introduction ,High speed sample and hold circuit	No	
29.	basic DAC techniques, weighted resistor DAC	No	
30.	R-2R ladder DAC	No	
31.	inverted R-2R DAC	No	Т2
32.	Different types of ADCs	No	
33.	parallel comparator type ADC	No	
34.	counter type ADC, successive approximation ADC and dual slope ADC	No	
35.	DAC and ADC specifications	No	
36.	voltage to time and voltage to frequency converters	No	
UNIT V	SPECIAL FUNCTION ICS		
37.	Voltage regulators-linear and switched mode types	No	
38.	Voltage regulators-linear and switched mode types	No	
39.	Frequency to voltage converters	No	
40.	Tuned amplifiers	No	
41.	Tuned amplifiers	No	T2
42.	Power amplifiers	No]
45.	Video amplifiers	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	05%
Cycle Test – II	-	05%
Model Test	-	10%
Attendance	-	05%
SEMINAR&ASSIGNMENT	-	05%
Final exam	-	70%

Prepared by: Dr.V.Jayalakshmi

Dated :

Addendum

ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:

- a) An ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) An ability to identify, formulate, and solve engineering problems.
- c) An ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d) An ability to design and conduct experiments, as well as to analyze and interpret data.
- e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- f) An ability to apply reasoning informed by the knowledge of contemporary issues.
- g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- h) An ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) An ability to function on multidisciplinary teams.
- j) An ability to communicate effectively with the engineering community and with society at large.
- k) An ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- 1) An ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION

Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE

Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM

Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL

Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS

Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
Dr.V.Jayalakshmi	

Course Coordinator

(Dr.V.Jayalakshmi)

HOD/EEE)

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