

Institute / School Name	School of Electronics and Electrical Engineering		
Program Name	B.E.		
Course Code	ECL5101		
Course Name	Basics of Electronics Engineering		
Lecture / Tutorial (per week)	4/1	Course Credits	5
Course Coordinator Name			

1. **Scope and Objectives of the Course**

1. To provide a comprehensive exposition of the principles of electronics engineering for both electronics as well as non-electronics undergraduates.
2. To understand the basics of electronics, elements and their functionality.
3. To understand the V-I characteristics of basics semiconductor devices such as diodes, transistors and operation of circuits like rectifiers, logic gates etc.
4. To provide a direct and effective methodology for learning basic electronics engineering concepts.
5. To understand methods to analyze and characterize the circuits and to have basic understanding for implementation of logic machines.

2. **Recommended books**

- a. 'Basic Electronics', D P Kothari, I J Nagrath ,McGraw Hill, ISBN(13) : 978-93-329-0158-2,2014
- b. 'Basic Electrical and Electronics', R Muthusubramanian, S Salivahanan,K, Tata McGraw Hill, ISBN: 9780070146129, Eighth Reprint,2012
- c. Basic Electronics and Linear Circuits, NN Bhargava, DC Kulshreshtha, SC Gupta, McGraw Hill Publications, ISBN: 978-1-25-900646-3,2015

4. **Other readings and relevant websites**

SNo.	Link of Journals, Magazines, websites and Research Papers
1	http://www.electrical4u.com/p-i-n-photodiode-avalanche-photo-diode/
2	http://www.dauniv.ac.in/downloads/Electronic%20Devices/01AEDCNpnpnptransistorLesson01A.pdf
3	http://www.powershow.com/view/1f9351-OGY1M/Logic_Gates_powerpoint_ppt_presentation
4	http://www.circuitstoday.com/555-timer

5. **Course Plan**

Lect. No. (1 Hr)	Topics
1-5	Unit-1:Trends and Applications Of Electronics What is electronics, Modern Trends and its applications in Communication and entertainment, Defense, Industrial, Medical Sciences, and Instrumentation. http://electricalengineering.global-summit.com/events-list/applications-of-electrical-electronics-engineering

	Show video: http://www.digitaltrends.com/cool-tech/bandage-of-the-future-hydrogel-delivers-medicine-automatically/
6-9	Unit-2: Introduction to Electronic Components Definition of Electronic Components: passive components: types of resistors: fixed (color coding) and variable, types of capacitors: mica, ceramic, paper, electrolytic and variable, inductor. Show Video on recent inventions in electronics: https://www.youtube.com/watch?v=PwtdKR9_PK0
10	Symbolic representation of active components: diode, BJT, FET, UJT.
11-12	Unit-3: Diodes and its applications Conduction in solids: Conduction in Metals, Semiconductors, Doped Semiconductors. https://www.youtube.com/watch?v=JBtEckh3L9Q
13-16	PN Junction Diode: Reverse Bias, Forward Bias, Equivalent Circuit of Diode, Numerical based on diode equation only https://www.youtube.com/watch?v=l2nrBITEVIs
ASSIGNMENT-1	
ST1 (Syllabus Covered from Lecture 1 to 16)	
17-19	Rectification: Half-wave rectification (Sinusoidal Input), Full Wave Rectification, Bridge Rectifier, Rectifier with Centre-tapped Transformer, Calculation of Average and RMS values of output, Ripple Factor, Efficiency, Peak inverse voltage for Half wave and full wave rectifiers
20-22	Special Purpose Diodes: Working principle of Zener diode, Varactor diode, Photodiode, Light Emitting diode, PIN diode https://www.youtube.com/watch?v=xSQHfsHTS88 https://www.youtube.com/watch?v=1PQAmSSiEiU
23	Unit-4: Bipolar Junction Transistors Introduction to Bipolar Junction transistor: BJT Construction
24-25	BJT operation: Biasing, Transistor Symbols, npn and pnp transistor. https://www.wiziq.com/tutorial/771695-bipolar-junction-transistors
26-28	Introduction to BJT Configurations only: Common Base, Common Emitter and Common Collector Configurations. https://www.youtube.com/watch?v=jUBygl-n6zk
29-30	Unit-5: Digital Electronics Introduction, Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, conversions from one number system to other
31-33	Addition, Subtraction, Multiplication, Division: Binary Number System only, Complement of Binary Numbers, Binary Addition and Subtraction using 1's and 2's complement method
34-35	Basic Logic gates, Universal Gates and special purpose gates with their truth table, symbols, logical expression,
ASSIGNMENT-2	
ST2 (Syllabus Covered from Lecture 17-35)	
36-40	Realization of logical expression using basic and Universal gates, NAND and NOR implementation of basic and derived logic gates https://www.youtube.com/watch?v=SW2Bwc17_wA
41-43	Unit-6: Clock and Timing Circuits Introduction, IC 555 Timer, Astable Operation, 555 Timer in Monostable Operation https://www.youtube.com/watch?v=WqGq9Yv1d_U
ST3 (Syllabus Covered from Lecture 1 to 43)	

6. Tutorial Plan

Tutorial Sheet No.	Topics to be covered (Total Syllabus is to be covered in the form of tutorial sheets)	Week
1	Revision of basic electronic components with their mathematical equations	1 st
2	Numerical on diode equation	2 nd

3	Numerical on rectifiers	3 rd
4	Numerical on Bipolar Junction Transistors	4 th
5	Class test based on assignment-1	5 th
6	Questions on Number System and Binary Arithmetic	7 th
7	Questions on 1s and 2s complement methods for binary addition and subtraction	8 th
8	Problems on Realization of logic expressions using basic and universal gates	9 th
9	Class test based on assignment-2	10 th
10	Revision of complete syllabus	12 th

6. Evaluation Scheme:

Component 1	Two assignments	10%
Component 2	Two Subjective Sessional Exams	30%
Component 3	End Term Examination	60%
	Total	100

Details of Component-1: There will be two written assignments to be taken from students, out of which one will be submitted before ST1 and second before ST2.

- (i) 1st Assignment will be from question of tutorial sheets 1-4
- (ii) 2nd Assignment will be from question of tutorial sheets 6-8

Details of Component-2: There will be two Sessional Tests (STs) for all theory papers as per below stated guidelines:

- (i) 1st Sessional test will be from 0-40% syllabus of the subject.
- (ii) 2nd Sessional test will be from 41-80% syllabus of the subject.
- (iii) 3rd Sessional test will be from 100% syllabus of the subject.

The best of two tests will be taken for finalizing the internal of the subject. Sessional tests are compulsory.

Details of Component-3: The End Term Examination will be held at the end of semester. The mandatory requirement of 75% attendance in all theory classes is to be met for being eligible to appear in this component.

This Document is approved by:

Designation	Name	Signature
Course Coordinator		
Program In-Charge		
H.O.D		
Date		

Basics of Electronics Engineering (ECL 5101)

Syllabus	Total Number of Lectures	Weight age
Unit-1:Application Of Electronics in various fields What is electronics, Modern Trends and its applications in Communication and entertainment, Defense, Industrial, Medical Sciences, and Instrumentation.	5	20%
Unit-2: Introduction to Electronic Components Definition of Electronic Components: passive components: types of resistors: fixed (color coding) and variable, types of capacitors: mica, ceramic, paper, electrolytic and variable, inductor. Symbolic representation of active components: diode, BJT, FET, UJT.	5	15%
Unit-3:Diodes and its applications Conduction in solids: Conduction in Metals, Semiconductors, Doped Semiconductors. PN Junction Diode: Reverse Bias, Forward Bias, Equivalent Circuit of Diode, Numerical based on diode equation only, Rectification: Half-wave rectification(Sinusoidal Input),Full Wave Rectification, Bridge Rectifier, Rectifier with Centre-tapped Transformer, Calculation of Average and RMS values of output, Ripple Factor, Efficiency, Peak inverse voltage for Half wave and full wave rectifiers, Special Purpose Diodes: Working principle of Zener diode, Varactor Diode, Photodiode, Light Emitting diode, PIN diode.	11	20%
Unit-4: Bipolar Junction Transistors Introduction to Bipolar Junction transistor: BJT Construction and Operation: Biasing, Transistor Symbols, npn and pnp transistor. Introduction to BJT Configurations only: Common Base, Common Emitter and Common Collector Configurations.	6	15%
Unit-5:Digital Electronics Introduction, Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal Number System, conversions from one number system to other, Addition, Subtraction, Multiplication, Division: Binary Number System only, Complement of Binary Numbers, Binary Addition and Subtraction using 1's and 2's complement method, Basic Logic gates, Universal Gates and special purpose gates with their truth table, symbols, logical expression, Realization of logical expression using basic and Universal gates, NAND and NOR Implementation of basic and derived logic gates	11	20 %
Unit-6:Clock and Timing Circuits Introduction, IC 555 Timer, Astable Operation, Monostable Operation	3	10%

Recommended books

- a. 'Basic Electronics', D P Kothari, I J Nagrath ,McGraw Hill, ISBN(13) : 978-93-329-0158-2,2014
- b. 'Basic Electrical and Electronics', R Muthusubramanian, S Salivahanan,K, Tata McGraw Hill, ISBN: 9780070146129, Eighth Reprint,2012
- c. Basic Electronics and Linear Circuits, NN Bhargava, DC Kulshreshtha, SC Gupta, McGraw Hill Publications, ISBN: 978-1-25-900646-3,2015

Institute / School Name	School of Electronics and Electrical Engineering		
Program Name	B.E.		
Course Code	ECP1101		
Course Name	Basics of Electronics Engineering Lab		
Labs (per week)	01	Course Credits	01
Course Coordinator Name			

1. Scope and Objectives of the Course

1. To provide a comprehensive exposition of the principles of electronics engineering for both electronics as well as non-electronics undergraduates.
2. To understand the V-I characteristics of basics semiconductor devices such as diodes, transistors and operation of circuits like rectifiers, logic gates etc.
3. To give a description of theory concepts with practical examples.

2. Reference Books

- a) **RB1:** 'Basic Electronics', D P Kothari, I J Nagrath ,McGraw Hill, ISBN(13) : 978-93-329-0158-2,2014
- b) **RB2:** 'Basic Electrical and Electronics', R Muthusubramanian, S Salivahanan,K, Tata McGraw Hill, ISBN: 9780070146129, Eighth Reprint 2012
- c) Lab manuals

3. Other readings and relevant websites

S.No.	Link of Journals, Magazines, websites and Research Papers
1.	http://ee.lamar.edu/EELABS/ELEN2107/Lab1.pdf
2.	http://mems.ece.dal.ca/eced2200/lab1.pdf
3.	ftp://ftp.interactiv.com/pub/interactiv/htdocs/pdf/pro/tp/huffine.pdf

4. Lab Plan

S. No.	Experiment Detail	Proposed lectures
1	a) Familiarization with basic electronic components. b) Identification of linear and non-linear elements based on VI characteristics.	1

2	Plot and analyze the forward and reverse characteristics of PN junction Si and Ge diodes and determine their knee and breakdown voltages.	1
3	Analyze Zener diode as voltage regulator and observe the output voltage with variable input voltage and fixed load resistance for zener diodes with breakdown voltages of 6 V, 8V and 12 V.	1
4	Study and observe the output waveform of half-wave and full wave rectifiers on CRO and calculate the average and rms values of output voltage and current.	1
5	Analyze the npn and pnp transistors in common emitter configuration and plot their input and output characteristics.	2
6	a) Analyze the truth tables of various logic gates. b) Implement 2-input XOR gate and 2-input X-NOR gate using basic gates.	1
7	Study the operation of astable, monostable and bistable multivibrators using 555 timer.	1
8	Plot and analyze the V-I characteristics of Light Emitting Diode in forward biasing.	1
9	Plot and analyze V-I characteristics of Avalanche photo diode.	1
10	Plot and analyze V-I characteristics of PIN diode.	1
11	Plot and analyze V-I characteristics of tunnel diode.	1
12	Plot and analyze V-I characteristics of Varactor diode.	1

5 Evaluation Scheme:

Component 1*	Lab Performance / File work	40
Component 2	Internal Viva – Voce	20
Component 3**	End Term	40
	Total	100

*Lab Performance will be evaluated periodically.

**The End Term examination for practical courses is held at the end of semester and includes conduct of experiment and an oral examination (viva voce). The mandatory requirement of 75% attendance in all lab classes is to be met for being eligible to appear in this component

This document is approved by

Designation	Name	Signature
Course Co-ordinator		
HoD		
Date		