Course Code	**ECE1022A**			
Course Category	**Engineering Sciences**			
Course Title	**Basics of Electrical and Electronics Engineering**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load in hrs	**4**	**0**	**2**	**3+1**

Pre-requisites: Higher Secondary Physics and Mathematics

Course Objectives:

1. To impart knowledge of Electric, Magnetic, and Electronic circuits
2. To impart understanding of fundamentals of AC and DC circuits
3. To give comprehensive exposure to analyse circuits of semiconductor diodes, transistors and Operational Amplifiers.
4. To equip the students with ability to understand digital circuits.

Course Outcomes: After completion of this course students will be able to

1. Predict the behaviour and characteristics of basic electrical and magnetic circuits. (CLII)
2. Classify Analog and Digital Circuits (CL-II)
3. Test basic electronic circuits based on diodes, transistors and Op-Amp.(CL-VI)
4. Identify components/equipment required for any particular application related to electrical and electronics engineering. (CL-II)
5. To design and test simple combinational logic circuits. (CL-VI)

Course Contents:

- **Semiconductor Diodes: PN** Junction Diode characteristics, Diode Types: Zener and Light Emitting diodes (LED), Diode Applications: Rectifiers, half wave and full wave, Zener diode as a voltage regulator, regulated power supply (7L)

- **Bipolar Junction Transistor (BJT)**: Working principle, operation, Common Emitter (CE), Common Base (CB), Common Collector (CC) Configurations, VI characteristics, biasing circuits, CE amplifier and its DC and AC Analysis with h parameter model. (8L)

- **Introduction to Integrated Circuits**: **A**nalog Integrated circuits, Basics of OPAMP: - inverting and non-inverting mode, study of IC 741
  Digital integrated circuits: Logic Gates, Boolean algebra, Combinational logic Circuits, De-Morgan's theorems, SOP, POS, K- map, Half Adder, Full Adder, flip-flops: RS flip flop, JK flip flop, D flip flop, shift registers, Introduction to Microcontroller (8L)

- **Single Phase Transformer:** Working principle, Construction, Types, Equivalent circuit, Losses, Efficiency, Regulation (6L)

- **D.C. Circuits**: Basic active and passive circuit elements, dependent and independent sources, series, parallel, star to delta and delta to star conversion, KCL, KVL, Thevenin's Theorem, Superposition Theorem (8L)

- **A.C. Circuits:** Generation of alternating EMF, Equation of alternating quantity, waveforms, phasor representation, Concept of impedance, admittance and power triangle, series RL, RC, RLC circuits, Series resonance, parallel circuits, Generation of three phase EMF(8L)

Laboratory Exercises / Practical:

1. Introduction to instruments and electronic components, Build and test Light Emitting diode Circuit on Bread Board
2. Design of rectifier using PN junction diode.
3. Design of voltage regulator using Zener diode.
4. Measurement of transistor amplifier gain in CE configuration.
5. Design and implementation of Full Adder using basic and universal gates.
6. Design of inverting and non-inverting amplifier using OPAMP.
7. Verification of KVL, KCL
8. Finding Resonant Frequency of series R-L-C circuit
9. Finding efficiency and regulation of Single-phase Transformer using Direct Loading method.

Learning Resources:

Reference Books:

1. Hughes , "Electrical and Electronic Technology", 10th Edition, Pearson
2. Cotton H., "Electrical Technology", 7th Ed., C.B.S. Publication.
3. Theraja B.L., "Electrical Technology", Vol. I and II, 2005, S. Chand
4. R.P. Jain, Modern Digital Electronics. New Delhi: Tata McGraw-Hill, 4th Edition, 2009

Supplementary Reading:

1. Nagrath I.J. and Kothari D.P., "Theory and Problems of Basic Electrical Engineering", 2005, PHI Learning Pvt. Ltd
2. Floyd Thomas, "Electronic Devices", Prentice Hall, 9th Edition 2012

Links

https://legacy-uploads.ul.com/wp-content/uploads/sites/40/2016/02/Internet-of-Things-white-paper_final.pdf.pdf

Pedagogy:

- Power Point Presentations, YouTube Videos
- PBL-Self learning, Peer to peer learning, Presentation skill development
- Circuit Simulations in Tinkercad
- Use of Virtual Lab for Expt No. 9

Assessment Scheme:

Class Continuous Assessment (CCA) (100 Marks)

Assignments	Mid term Test	MCQ Test
50	20	30

Laboratory Continuous Assessment (LCA) (50 Marks)

Lab Manual Submission & Simulation Understanding	PBL / Project simulation
30	20

Term End Examination:
Term end exam of 50 Marks will be based on entire syllabus.