JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.Sc.   **Semester: I**
ELECTRONICS PAPER I
ELECTRONIC FUNDAMENTALS - I

Course Code: 18IEL1   **No. of Hours: 60**

COURSE OBJECTIVES:
On completion of the following units of syllabus contents, the students must be able to:
- Familiarize various passive and active components
- Study the concepts of current and voltage sources
- Study of Kirchoff's Laws
- Explain the circuit theorems
- Analysis of AC Circuit.
- Solve simple problems in AC and DC circuits
- Study the working principle of PN junction diode and transistor
- Understand the working principle of different types of rectifiers
- Explain the concept of Filter Circuits
- Study the working principle of clippers and clampers
- Understand the different transistor configurations
- Know the construction and working principle of optoelectronic devices

LEARNING OUTCOMES
- Familiarize and understand passive and active components and the working of Basic AC and DC Circuits using Network Theorem
- Distinguish between PN junction and Zener Diodes to understand the working of op to electronic devices
- Knowledge of Transistor fundamentals
- Working and applications of Optoelectronic devices

UNIT I

INTRODUCTION TO ELECTRONIC DEVICES AND CIRCUIT FUNDAMENTALS
14 HRS
Review of Passive Components (R, L, C). **Switch** Types **– DIP switches, Toggle switch, SPST, SPDT, DPST, DPDT**. Relay –Electromagnetic relay, construction and working, types and Applications (Mention only).
Current and voltage sources-Concept of voltage source and current source, symbol, internal resistance of a source, Graphical representation and comparison of real and ideal voltage and current source, inter conversions of voltage source and current sources, numerical. AC voltage sources.
RC circuit analysis - Time constant definition, charging and discharging Derivations for

current and voltage, Graphical representation, Numerical problems.

AC circuit analysis-. Resistor, Capacitor, Inductor, LCR series, Phasor diagram Equation for impedance & Phase difference (No derivation)**,** Power factor(reactive and apparent power). **Resonance** -series and parallel circuit, (Derivation and problem only on Series resonance). Quality factor, Bandwidth and Selectivity.

UNIT II
NETWORK THEOREMS   12 HRS
DC resistive circuit- Characteristics of series and parallel circuits (review) , concept of open and short circuits, voltage divider theorem, current divider theorem, Kirchoff's laws - statement and explanation. Analysis of a DC network: mesh, branch and nodal voltage methods, Problems.

Bilateral and unilateral network. Network Theorems: **Superposition theorem, Thevenin's theorem, Norton's theorem** – Statement, Explanation considering a simple resistive network with dc source. Application to Resistive Circuits. Thevenin's theorem for AC circuits. (Simple Circuit). **Maximum power transfer theorem**- Statement, Explanation with a simple resistive circuit with dc sources- proof of the theorem -expression for maximum power delivered, Problems.

UNIT III
SEMICONDUCTOR DIODE THEORY AND APPLICATIONS   14 HRS
Diodes: PN Junction diode – Working and Characteristics, Parameters, Avalanche break down. Zener diode – Working and Characteristics, Zener break down. Specifications- peak inverse voltage, current and power rating, Reverse leakage current. Zener diode voltage regulator – Load and Line regulation. Numerical Problems.

Rectifier: Introduction, Classification of Rectifiers. Half Wave Rectifier, Full Wave Rectifier and Bridge Rectifier – Working, Waveforms, derivation for I_{dc}, I_{rms}, V_{dc}, V_{rms}, Ripple factor and Efficiency, Numerical Problems, Filters-C,L and π - working and waveforms

Clipping circuits- working of positive and negative biased clippers -input and output waveforms.

Clamping circuit- working of a positive and negative clamper circuit-input and output waveforms- applications.

Voltage multiplier- Principle and working of a voltage tripler.

UNIT IV
BIPOLAR JUNCTION TRANSISTOR FUNDAMENTALS   10 HRS
NPN and PNP transistors - Construction, symbol, Working of a **NPN** transistor, Transistor configurations- Current gains, input and output resistances (CB, CE, CC), Relation between α, β and γ. Input and output characteristics of CE configuration, concept of Leakage current. Transistor as a switch. Mention of voltage, power and high frequency transistors

UNIT V
OPTO ELECTRONIC DEVICES   **10 HRS**

LDR, LED, 7 segment LED display, LCD, solar cell (symbol, principle, construction and working), Opto-coupler, Infrared transmitter and Receiver, Laser diode, Avalanche Photodiode , Photo transistor (principle and applications only).

BRIDGE COURSE
(To be completed in first two lab sessions):
Passive components: Resistors, Capacitors, Inductors - Fixed and variable, Colour coding, Uses.
Note: Questions shall not be set for end semester examination from the portions mentioned as 'review' and bridge course

TEXT BOOKS

1. V.K Mehta and Rohit Mehta, Principles of electronics, S.Chand publications, 2007.
2. R.S Sedha, Applied Electronics, S. Chand Publishers, 2005.
3. Floyd, Electronic devices , fifth edition, PHI publications,1999.
4. B.L Theraja, Basic Electronics, S.Chand & Co, 2007.

REFERENCES

1. Robert Boylsted & Louis Nashelsky, Electronic Devices and Circuit Theory PHI 8 Th Edition-2003.
2. Optical fiber communications by Gerd Keiser international edition 2000.
3. N.N .Bhargava, Kulkshetra & D.C Gupta, Basic Electronics and Linear Circuits, TMH-1989
4. A.P.Malvino, Electronic Principles, TMH 7th Edition.
5. B.Basavaraj, Fundamentals of Electronics, Revised Edition 2002.

Electronics Practical I (code)
LIST OF EXPERIMENTS
1. (a) I-V characteristics of Semiconductor diode
   (b) I-V characteristics of Zener diode
2. Maximum power transfer theorem.
3. Superposition theorem.
4. Thevenin's theorem.
5. Zener diode as voltage regulator- determination of line and load regulation.
6. Half and full wave rectifier with and without filter.
7. Bridge rectifier with and without filter.
8. Voltage Multiplier (tripler).
9. Transistor characteristics in CE mode- determination of β.
10. RC circuit- Time constant with different values of C and R.

Note: Any 8 out of 10 experiments have to be conducted.