B SC II SEMESTER ELECTRONICS

Program Name	B. Sc. in Electronics
Semester	**Second semester**
Course Title	**Electronic Circuits**

Course Objectives:

The course, ELE –CT2, includes – Bipolar and Unipolar devices and their applications, study of various types of amplifiers, Concept of feedback, types of oscillators and Electronics Devices.

Unit I: Bipolar and Unipolar devices

Bipolar devices : Bipolar Junction Transistors (BJT) **-** Construction, Types, CE, CB, and CC configurations V- I Characteristics of a transistor in CE mode, Regions of operation (Active, Cut off and Saturation), leakage currents, Current gains α, β and their inter relations, transistor as a Switch.

Uipolar devices: Junction Field Effect transistor (JFET): Types, construction and working of N-Channel FET, Characteristics, FET Parameters and their relationships. Comparison of FET and BJT.

Uni Junction Transistor (UJT) : Basic construction, working, V-I characteristics, Intrinsic standoff ratio, UJT as a relaxation oscillator.

Unit II: Amplifiers:

Transistor biasing and stabilization circuits, dc load line and Q point, Thermal runaway , stability and stability factor S. Fixed bias and voltage divider biasing methods.

Small Signal amplifiers : Classification of amplifiers based on different criteria, small signal CE amplifier- circuit, working, Frequency response.

Multistage amplifiers – Types of coupling - RC coupled amplifier, Transformer coupled amplifier, Direct coupled amplifier- circuit diagrams and frequency response graph, advantages and disadvantages.

Power Amplifiers : Difference between voltage and power amplifiers, classification of power amplifiers- Class A, Class b, Class c and their comparisons.

Tuned Amplifier : Single tuned amplifier - circuit diagram, working and frequency response, bandwidth, Q-factor

Unit III: Feedback and Oscillators

Concept of feedback, types of feedback - Positive and Negative feedback, advantages of negative feedback. voltage gain of feedback amplifier. **Oscillators:** Basic principles of oscillators- Tank Circuit-Barkhausen criteria-LC oscillators. Hartley and Colpitt's, RC oscillator: Phase shift oscillator, Wein bridge and crystal oscillators using transistors- expression for frequency of oscillations.

Unit IV: Power Electronics devices

Silicon Controlled Rectifier (SCR), Diode for Alternating Current (DIAC), Triode for Alternating Current (TRAIC): Working, Construction, V-I characteristics, Applications. Half-wave and Full-Wave controlled rectifiers.

MOSFET: N-Channel and P- channel: construction, Working, V-I characteristics and transfer characteristics. V MOSFET, IGBT: Construction, working and V-I characteristics.

OUTCOME OF THE COURSE:

After studying this course, the students are:

1. Able to understand the construction and characteristics of Bipolar and unipolar devices.
2 Able to design and construct various types of amplifiers.
3. Able to understand the concept of feedback in oscillator.
4. Able to construct and analyze the working of power electronic devices.

REFERENCE BOOKS:

1. Applied Electronics: R.S.Sedha- S.Chand Publ. 3rd Edition.
2. Basic Electronics: B.L.Theraja, (S.Chand. and Co. : 3rdEdition)
3. Principles of Electronics:V.K.Mehata. (S.Chand. and Co. : 6th Edition)
4. Electronic devices and circuit theory: Robert Boylsted and Louis Nashelsky-PHI 5th Edition.
5. Electronic devices: David A Bell-Reston publishing Company/DB Tarapurwala Publ.
6. Fundmentals of Electronics: B.Basavaraj-(Omkar Publishers Bangalore, Revised edition 2002.
7. Basic Electronics and linear Circuits : N. N. Bhargava., D C Kulshresta and D C Gupta- TMH Publishers 4th Ed.

Program Name	B. Sc. in Electronics
Semester	**Second semester**
Course Title	**Electronic Circuits Practicals**

Note: Minimum 12 Experiments to be performed

1. Study of Input and output characteristics of a transistor in CE configuration, determine the voltage and current gain.
2. To study Transistor as switch.
3. Study of I/O characteristics of FET-determination of drain resistance, trans conductance and amplification factor.
4. To study UJT as an relaxation oscillator, determination of η.
5. To design and construct single stage CE amplifier and study its frequency response.
6. To study two stage RC coupled amplifier.
7. To study Transformer coupled amplifier.
8. To study single tuned amplifier.
9. To design and construct the Hartely oscillator.
10. To design and construct the Colpitt's oscillator
11. To design and construct the RC Phase Shift oscillator.
12. To study the Crystal oscillator.
13. To study the Wein Bridge oscillator.
14. To study V-I characteristics of SCR.
15. To design and construct SCR based Half-wave controlled rectifier.
16. To study the V-I characteristics of MOSFET.