

**Course Name:** Mechanical and Production

**Course Code:** ME/PT/PG/MH

Engineering/Production Technology

**Semester:** Fourth

**Subject Title:** Fundamentals of Electronics

**Subject Code:** 9051

**Teaching and Examination Scheme :**

Teaching Scheme			Examination Scheme						
TH	TU	PR	Paper Hrs	TH	Test	PR	OR	TW	Total
03	--	02	03	80	20	50@	-	-	150

**Rationale:**

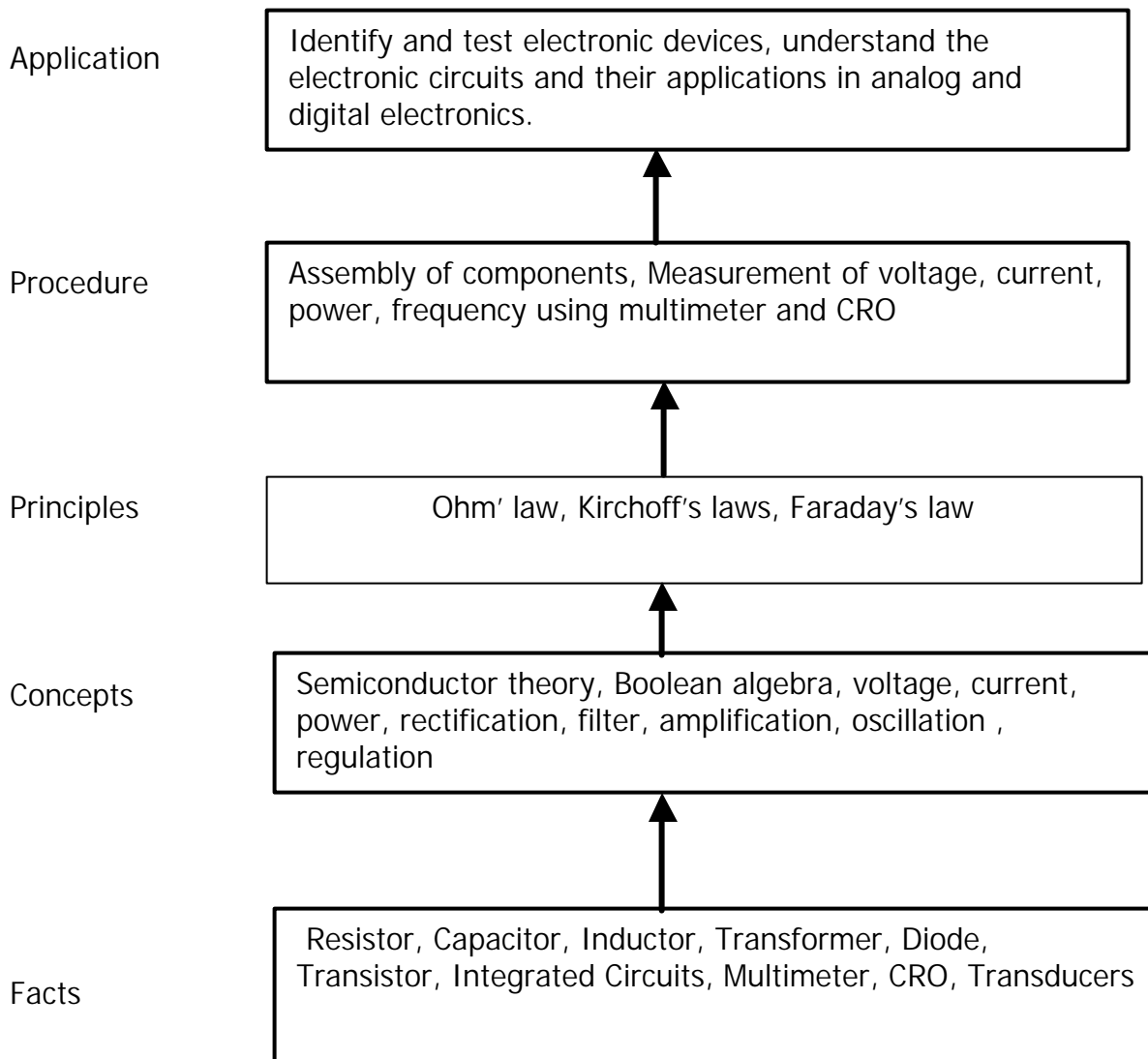
This subject is classified under core technology group and forms an important course of any branch of engineering. The course envisages identification and testing of components, their principles of working and applications of various electronic devices and circuits in analog and digital electronics.

**Objectives:**

Students should be able to:

1. Identify and test different components.
2. Use principles of circuit operations and its applications.
3. Distinguish various elements in digital electronics.
4. Understand working of different types of power supplies.
5. Use test instruments.

## Learning Structure:



## Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<p><b>Electronic Devices</b></p> <p>Introduction to electronic devices, their symbols, principle of working and testing procedure – Diode, Zener diode, Power diode, Varactor diode, Bipolar Junction Transistor (BJT), Field Effect Transistor(FET) - JFET &amp; MOSFET, Uni-junction Transistor(UJT), power devices – DIAC, TRIAC, SCR, Photo devices-, LDR, Photo diode, Photo transistor, LED &amp; LED display ( 7 segment), Liquid crystal display(LCD), opto –coupler, thermister- NTC, PTC</p>	10	16
02	<p><b>Power supply</b></p> <p>Circuit diagram and operation- Half wave, full wave &amp; bridge rectifier. Filters – L, C, L-C, ? filter            Concept of unregulated power supply, regulated power supply- line regulation &amp; load regulation.            Principle of operation, block diagram and application of shunt regulated power supply, series regulated power supply, switch mode power supply (SMPS), 3 pin IC regulated, IC 723 adjustable power supply.            Block diagram of UPS, Concept of online and off line UPS.            Concept of constant current limiting and fold back current limiting, concept of constant voltage source, constant current source</p>	09	15
03	<p><b>Transistor</b></p> <p>Transistor as a switch and amplifier, single stage transistor amplifier CB, CE and CC configuration and their applications, RC coupled and direct coupled amplifier, their frequency response and application.</p> <p>Power amplifier- class A, class B, class C, class AB, their comparison on operating point, conduction cycle, efficiency, application.(No circuits expected)</p> <p>Oscillator – Requirement of oscillator circuit, Barkhausen's criteria of oscillator, circuit diagram and its application-. Phase shift oscillator, Hartley oscillator, Colpitts oscillator, Crystal oscillator.</p>	09	15

04	<b>OP Amp</b> Block diagram, configurations and use of op amp as - Inverting, Non-inverting, Summing, Voltage to current converter, current to voltage converter, differentiator, Comparator, Wien bridge oscillator, Schmitt's trigger, Instrument amplifier	05	10
05	<b>Digital Electronics</b> Number system- Decimal, Binary, Hexadecimal, BCD, Decimal to binary conversion, , Decimal – Hexadecimal conversion. Study of logic gates, Symbol, truth table and IC numbers - NOT, AND, OR, NAND, NOR, XOR, XNOR and NAND as universal gate. Flip Flops – Block diagram of flip flop, RS flip flop, D flip flop ,Toggle , JK flip flop, Master Slave JK flip flop, Clocked flip flop – level triggered and edge triggered , Application of flip flop – Frequency divider, Ring counter, Shift register. Seven segment driving circuit, Encoder, Decoder, Multiplexer, De multiplier.	09	14
06	<b>IC 555 -</b> Block diagram, Multi vibrator circuit diagram and working for Mono stable, Bi stable and Astable Multivibrator, Analog to Digital Converters , Digital to Analog converter Block diagram and working of – Welding control circuits –sequential timer Temperature control circuits using SCR,FWR Speed control circuits Level control circuit using variable capacitor and potentiometer.	06	10
Total		48	80

### Practical:

Skills to be developed:

Intellectual Skills:

1. Identification and selection of components
2. Interpretation of circuits
3. Understand working of various types of power supplies

Motor skills:

- a. Drawing of circuits
- b. Measurement of various parameters using multimeter
- c. Testing of components using LCR meter, IC tester
- d. Follow standard test procedure

## List of Practical:

1. Use of multimeter (analog and digital) for current, voltage and resistance measurement (Use of colour code for resistors).
2. Study of front panel of CRO and measurement of frequency and voltage.
3. I) Measurement of L, C, R on LCR meter  
II) Testing of an IC using IC tester
4. Testing of components like diode, FET, MOSFET, LED, SCR, diac, triac, Zener diode, inductor, capacitor using a multimeter
5. Line and load regulation of un-regulated power supply and regulated power supply.
6. To plot the frequency response of single stage RC coupled amplifier and calculate band width
7. Verification of Op-Amp as inverting and non inverting amplifier.
8. To generate a square wave by using Schmitt trigger.
9. Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR, XOR, XNOR
10. Construct a ring counter using JK flip-flop and verify count sequence.
11. Design a square wave oscillator for 100 Hz using IC 555.(Use astable multivibrator)
12. Speed control of AC/DC motor by using SCR, UJT

**Note :** 1) Teachers are expected to make students familiar with the Data Books and Operation Manuals and also encourage them to visit related websites.

2) At least one practical from the above list be performed by using simulation software.

## Learning Resources:

### 1. Books:

Sr.No	Author	Title	Publication
01	V.K. Mehta	Principles of Electronics	S. Chand & Company Ltd. New Delhi
02	Paul Malvino	Electronic Principles	Tata McGraw Hill Publishers
03	A. Mottershead	Electronic Devices & Components'	Prentice Hall of India
04	R.P. Jain	Modern Digital Electronics	Tata McGraw Hill Publishers
05	Grob Bernard	Basic Electronics	Tata McGraw Hill Publishers
06	Paul B. ZBar, Albert p.Malvino,Michael A. Miller	Basic Electronics - a Text Lab Manual	Tata McGraw Hill Publishers
07	Paul B. ZBar	Industrial Electronics - a Text Lab Manual	Tata McGraw Hill Publishers