Department of Electronics

Vocational Skill Course (VSC)

Basics of Electronic Components

Course code: UEL112P

Credits: 2 (4 Pr) No. of Practical Hrs.:60

Course description:

This course aims to provide students with a strong foundation in electronic components and circuit analysis, including an understanding of the fundamental laws used to solve circuits. Students will also become familiar with various measuring and testing instruments commonly used in electronics, as well as the basic techniques of assembling electronic circuits and troubleshooting common problems. In addition, this course will cover the fundamentals of semiconductor devices that power modern electronics. By the end of the course, students will have the skills and knowledge needed to design and build basic electronic circuits, and will be well-prepared to pursue further studies in the field of electronics.

Course Objectives:

1. Develop an understanding of the fundamental concepts of resistance, voltage, and current in electronic circuits.
2. Learn about the various electronic components used in circuits, including their symbols and basic properties.
3. Gain familiarity with testing and measuring instruments commonly used in electronics.
4. Acquire the skills needed to assemble electronic circuits and troubleshoot common problems that may arise during the assembly process.
5. Understand the basic principles of operation of semiconductor devices, which are the building blocks of modern electronic devices.

Course learning outcomes:

Upon completion of this course, learners will be able to:

1. Demonstrate an understanding of electronic components and their various types.
2. Identify and explain the use of different electronic components in various circuits.
3. Apply the concepts of resistance, voltage, and current to analyse electronic circuits.
4. Utilize resistors in various configurations to achieve specific circuit requirements.
5. Safely operate a Multimeter/Digital Multimeter to measure voltage, current, and resistance.
6. Apply Ohm's Law to calculate voltage, current, and resistance in electronic circuits.
7. Effectively use a Cathode Ray Oscilloscope (CRO) for circuit measurements and analysis.

Unit I: Basic Circuit Components:

Resistors: Introduction to Resistor and Colour Band Coding, Power Dissipation, Parallel and Series connection of resistors, Fixed and Variable resistors, find value of resistor using a meter,

Capacitors: Introduction to Capacitors, Characteristics of capacitor, Capacitors Behaviour, Capacitors in Series and Parallel, how to test a capacitor, Air, Paper, Mica, Teflon, Ceramic, Plastic and Electrolytic capacitor.

Inductors: Types, identification, use of inductance, Inductance in series and parallel, testing of resistance and inductance using multimeter.
Diode and Transistor: Identification of diode, types and application, types of transistors, identification and application

Unit II Measurement of Circuit Parameters:

Introduction to Resistance, Current, Voltage, Types of Circuits, Introduction to DMM, Volt Ohm Meter Basics Measuring Resistance, how to test Resistors, Measuring Current, Measuring Voltage, Peak, Peak to Peak, Root Mean Square and Average Values. Circuit Diagram Basics and symbols, Introduction to CRO, Measurement of voltage, frequency and phase by CRO, Oscilloscope probes.

Unit III: Network Theorems:

Statement: Ohm's Law, Kirchoff's laws, application of these laws, Node Analysis, Mesh Analysis simple examples based on these laws.

List of Practical:

1. Study of laws of series resistor and application as voltage divider.
2. Study of laws of parallel resistor and application as current divider.
3. Study of laws of series capacitor and application as voltage divider.
4. Study of laws of parallel capacitor and application as current divider.
5. Verification of Terman's equation for inductance. Reactance characteristics of inductor
6. Study of battery as practical (i) voltage source (ii) current source.
7. Study of voltage divider circuit.
8. Study of current divider circuit.
9. Measurement of Peak, Peak to Peak, Root Mean Square and Average Values of voltage by CRO
10. Measurement of frequency and phase by CRO.
11. Verification of KVL.
12. Verification of KCL.

Reference Books:

1. Basic Electronics solid state physics B. L. Theraja, S. Chand and company
2. Electronic Devices and circuits Allen Mottershed, Prentice Hall of India Pvt. Ltd.
3. An Introduction to Electronics, R. G. Kale, U. K. Puranik, V. N. Pendse, A. A. Sakale, Kitab Mahal Publications.
4. Basic Electronics, Grob, Tata McGraw Hill

5. Electronic Devices, T. L. Floyd, Pearson Education Asia
6. Electronic Principles, Malvino, Tata McGraw Hill
7. Electronic components and materials, Madhuri Joshi, Schroff pub. And Distributors
8. Electronic components and materials, S. M. Dhir, TMH

Department of Electronics

Vocational Skill Course (VSC)

Transducers, Sensors & its applications

COURSE CODE: UEL122P

Credits: 2 (4 Pr) No. of Practical Hrs.:60

Course description:

This course offers a comprehensive introduction to transducers and their practical applications. Through a combination of theoretical concepts and hands-on activities, students will acquire a solid understanding of both active and passive transducers commonly used in electronics. Additionally, students will gain fundamental knowledge of sensors and their use in modern electronic systems. Throughout the course, students will learn to apply various techniques in electronic instrumentation, providing a strong foundation for designing and constructing basic electronic systems. By the end of the course, students will possess the skills and knowledge required to design and build simple electronic instrumentation systems, and will be well-equipped to pursue further studies in the field of electronic instrumentation.

Course Objectives:

1. Develop an understanding of the fundamental concepts of transducer and its types.
2. Learn about the use of various transducers in electronic instrumentation and its basic properties.
3. Gain familiarity with sensors to sense and measure various physical parameters, commonly used in modern electronics.
4. Acquire the skills needed to convert physical parameter to its equivalent electrical parameter using transducer principle.
5. Understand the basic principles of signal conditioning and data acquisition system used in modern electronic instrumentation system development.

Course learning outcomes:

Upon completion of this course, learners will be able to:

1. Demonstrate an understanding of basic principles of various active and passive transducers.
2. Understand the static and dynamic characteristics of transducers.
3. know the various transducers to convert various types of physical parameters to its equivalent electrical parameter or vice versa.
4. Understand the various sensors to sense or measure various physical parameters.
5. Implement the Signal conditioning and DAQ system with different transducers and sensors for real time applications.

Unit I:

Transducer: Definition and explanation of transducer, general requirements of transducer, classification of Transducer: active and passive transducers, static and dynamic characteristics of transducers, Introduction to sensors, types of sensors, typical applications of sensor, actuators.

Unit II:

Transducers: Definition, construction and working of: moving coil microphone and loud speaker, Thermistor (NTC & PTC), Thermocouple, LVDT, Piezo-electric, Strain Gauge, Capacitive Transducer, Tachometer, photo-multiplier tube, L.D.R., photo-transistor.

Unit III:

Signal Conditioning and DAQ Systems: Introduction, Functions of signal conditioning equipment, need for amplification of signals, Filtering, Sample and Hold circuits, Applications of Transducer: Measurement of temperature using thermistor, Lux meter and Colorimeter using LDR, Insect Repellent using Piezo buzzer.

List of Practical:

1. Measurement of resistance from its physical parameters.
2. Measurement of inductance by using Terman's equation.
3. Measurement of Capacitance by using parallel plate capacitor.
4. Measurement of displacement by using LVDT.
5. Measurement of displacement by using LDR.
6. Measurement of temperature by using thermistor.
7. Study of level sensors.
8. Study of flow Sensors.
9. Study of proximity sensors.

Reference Books:

1. Principle of Electronics by V. K. Mehta
2. Basic Electronics by B L Theraja
3. Element of Electronics by M.K.Bagde and S.P.Singh
4. Electronic instrumentation and Measurement Technique by W.D. Cooper.
5. Principles of Electronics by Malvino
6. An introduction to Electronics by R.G. Kale and Puranik
7. Electrical Measurement and Instrumentation by A. K. Sawhney.
8. Electronic Instrumentation by S. K. Khedkar