

# ***ADD ON COURSE ON BASIC WORKSHOP PRACTICE***

*Offered by  
Department of Physics  
Mangaldai College*

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## ***Course Information:***

During the duration of the add on course, a candidate is trained on Professional Skill, Professional Knowledge, Workshop Calculation & Science and Employability Skill related to job role. In addition to this, a candidate is entrusted to undertake project work and extracurricular activities to build up confidence. The broad components covered under Professional Skill subject are as below:-

### ***Unit I: Electrical and Electronic Skill (7 Lectures)***

Conducting Materials, Insulating Materials-properties and their application, Insulating materials – properties and their application, Classification of magnetic materials into soft and hard magnetic materials, Semiconductor Materials - semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductor (Si & Ge), Material used for electronic components like resistor, capacitor, diode, transistors and inductors. Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

### ***Unit II: Basic electrical workshop (6 Lectures)***

Basic Terminologies - current, EMF, potential difference (Voltage), resistance, resistivity their units. Effect of temperature on the resistance of conductors, temperature coefficient of resistance, Electrical power, energy and their units (SI). D.C Circuits – Kirchhoff's law, Thevenin's theorem, Norton's theorem, superposition theorem. Batteries - Construction, chemical changes during charging and discharging of lead acid cells. Capacitors - Concept of capacitor, types of capacity of parallel plate capacitor, Composite capacitor and effect of physical parameters, Energy stored in a capacitor, dielectric and its influence on capacitance of a capacitor, Series and parallel combination of capacitors.

### ***Unit III: Electronic Instruments and Measurements (Lectures 4)***

Ammeters and voltmeters, Electronic instruments, Measurement of inductance and capacitance, Transducer, different types of sensors – temperature, pressure, load, vibration etc. Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

### ***Unit IV: Cathode Ray Oscilloscope (Lectures 6)***

Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

### ***Unit V: (Lectures 2)***

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes.

### ***Unit VI: Signal Generators and Analysis Instruments (Lectures 2)***

Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. (Brief idea for testing, specifications. Distortion factor meter, wave analysis.)

### ***Unit VIII: Digital Instruments (Lectures 3)***

Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter. Block diagram and working of a digital multimeter.

#### **Lab**

1. Study the use of multimeter and Oscilloscope.
2. To use soldering of electrical circuit having discrete components on PCB.
3. To construct a regulated power supply

### **Training System:**

It mainly consists of Domain area and Core area. The Domain area (Theory & Practical) imparts professional skills and knowledge, while Core area (Workshop Calculation and science and Employability Skills) imparts requisite core skill & knowledge and life skills. The course will constitute of 30% theory and 70% hands on work to develop skills that are employable. After passing out the training program, the trainee is awarded Certificate of recognition that might help the student to acquire job.

### **Job Role:**

Trainee broadly needs to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job, repair and maintenance work.

- Check the job with circuit diagrams/components as per drawing for functioning, diagnose and rectify faults in the electronics Components/modules.
- Document the technical parameters in tabulation sheet related to the task undertaken.

## **Learning Outcome:**

*The aim of this course is to enable the students to familiar and experience with various electrical tools through hands-on mode. This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed are to be done in continuation of the topics.*

## **Assessment Criteria:**

Assessment will be evidence based comprising the following:

The students will be assessed by an examination of 50 marks. 30 out of 50 marks will be Multiple Choice Questions and 20 marks will be subjective.

## **Reading Materials:**

1. A text book in Electrical Technology-B L Theraja – S. Chand and Company.
2. Performance and design of AC machines – M.G. Say, ELBS Edn.
3. Mechanical workshop practice, K.C. John, 2010, PHI Learning Pvt. Ltd.
4. Workshop Processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN: 0750660732]
5. New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN:0861674480]