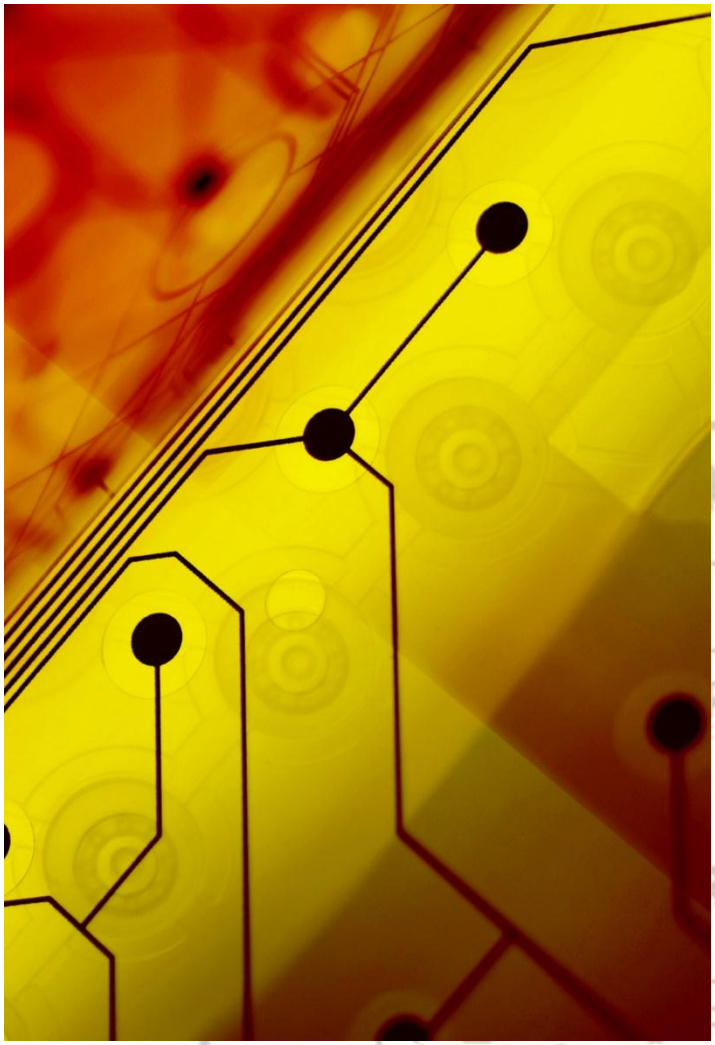

[Question Bank]

LAB:

ELECTRICAL AND ELECTRONICS

Code: ECE-153

Subject Teacher:

Er. Rupinder kaur

Semester IInd

This booklet Includes:

- List of Equipments
- List of Softwares
- List of Experiments
- lab Manual
- Question Bank

ECE 153 ELECTRICAL AND ELECTRONICS LAB

Quiz Questions with answers.

Experiments 1. Identification and familiarization with the basic tools used in lab.

Q. What are the basic tools in lab?

Ans. The basic tools are:

- Multimeter
- LCR Meter
- Oscilloscope
- Soldering Iron
- Power Supply
- Function Generators
- Signal Generators

Experiments 2. Familiarization and testing of Resistance, Capacitor & Inductors.

Q.1 List different types of electronic components?

Ans. Electronic components are mainly classified into two types:

- Passive components
- Active components

Q.2 Define passive component?

Ans. A passive component is an electronic component that consumes energy in the form of voltage but does not supply energy.

Q.3 What are the characteristics of passive components?

Ans.

1. Passive components cannot increase the power of an electrical signal.
2. Passive components temporarily store the electrical energy in the form of electric field or magnetic field.
3. Passive components do not depend on the external source of voltage to perform a specific task.

Q.5 Define active component?

Ans. Active component is an electronic component that consumes energy in the form of voltage or current and supplies energy in the form of voltage or current.

Q.6 What are the characteristics of active components?

Ans.

1. Active components control the electric current flowing through them.
2. Active components depend on the external voltage or current to work.
3. Active components amplify the power of an electrical signal.

Q.7 List different types of passive components?

Ans. The different types of passive components include:

- Resistors
- Capacitors
- Inductors

Q.8 List different types of active components?

Ans. The different types of active components include:

- Diode
- Transistor
- Integrated circuit

Q.9 Define resistor?

Ans. Resistor is a passive component that restricts the flow of electric current.

Q.10 Define capacitor?

Ans. Capacitor is an electronic component that stores electrical energy in the form of static electric field.

Q.11 Define inductor?

Ans. Inductor is an electronic component that stores electrical energy in the form of magnetic field.

Experiments 3. To study various types of switches such as normal/miniature toggle, push button, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multiway Master Mains Switch.

Q.1 Define switches?

Ans. A device for making and breaking the connection in an electric circuit.

Q.2 What do you mean by poles and throw?

Ans. Poles: A switch pole refers to the number of separate circuits that the switch controls. A single-pole switch controls just one circuit. A double-pole switch controls two separate circuits.

Throw: The number of throws indicates how many different output connections each switch pole can connect its input to. The two most common types are single-throw and double-throw:

- A single-throw switch is a simple on/off switch that connects or disconnects two terminals. When the switch is closed, the two terminals are connected and current flows between them. When the switch is opened, the terminals are not connected, so current does not flow.
- A double-throw switch connects an input terminal to one of two output terminals. Thus, a double-pole switch has three terminals. One of the terminals is called the common terminal. The other two terminals are often referred to as A and B.

Q.3 What is SPST?

Ans. SPST (single pole, single throw): A basic on/off switch that turns a single circuit on or off. An SPST switch has two terminals: one for the input and one for the output.

Q.4 What is SPDT?

Ans. SPDT (single pole, double throw): An SPDT switch routes one input circuit to one of two output circuits. This type of switch is sometimes called an A/B switch because it lets you choose between two circuits, called A and B. An SPDT switch has three terminals: one for the input and two for the A and B outputs.

Q.5 What is DPST?

Ans. DPST (double pole, single throw): A DPST switch turns two circuits on or off. A DPST switch has four terminals: two inputs and two outputs.

Q.6 What is DPDT?

Ans. DPDT (double pole, double throw): A DPDT switch routes two separate circuits, connecting each of two inputs to one of two outputs. A DPDT switch has six terminals: two for the inputs, two for the A outputs, and two for the B outputs.

Q.7 Define push button switch?

Ans. A push to make switch allows electricity to flow between its two contacts when held in. When the button is released, the circuit is broken. This type of switch is also known as a Normally Open (NO) Switch. (Examples: doorbell, computer case power switch, calculator buttons, individual keys on a keyboard)

Q.8 Define Toggle switches?

Ans. Toggle switches are among the most basic and most common of all electronic components. At the simplest level, that allows a circuit to be powered or depowered by throwing the switch from the open to closed position or vice versa.

Q.9 Define Rotary switches?

Ans. A rotary switch is a switch operated by rotation. These are often chosen when more than 2 positions are needed, such as a three-speed fan or a CB radio with multiple frequencies of reception or "channels

Q.10 Define Micro switches?

Ans. A micro switch is a switch that operates by small movements of a lever and it is for controlling auxiliary circuits may be fitted to either side of the contactor.

Experiments 4. To study various types of protective devices such as Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, and thermal fuse, single/multiple circuit breakers, over and under current relays.

Q.1 What are the protection devices?

Ans. Switchgear is a combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. Switches are safe to open under normal load current, while protective devices are safe to open under fault current.

Q.2 What protects a circuit?

Ans. Household circuit breakers provide both overload and over current protection. It should be noted that the protective devices mentioned are designed primarily to protect equipment. Protection from electrical shock to people is provided by devices such as ground fault circuit interrupters.

Q.3 What are the three types of circuit protection devices?

Ans. Circuit Breakers, Electronic Fuses and Fuse Holders, Clips & Blocks.

Q.4 What is an Electronic Fuse?

Ans. An electronic fuse is a low resistance resistor that provides protection in the event of a load over current. Short circuits, device failure or overloading can cause a load over current. In an electronic fuse, a metal wire melts in the event of an over current, therefore causing an interruption in the circuit.

Q.5 What are the applications for electronic fuses?

Ans. Electronic Fuses can be used in all types of electronic applications including:

- Laptops
- Cell phones
- Game systems
- Printers
- Digital cameras
- DVD players
- Portable electronics
- LCD monitors

- Scanners
- Battery packs
- Hard disk drives

Q.6 What is Fuse wire?

Ans. It consists of a thin wire enclosed inside a casing. Incase of excessive current, the fuse wire simply burns up or disintegrates causing the circuit to break. However they are not and the fuse wire has to be manually changed once it burns. reliable Thus they are mostly not preferred.

Q.7 Define cartridge fuses?

Ans. Cartridge fuses are used to protect motors and branch circuits where higher amps or volt ratings are required. They are available in a wide variety of sizes, amp and volt ratings up to 600Vac and 600 amps.

Q.8 What is the full form of HRC fuse?

Ans. High rupturing capacity fuse.

Q.9 Define HRC?

Ans. HRC fuse is defined as the fuse wire or element can carry short circuit heavy current for a known time period. During this time if the fault is removed, then it does not blow off otherwise it blows off or melts.

Q.10 What is the difference between MCCB and MCB?

Ans. “MCB” stands for “Miniature Circuit Breakers”, while “MCCB” is “Molded Case Circuit Breaker.” Judging from their power capacities, the MCB is mainly used for low-energy requirements, like home wiring or small electronic circuits. On the other hand, the MCCB is more suited in providing energy for high-power equipment.

Experiments 5. To get familiar with the working knowledge of the measuring instruments: a) Ammeter & Voltmeter b) Cathode ray oscilloscope (CRO) c) Multimeter (Analog and Digital)

Q.1 What is a CRO?

Ans. Electronic device is an electronic device with a CRT as its main component & other associated circuits consisting of a power supply unit, a saw-tooth wave generator, horizontal & vertical amplifiers.

Q.2 What are the applications of CRO?

Ans. Applications of CRO:

- Voltage measurement
- Current measurement
- Examination of waveform
- Measurement of phase and frequency

Q.3 Define multimeter?

Ans. A multimeter or a multitester, also known as a VOM (volt-ohm-milliammeter), is an electronic measuring instrument that combines several measurement functions in one unit. A typical multimeter can measure voltage, current, and resistance.

Q.4 What are the types of multimeter?

Ans. Analog multimeters use a microammeter with a moving pointer to display readings.
Digital multimeters (DMM, DVOM) have a numeric display, and may also show a graphical bar representing the measured value.

Q.5 How do you check for continuity with a multimeter?

Ans.

1. Turn the dial to Continuity Test mode ( )
2. First insert the black test lead into the COM jack.
3. Then insert the red lead into the V Ω jack. ...
4. With the circuit de-energized, connect the test leads across the component being tested.

Q.6 What is the function of the CRT?

Ans. The cathode ray tube (CRT) is a vacuum tube that contains one or more electron guns and a phosphorescent screen, and is used to display images. It modulates, accelerates, and deflects electron beam(s) onto the screen to create the images.

Q.7 Define ammeter?

Ans. The ammeter is the measuring instruments which are used to measure the current in the circuit. It measures the small amount of current in milliamperes or micro-amperes. The ammeter is placed in series with the measuring circuit so that the whole current of the circuit passes through it.

Q.8 Define voltmeter?

Ans. The voltmeter is the voltage measuring devices. It is connected in parallel with the electrical circuit whose potential is to be measured. The connection polarity of the voltmeter is same as that of the ammeter i.e. the positive terminal is connected to the positive polarity of the supply and the negative potential is connected to the negative polarity.

Q.9 What is the differences between Ammeter and Voltmeter?

Ans.

1. The ammeter is defined as the device used for measuring the small value current flows in the circuit, whereas the voltmeter measures the potential difference between any two points of the electrical circuit.
2. The resistance of the ammeter is low. So that, the whole current of the circuit will pass through it. Whereas, the internal resistance of the voltmeter is very low so that the current from the circuit does not disturb the measuring of the voltmeter.
3. The ammeter is connected in series with the circuit for measuring the complete current, whereas the voltmeter is connected in parallel with the circuit. The potential difference of the parallel circuit remains same at all points. So for measuring the exact value of the potential difference, it is connected in parallel with the points whose voltage is to be measured.
4. The accuracy of the ammeter is more as compared to the voltmeter.
5. The measuring range of the voltmeter can be increases or decreases by changing the value of resistance whereas the range of ammeter cannot be changed.

Q.10 What is the difference between analog and digital multimeter?

Ans.

CHARACTERISTICS	ANALOG MULTIMETER	DIGITAL MULTIMETER
Accuracy	Prone to error because of wrong pointer based reading	Measures with great accuracy
Reading	Provides reading on a scale against pointer	Provides reading in numeric form appeared on a LCD
Calibration	Calibration is done manually	They are calibrated automatically before taking any measurement
Cost	Less costly as they offer very few features	Expensive as they offer wide range of features
Range	Have to set a range of measurement manually	Mostly, they have auto-ranging feature but costlier than their counter-parts
Measuring parameters	Usually it measures current,	Measures current, voltage, resistance, capacitance, and inductance as well

CHARACTERISTICS	ANALOG MULTIMETER	DIGITAL MULTIMETER
	voltage, and resistance	
ADC Requirement	Does not require analog-to-digital converter (ADC) to display reading	Requires ADC in order to display the reading on LCD
AC Frequency	Highest AC Frequency which can be measured is lower	Highest AC Frequency which can be measured is higher than its counter-part
Construction	Construction is easy and simple	Complicated construction because of several electronic and logic components involvement
Power supply	Is not required	Is required in these types of meters
Size	Bigger in size	Very small like hand-held devices

Experiments 6. To get familiar with the working knowledge of the following instruments: a) Signal generator b) Function generator c) Power supply.

Q.1 Define Function generator?

Ans. A ***function generator*** is a ***signal*** source that has the capability of producing different types of waveforms as its output ***signal***. The most common output waveforms are sine-waves, triangular waves, square waves, and sawtooth waves. The frequencies of such waveforms may be adjusted from a fraction of a hertz to several hundred kHz.

Q.2 What are the types of function generator?

Ans. Analogue function generator and Digital function generator.

Q.3 Define signal generator?

Ans. A ***signal generator*** is an electronic device that is capable of producing repeating or non-repeating waveforms. The ***waveform*** can be of different shapes and amplitude. ***Signal generators*** are mostly used in testing, troubleshooting, designing and repairing electronic devices.

Q.4 What is the difference between function generator and signal generator?

Ans. Function generator is a kind of multi wave signal generator. Function generator has a very wide frequency range, the use of a wide range of. Can be used for production testing, equipment maintenance and laboratory, also widely used in other areas of science and technology.

Signal generator is a kind of equipment that can provide all kinds of frequency, waveform and output level. It is also called the signal source or oscillator. It is widely used in the field of production practice and science and technology.

Q.5 What is the definition of power supply?

Ans. A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters.

Experiments 7. Familiarization and testing of Diode, BJT & FET.

Q.1 Define diode?

Ans. A semiconductor device with two terminals, typically allowing the flow of current in one direction only.

Q.2 What do you mean by ideal diode?

Ans. Ideal diode

- Perfect conductor with zero voltage drop when the diode is forward biased.
- Open circuit, when the diode is reversed biased.

Q.3 What are the types of diodes?

Ans. There are many types of diodes

- Small Signal Diode.
- Large Signal Diode.
- Zener Diode.
- Light Emitting Diode (LED)
- Constant Current Diodes.
- Schottky Diode
- Step Recovery Diodes.

Q.4 What is the use of a diode?

Ans. Diodes can be used as rectifiers, signal limiters, voltage regulators, switches, signal modulators, signal mixers, signal demodulators, and oscillators. The **fundamental** property of a diode is its tendency to conduct electric current in only one direction.

Q.5 What is the full form of BJT?

Ans. Bipolar Junction Transistor.

Q.6 Define BJT?

Ans. A Bipolar Junction Transistor, or BJT, is a solid-state device in which the current flow between two terminals (the collector and the emitter) is controlled by the amount of current that flows through a third terminal (the base).

Q.7 What is a BJT used for?

Ans. BJT are widely used an amplifier, oscillator, switch etc. It is a current-driven device (MOSFET is voltage driven), the output current is equal to the input current times a factor which is called Gain. A basic BJT has three pins: the Base, Collector, and Emitter.

Q.8 What are the types of BJT?

Ans. BJTs come in two types, or polarities, known as PNP and NPN based on the doping types of the three main terminal regions. An NPN transistor comprises two semiconductor junctions that share a thin p-doped region, and a PNP transistor comprises two semiconductor junctions that share a thin n-doped region.

Q.9 Define FET?

Ans. The field-effect transistor (FET) is a transistor that uses an electric field to control the electrical behaviour of the device. FETs are also known as unipolar transistors since they involve single-carrier-type operation.

Q.10 Draw the symbols of diode,BJT and FET?

Experiments 8. Use of diode as half wave and full wave rectifier.

Q.1 Define Rectifier?

Ans. A rectifier is a circuit which converts the Alternating Current (AC) input power into a Direct Current (DC) output power.

Q.2 What is the types of Rectifier?

Ans. Two types: Half Wave Rectifier and Full wave rectifier.

Q.3 Define Half wave rectifier?

Ans. A half wave rectifier is a type of rectifier which converts the positive half cycle (positive current) of the input signal into pulsating DC (Direct Current) output signal.

Q.4 Define Full wave rectifier?

Ans. In both the half cycles current flows through the load in the same direction.

Q.5 Which are different types of Full Wave rectifier?

Ans. Different types of full wave rectifier are Centre-Tap full wave rectifier & Bridge rectifier

Q.6 How many no. of diodes are used in full wave rectifier?

Ans. Four number of diodes are used for Bridge rectifier and two number of diodes are used -Tap rectifier.

Q.7 Give disadvantage of centre-Tap full wave rectifier?

Ans. Necessity of transformer with secondary winding.

Q.8 Write ripple factor for FW rectifier?

Ans. The ripple factor for Full wave rectifier is 0.48.

Q,9 What is the efficiency of FW rectifier and HW rectifier?

Ans. Efficiency of full wave rectifier is 81.2% and half wave rectifier is 40.6%.

Q.10 Write advantages of bridge rectifier?

Ans. Suitable for high-voltage applications.

Experiments 9. Verification of truth tables of logic gates.

Q.1 Define Logic gates?

Ans. A logic gate is an elementary building block of a digital circuit. Most logic gates have two inputs and one output. At any given moment, every terminal is in one of the two binary conditions low (0) or high (1), represented by different voltage levels.

Q.2 What is the use of a logic gate?

Ans. A logic gate implements a Boolean function and thus performs a logical operation on one or several logic inputs in order to produce a single logic output. A logic gate often uses diodes or transistors that act like electronic switches.

Q.3 What is the basic logic gates?

Ans. Digital systems are said to be constructed by using logic gates. These gates are the AND, OR, NOT, NAND, NOR, EXOR and EXNOR gates.

Q.4 What are the universal logic gates?

Ans. A universal logic gate is a logic gate that can be used to construct all other logic gates. There are many articles about how NAND and NOR are universal gates, but many of these articles omit other gates that are also universal gates.

Q.5 What is a truth table?

Ans. A ***truth table*** is a tabular representation of all the combinations of values for inputs and their corresponding outputs. ***Truth tables*** are usually used for logic problems as in Boolean algebra and electronic circuits.

Q.6 What is a Boolean expression?

Ans. A Boolean expression is a logical statement that is either TRUE or FALSE . Boolean expressions can compare data of any type as long as both parts of the expression have the same basic data type.

Q.7 Why is it called a logic gate?

Ans. They are called gates because they control the flow of signal, their output is either 0 or 1, meaning true or false. Their output is the result of their input(s). The simplest form of a logic gate is the negation gate.

Q.8What are the application of Logic gates?

Ans. Applications for Logic Gates:

Logic circuits are found in several devices including multiplexers, arithmetic logic units, computer memory and registers. They are also used in microprocessors, some of which can contain over 100 million gates. Also, logic gates are the building blocks of digital electronics and are formed by the combination of transistors in order to realize some digital operations. Every digital product, including personal computers, mobile phones, tablets, calculators and digital watches also uses logic gates.

Q.9 Draw symbol of each logic gates with truth tables?

Experiments 10. To learn soldering and desoldering techniques.

Q.1 Define soldering?

Ans. A procedure in which two or more metal products are fixed as one by liquefying and running a space filler metal (solder) in the joint is known as Soldering.

Q.2 Define Desoldering?

Ans. Desoldering is the removal of solder and components from a circuit board for troubleshooting, repair, replacement, and salvage.

Q.3 What are the soldering techniques?

Ans. Soldering is a process in which two or more metal items are joined together by melting and then flowing a filler metal into the joint—the filler metal having a relatively low melting point. Soldering is used to form a permanent connection between electronic components.

Q.4 What is soldering equipment?

Ans. A soldering iron is a hand tool used in soldering. It supplies heat to melt solder so that it can flow into the joint between two workpieces. A soldering iron is composed of a heated metal tip and an insulated handle.

Q.5 Which material is used in soldering wire?

Ans. Soldering filler materials are available in many different alloys for differing applications. In electronics assembly, the eutectic alloy of 63% tin and 37% lead (or 60/40, which is almost identical in melting point) has been the alloy of choice

Q.6 What can be used as flux for soldering?

Ans. Flux is used in soldering to remove oxides from the contacts of the parts to be soldered together. Fluxes can be made from hydrochloric acid, zinc chloride or rosin.