Syllabus: Internship in Practical Electronics

CONCEPT OF AC & DC SUPPLY

1) What is current and voltage? Simple explanation
2) What is AC & DC? Explanation of AC/DC current and AC/DC voltage. Concept of electric power.

STUDY OF BASIC CONCEPTS

1) Study of analog/digital multimeter
2) Batteries in series and parallel combination – measure voltage using multimeter
3) Kirchhoff's Voltage Law – basic idea
4) Kirchhoff's Current Law – basic idea

SIMPLE ELECTRICAL EXPERIMENTS

1) Resistor colour code chart
2) Study of series and parallel combination of resistors – calculations of wattage
3) Study of Ohm's Law
4) Potential divider rule and its applications – explanation *(internal resistance)* with two resistors and battery
5) Potential divider using variable resistor – explanation with large value of resistor like 100kΩ
6) Study of electromagnetic induction – both experiments: Explanation of concept of cycle
7) Study of DC motor – its structure and *dual nature*
8) Electromagnetic relay switch – its structure and simple demo
9) Study of speaker as electromagnetic device – demo with music
10) Study of transformer – multi-tap transformer
11) Study of capacitor – checking capacitor with DMM, charging and discharging with equation T=R.C
12) Capacitor blocks DC but passes AC – demo experiment with calculations, use of capacitor in AC circuits

BASIC SEMICONDUCTOR EXPERIMENTS

1) Checking of diode using multimeter – finding out anode & cathode, faulty or ok
2) Checking of LEDs using multimeter – finding out anode & cathode, faulty or ok
3) Diode as unidirectional current device – connecting diode & a bulb to dc supply and reverse diode polarity
4) Diode passes only half cycle of AC through it – explanation with AC supply, bulb & diode
5) Potential barrier concept of diode – explanation with a diode in series with bulb and measure the battery voltage (V), diode voltage (V_F) and bulb voltage (V_L) and show that $V = V_F + V_L$.
6) Diodes in series, parallel, anti series and anti-parallel combination – explanation with DC supply & bulb
7) Silicon & Germanium diodes in parallel combination – use DC supply, connect diodes with a small bulb, measure voltage across Si & Ge diodes to show that voltage across parallel combination is equal to the Germanium diode, only. *(use problems in 11th practical experiments with readings)*
8) LEDs of different colour in parallel – use DC supply, connect LEDs of different colours in parallel to show that the lowest potential barrier LED glows.
9) Calculating the series resistance value in LED circuit.
10) LEDs in anti-parallel combination with reversible battery voltage – through a resistor

APPLICATIONS OF PN JUNCTION DIODE (BREADBOARD EXPERIMENTS)

1) Construction of Half Wave Rectifier – basic calculations *with and without* filter capacitor
2) Construction of Full Wave Rectifier – basic calculations *with and without* filter capacitor
3) Construction of Bridge Rectifier – basic calculations *with and without* filter capacitor

BASICS OF TRANSISTOR

1) Checking of transistor – using DMM, identification of collector, base & emitter terminals
2) How to use transistor as a switch? – Circuit with controlling LED, buzzer, relay.
3) How to use transistor as an amplifier? – Simple circuit with battery, speaker and mobile music.

SOLDERING PRACTICE

1) Soldering practice of wooden board
2) How to read circuits with symbols? – Basic explanation
3) Construction of Unregulated /Regulated DC power supply – two diodes, capacitor, IC7805, veroboard
4) Construction of simple circuit – two LEDs in anti-parallel combination with single resistor and reversible polarity of battery.
5) Construction of burglar alarm – transistor BC547, buzzer, 1kΩ resistor.
6) Construction of burglar alarm – transistor BC547, buzzer, reed relay, 1kΩ resistor.
7) Construction of Automatic Street Lights – transistor SL100, 1kΩ, variable resistor (100kΩ), relay switch, diode, LDR, etc.

CONSTRUCTION OF ADVANCED CIRCUITS ON PCB (DIY KITS)

1) Mains supply Fan Speed Control
2) FM Transmitter Private Radio Station

USING THE PCB DESIGNING SOFTWARE

1) How to use Express PCB software?
2) Designing, printing, etching, drilling and component mounting of IC 555 flasher circuit PCB – IC555, 1kΩ, 100kΩ, 10uF, 330Ω, LED, etc.
3) Designing, printing, etching, drilling and component mounting of DC motor speed control circuit PCB – transistor SL100, 1kΩ, variable resistor (10kΩ), DC motor, etc.

SIMULATION OF ELECTRONIC CIRCUITS

1) Training of Circuit Wizard *(Student's Edition)* Simulation Software
2) Half wave rectifier simulation
3) Bridge rectifier simulation
4) IC 555 as astable multivibrator *(flasher)* simulation
5) Photo Relay circuit simulation
6) IC 555 as burglar alarm circuit simulation
7) Designing different circuits on Fritzing Software for college project presentation