SYLLABUS FOR LAB ASSISTANT

(ELECTRONICS ENG./ECE)

Unit 1.0	Basic Electrical Engineering	
		Electrical Charge and flow of charges, DC and AC Current and Voltage, Ideal and Practical Current and Voltage Sources, Potential Difference, Terminal Voltage, Resistance, Classification of resistors, Practical application of resistors, commonly used resistance material, Effect of Temperature on resistance, series and parallel combination of resistances, Electrical works, Power and Energy, capacitance, capacitive reactance, Energy Stored in a capacitor, Voltage and current equation for capacitor, series and parallel combination of capacitors, Effect of dielectric media on capacitors, Inductors, Self and mutual Inductance, Inductive Reactance, Energy Stored in an Inductor, Voltage and current equations of Inductors, Practical application of Inductors, Ohm's Law, Active and Passive elements, linear and Non-linear Circuit, unilateral and Bilateral circuit element, Node, Branch, Loop, Mesh, Kirchhoff's Current Law, Kirchhoff's Voltage Law- with simple problems to solve DC Networks, Frequency, Time period, Amplitude, Angular Velocity, RMS Value, Average Value, AC Circuits, Rectangular, Polar and Phasor representation of alternating quantities, Electromagnetic Induction, Induced emf and current, Statically and dynamically Induced emf, Faraday's laws of Electromagnetic Induction, Lenz's law, Fleming's Right hand Rule, Fleming's Left hand Rule.
Unit 2.0	**Electrical Circuits and Networks**	
		Lumped and Distributed parameters, Concept of Independent and Dependent source, Concept of Open Circuit, Closed Circuit and short circuit, Star/Delta transformation of passive network, source Transformation, Mesh Analysis and Nodal Analysis of networks, Transient and Steady State, Superposition theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum Power transfer theorem- with simple problems to solve DC Networks, Wave forms, phasor diagram, expression of voltage, current and power in pure resistance, Inductance and capacitance, Active, Reactive and apparent power, power factor, lagging, leading and unity Power factor, Effects of Poor Power factor, Resonance and it's importance in electrical circuit, series and parallel resonance, Resonant frequency, quality factor and bandwidth in series and parallel RLC Circuit.
Unit 3.0	**Fundamentals of Electronics Engineering**	
		Overview of Formation and Working of P-N Junction Diode and Zener Diode, Diode and Zener Diode Characteristics, Construction and Working of Half-Wave Rectifier, Construction and working of Full-wave Rectifier, Symbol, Types and Construction of Bipolar Junction Transistor, Working of NPN and PNP Transistor, CE, CB and CC Transistor Configuration, Concept, Symbol and Construction of JFET and MOSFET, Concept of Binary, Octal, Decimal and Hexadecimal number systems, conversion from one number system to another number systems, AND, OR, NOT, NAND, NOR, XOR Logic Gates with symbol, Truth Table, Logic expression and applications.
Unit 4.0	Electrical Measurement and Instrumentation.	
		Classification of basic instruments - Indicating, Recording and Integrating type, Concept of Deflecting, controlling and damping torque, Concept of Accuracy, precision, Resolution, tolerance, sensitivity and repeatability, Errors in measurement, types of errors - Limiting error, Gross error, systematic error, Random error, Principal of current and Voltage Measurement, Permanent Magnet moving coil, moving Iron, Induction and dynamometers type instruments, Principle of power and energy measurement, Measurement of single and three phase power by one wattmeter and three wattmeter method, Measurement of energy using single phase

		and three phase energy meter, Classification of resistances - Low, Medium and High, Kelvin's Double Bridge, Wheatstone Bridge, ohmmeter and megger, Earth resistance, Inductance measurement by use of Anderson Bridge, Capacitance measurement by use of Schering bridge, Frequency measurement by use of Wein's Bridge.
Unit 5.0	**Communication Systems**	
		Basic building blocks of communication system: Transmitter, receiver, channel, antenna, multiplexer, encoder, decoder, Basics of: AM, FM modulations, Sampling Theory: Sampling theorem in time and frequency domain, Aliasing phenomenon, Sampling techniques (Ideal, Natural, and Flat top), aperture effect and equalization, Pulse Modulation: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM): Basic definition, generation and detection procedure, waveform, advantages, disadvantages.
Unit 6.0	**Microprocessor and Microcontroller and its applications**	
		Evolution of Processors (Microprocessors and Microcontrollers), Microprocessors and Microcontrollers comparisons, Architecture, Pin Diagram, Register structure, Addressing Modes, Instruction set, Interrupt System of 8085, Architecture, Pin Diagram, Register structure, Addressing Modes, Instruction set, Interrupt System of 8051.
Unit 7.0	**Control System, Switchgear and protection**	
		Concept of open and closed loop Transfer function of R C and R-L-C electrical circuits, Block diagram and it's reduction techniques, Necessity of protection system, primary and Back up protection, Necessity of fuse, working principle and material used in fuse, concept and working principle isolators, Types and functions of various circuit breakers, Types and function of Relay
Unit 8.0	**Fundamentals of Operational Amplifier**	
		Operational Amplifier: - Block diagram, Equivalent Circuit, Symbol. Slew Rate, Parameters of Ideal and Practical Op-Amp, Modes of operations: Inverting and Non-Inverting, Op-Amp IC 741 pin diagram and description, Arithmetic Operations Circuit: Adder, Subtractor, Scaler, Integrator, Differentiator, Differential amplifier, Voltage Follower (Unity Gain Amplifier), Op-amp as an Instrumentation amplifier: Working, Derivation of output voltage, Voltage to Current converter with floating and grounded load, Current to Voltage converter.