Government Polytechnic Hamirpur
Lecture Planning (Theory)

Branch : **Electrical Engg.** Semester: **3rd**

Subject : **INTRODUCTION TO ELECTRICAL GENERATION SYSTEM** Session: **Aug 26 - Dec 26**

Teacher : **Mr. Archit Bharti** Cass Room :

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Rem
1.	1-12	Thermal Power Plants	Coal, Gas/ Diesel and Nuclear-based Layout and working of a typical thermal power plant with steam turbines and electric generators. Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: Coal, Gas/diesel, nuclear fuels–fusion and fission action. Safe Practices and working of various thermal power plants: coal-based, gas-based, diesel-based, and nuclear based. Functions of the following types of thermal power plants and their major auxiliaries: Coal fired boilers, fire tube and water tube. Gas/diesel based combustion engines. Types of nuclear reactors: Disposal of nuclear waste and nuclear shielding. Thermal power plants in India..	R1,R2,R3	
2.	13-22	Large and Micro-Hydro Power Plants	Energy conversion process of hydro power plant. Classification of hydro power plant: High, medium and low head. Construction and working of hydro turbines used in different types of hydro power plant: a. High head – Pelton turbine b. Medium head – Francis turbine c. Low head – Kaplan turbine. Safe Practices for hydro power plants. Different types of micro- hydro turbines for different heads: Pelton, Francis and Kaplan turbines, .. Locations of these different types of large and micro-hydro power plants in Himachal. Potential locations of micro-hydro power plants in Himachal	-do-	
3.	23-34	Solar and Biomass based Power Plants	Solar Map of India: Global solar power radiation. Solar Power Technology a. Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors b. Solar Photovoltaic (PV) power plant: layout, construction, working. Biomass-based Power Plants c. Layout of a Bio-chemical based (e.g. biogas) power plant: d. Layout of a Thermo-chemical based (e.g. Municipal waste) power plant e. Layout of an Agro-chemical based (e.g. bio-diesel) power plant, Features of the solid, liquid and gas biomasses as fuel for biomass power plant.	-do-	
4.	35-42	Wind Power Plants Wind Map of India	Wind power density in watts per square meter Layout of Horizontal axis large wind power plant: Geared wind power plant. Direct-drive wind power plant. Salient Features of electric generators used in large wind power plants: Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG) Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG)	-do-	
5.	43-56	Economics of Power Generation and Interconnected Power System	Related terms: connected load, firm power, cold reserve, hot reserve, spinning reserve. Base load and peak load plants; Load curve, load duration curve, integrated duration curve Cost of generation: Average demand, maximum demand, demand factor, plant capacity factor, plant use factor, diversity factor, load factor and plant load factor. Choice of size and number of generator units, combined operation of power station. Causes, Impact and reasons of Grid system fault: State grid, national grid, brown-out and black-out; sample blackouts at national and international level.	-do-	

5/8/26

Signature of Teacher with Date

Signature of HOD (EE)

Govt. Polytechnic Hamirpur
Practical Planning & Coverage

Branch : **Electrical Engg.** Semester: **3rd**

Subject : **INTRODUCTION TO ELECTRICAL GENERATION SYSTEM** Session: **Aug 26 - Dec 26**

Teacher : **Ms. Shikha** Lab :

Pract. No.	Description of Practical	Reference for Procedure/ Writeup	Likely Dates	Actual Dates	Sign
1	Identify the routine maintenance parts of the gas fired thermal power plant after watching a video programme	Lab Manual			
2.	Assemble and dismantle a small diesel generator power plant.	Lab Manual			
3.	Identify the routine maintenance parts of the nuclear fired thermal power plant after watching a video programme.	Lab Manual			
4.	Identify the routine maintenance parts of the large hydro power plant after watching a video programme	Lab Manual			
5	Identify the routine maintenance parts of the micro hydro power plant after watching a video programme.	Lab Manual			
6	Assemble a micro hydro power plant and then dismantle it.	Lab Manual			
7	Identify the routine maintenance parts of the large wind power plant after watching a video programme.	Lab Manual			
8	Identify the routine maintenance parts of the horizontal axis small wind turbine after watching a video programme.	Lab Manual			
9	Identify the routine maintenance parts of the vertical axis small wind turbine after watching a video programme.	Lab Manual			
10	Assemble the parabolic trough or parabolic dish Concentrated Solar Power (CSP) plant.	Lab Manual			
11	Dismantle the parabolic trough or parabolic dish CSP plant.	Lab Manual			
12	Assemble the solar PV plant to produce electric power and then dismantle it.	Lab Manual			

Shikha 01/08/26

Signature of Teacher with Date

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Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG
Subject : ELECTRICAL CIRCUITS
Teacher: ANIL KUMAR JAGOTA

Semester: 3rd
Session: AUG-2026
Class Room: L1

S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	12	**Single Phase A.C Series Circuits**	Generation of alternating voltage, Phasor representation of sinusoidal quantities R, L, C circuit elements its voltage and current response R-L, R-C, R-L-C combination of A.C series circuit, impedance, reactance, impedance triangle, Power factor, active power, reactive power, apparent power, power triangle and vector diagram, Resonance, Bandwidth, Quality factor and voltage magnification in series R-L, R-C, RL-C circuit	**R1,R2**	
2	13	**Single Phase A.C Parallel Circuits**	R-L, R-C and R-L-C parallel combination of A.C. circuits. Impedance, reactance, phasor diagram, impedance triangle R-L, R-C, R-L-C parallel A.C. circuits power factor, active power, apparent power, reactive power, power triangle Resonance in parallel R-L, R-C, R-L-C circuit, Bandwidth, Quality factor and voltage magnification	**R1,R2**	
3	16	**Three Phase Circuits**	Phasor and complex representation of three phase supply, Phase sequence and polarity Types of three-phase connections, Phase and line quantities in three phase star and delta system, Balanced and unbalanced load, neutral shift in unbalanced load. Three phase power, active, reactive and apparent power in star and delta system	**R1,R2**	
4	13	**Network Reduction and Principles of Circuit Analysis**	Source transformation, Star/delta and delta/star transformation Mesh Analysis, Node Analysis	**R1,R2**	
5	16	**Network Theorems**	Superposition theorem. Thevenin's theorem. Norton's theorem Maximum power transfer theorem Reciprocity theorem Duality in electric circuits.	**R1,R2**	

REFERENCE RESOURCES

R1- Ashfaq Husain, Networks & Systems, Khanna Book Publishing, New Delhi
R2- Gupta, B.R; Singhal, Vandana;, Fundamentals of Electrical Network, S.Chand and Co.

01/08/2026
Signature of Teacher

Signature of H.O.D

Govt. Polytechnic Hamirpur (H.P.)
Practical Planning & Coverage

Branch : Electrical Engg. Semester: 3rd

Subject : ELECTRICAL CIRCUITS LAB Session: Aug-Dec-2026

Teacher: Archit Bharti Lab : EMMI LAB

Pract. No.	Description of Practical	Reference for Procedure/ Writeup	Likely Dates	Actual Dates	Signature
1.	Use dual trace oscilloscope to determine A.C voltage and current response in given R, L, C circuit.	R1 R2 R3	12/8/2026 & 10/8/2026		
2.	Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L series circuit. Draw phasor diagram.	R1 R2 R3	19/8/2026 & 17/8/2026		
3.	Use voltmeter, ammeter to determine active, reactive and apparent power consumed in given R-C series circuit. Draw phasor diagram.	R1 R2 R3	19/8/2026 & 17/8/2026		
4.	Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram..	R1 R2 R3	26/8/2026 & 24/08/2026		
5.	Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor	R1 R2 R3	26/8/2026 & 24/08/2026		
6.	Use voltmeter, ammeter, and wattmeter to determine current, p.f., active, reactive and apparent power in R-C parallel A.C. circuit.	R1 R2 R3	9/9/2026 & 7/09/2026		
7.	Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-L-C parallel circuit with series connection of resistor and inductor in parallel with capacitor.	R1 R2 R3	9/9/2026 & 7/09/2026		
8	Use variable frequency supply create resonance in given parallel R-L-C circuit or by using variable inductor or capacitor.	R1 R2 R3	16/9/2026 & 14/09/2026		
9	Use voltmeter, ammeter, wattmeter, p.f meter to determine line and phase quantities of voltage and current for balanced three phase star and delta connected load and calculate active, reactive, and apparent power. Draw phasor diagram.	R1 R2 R3	16/9/2026 & 14/09/2026		

10	Use voltmeter, ammeter, wattmeter, p.f meter todetermine line and phase quantit41ies of voltage and current for unbalanced three phase star and delta connected load and calculate active, reactive, and apparent power. Draw phasor diagram.	R1 R2 R3	30/9/2026 & 28/09/202 6		
11	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying mesh analysis.	R1 R2 R3	14/10/202 6 & 12/10/202 6		
12	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying node mesh nnalysis.	R1 R2 R3 R4	04/11/202 6 & 02/11/202 6		

Signature of Teacher with Date 1/8/26

Signature of H.O.D.

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG **Semester**: 3rd

Subject :ELECTRICAL AND ELECTRONICS MEASUREMENT **Session**: AUG-2026

Teacher: SHIKHA **Class Room**: L1

S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	16	**Fundamentals of Measurements**	Measurement: Significance, units, fundamental quantities and standards Classification of Instrument Systems: Null and deflection type instruments Absolute and secondary instruments Analog and digital instruments Static and dynamic characteristics, types of errors, Calibration: need and procedure Classification of measuring instruments: indicating, recording and integrating instruments.	R1,R2	
2	12	**Measurement of voltage and current**	DC Ammeter: Basic, Multi range, Universal shunt, DC Voltmeter: Basic, Multi-range, concept of loading effect and sensitivity AC voltmeter: Rectifier type (half wave and full wave) .CT and PT: construction, working and applications. Clamp-on meter.	R1,R2	
3	14	**Measurement of Electric Power**	Analog meters: Permanent magnet moving coil (PMMC) and Permanent magnet moving iron (PMMI) meter, their construction, working, salient features, merits and demerits. Dynamometer type wattmeter: Construction and working Range: Multiplying factor and extension of range using CT and PT Errors and compensations. Active and reactive power measurement: One, two and three wattmeter method. Effect of Power factor on wattmeter reading in two wattmeter method. Maximum Demand indicator	R1,R2	
4	10	**Measurement of Electric Energy**	Single and three phase electronic energy meter: Constructional features and working principle, Errors and their compensations. Calibration of single phase electronic energy meter using direct loading.	R1,R2	
5	18	**Circuit Parameter Measurement, CRO and Other Meters**	Measurement of resistance: Low resistance: Kelvin's double bridge, Medium Resistance: Voltmeter and ammeter method, High resistance: Megger and Ohm meter: Series and shunt Measurement of inductance using Anderson Bridge (no derivation and phasor diagram). Measurement of capacitance using Schering bridge (no derivation and phasor diagram) Single beam/single trace CRO, Digital storage Oscilloscope: Basic block diagram, working, Cathode ray tube, electrostatic deflection, vertical amplifier, time base generator, horizontal amplifier, measurement of voltage/ amplitude/ time period/ frequency/ phase angle delay line, specifications. Other meters: Earth tester, Digital Multi-meter; L-C-R meter, Frequency meter (ferromagnetic and Weston type), Phase sequence indicator, power factor meter (single phase and three phase dynamometer type), Synchroscope, Tri-vector meter, Signal generator need, working and basic block diagram. Function generator: need, working and basic block diagram, function of symmetry.	R1,R2	

REFERENCE RESOURCES

R1- Electrical and Electronics Measurements and Instrumentation by Sawhney A.K

R2- Electrical and Electronic Measurement and Instrumentation by Rajput R.K

Signature of Teacher Shikha

Signature of H.O.D

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG **Semester**: 3rd

Subject :ELECTRICAL AND ELECTRONICS MEASUREMENT LAB **Session**: AUG-2026

Teacher: SHIKHA **Class Room**: L1

Pract. No.	Description of Practical	Reference for Procedure / Writeup	Likely Dates	Actual Dates	Signature
1.	Identify measuring instruments on the basis of symbols on dial, type, accuracy, class position and scale.	Lab Manual	1st Week		
2.	Identify the components of PMMC and MI instruments.	Lab Manual	2nd Week		
3.	Troubleshoot PMMC and MI instruments.	Lab Manual	3rd Week		
4.	Measure AC and DC quantities in a working circuit.	Lab Manual	4th Week		
5.	Extend range of ammeter and voltmeter by using (i) shunt and multiplier (ii) CT and PT.	Lab Manual	5thWeek		
6.	Use Clamp-on meter for measurement of AC/DC current, AC/DC voltage.	Lab Manual	6th Week		
7.	Use electro-dynamic watt-meter for measurement of power in a single phase circuit	Lab Manual	7th Week		
8	Troubleshoot electrodynamic watt-meter for measurement of power in a single phase circuit	Lab Manual	8th Week		
9	Calibrate single phase electronic energy meter by direct loading.	Lab Manual	9th Week		
10	Troubleshoot single phase electronic energy meter.	Lab Manual	10th Week		
11	Use digital multi-meter for measurement of AC/DC current, AC/DC voltage	Lab Manual	11th Week		
12	Use voltmeter and ammeter method for measurement of medium resistance	Lab Manual	12th Week		
13.	Revision		13th Week		
14.	Revision		14th Week		

R1:

Rajput R.K., Electrical and Electronic Measurement and Instrumentation, S.Chand and Co. New Delhi, ISBN
R2:Sawhney A.K., Electrical and Electronics Measurements and Instrumentation., Dhanpai Rai and Sons, New Delhi

Shikha

Signature of Teacher

Signature of H.O.D

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG **Semester**: 3rd

Subject :ELECTRICAL MOTORS AND TRANSFORMERS **Session**: AUG-2026

Teacher: SHIKHA **Class Room**: L1

S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	8	**DC Generators**	DC generator: construction, parts, materials and their functions. Principle of operation of DC generator: Fleming's right hand rule, schematic diagrams, e.m.f. equation of generator, armature reaction, commutation and Applications of DC generators.	R1,R2	
2	10	**D.C. Motors**	DC motor: Types of DC motors. Fleming's left hand rule, Principle of operation, Back e.m.f. and its significance, Voltage equation of DC motor. Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency. DC motor starters: Necessity, two point and three point starters. Speed control of DC shunt and series motor: Flux and Armature control. Brushless DC Motor: Construction and working.	R1,R2	
3	13	**Single Phase Transformers**	Types of transformers: Shell type and core type; Construction: Parts and functions, materials used for different parts: CRGO, CRNGO, HRGO, amorphous cores. Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage transformation ratio, Significance of transformer ratings. Transformer No-load and on-load phasor diagram, Leakage reactance, Equivalent circuit of transformer: Equivalent resistance and reactance. Voltage regulation and Efficiency: Direct loading, OC/SC method, All-day efficiency.	R1,R2	
4	14	**Three Phase Transformers**	Bank of three single phase transformers, Single unit of three phase transformer. Distribution and Power transformers, Construction, cooling, Three phase transformers connections as per IS:2026 (part IV)-1977, Three phase to two phase conversion (Scott Connection), Selection of transformer as per IS: 10028 (Part I)-1985, Criteria for selection of distribution transformer, and power transformer, Amorphous Core type Distribution Transformer, Specifications of three-phase distribution transformers as per IS:1180 (part I)-1989 Need of parallel operation of three phase transformer, Conditions for parallel operation. Polarity tests on mutually inductive coils and single phase transformers; Polarity test, Phasing out test on Three-phase transformer.	R1,R2	
5	11	**Special Purpose Transformers**	Single phase and three phase auto transformers: Construction, working and applications. Instrument Transformers: Construction, working and applications of Current transformer and Potential transformer. Isolation transformer: Constructional Features and applications. Single phase welding transformer: constructional features and applications. Pulse transformer: constructional features and applications. 'K' factor of transformers: overheating due to non-linear loads and harmonics.	R1,R2	

REFERENCE RESOURCES

R1- Principles of Electrical Machines byMehta, V. K. and Mehta, Rohit,

R2- Electrical Machines by G.C. Garg& P.S. Bimbhra,

Shikha

Signature of Teacher

Signature of H.O.D

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG

Subject : ELECTRONICS DEVICES AND CIRCUITS

Teacher: ANIL KUMAR JAGOTA

Semester: 3rd

Session: AUG-2026

Class Room: L1

S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	8	Semiconductor and Diodes	Definition, Extrinsic/Intrinsic, N-type & P-type PN Junction Diode – Forward and Reverse Bias Characteristics , Zener Diode – Principle, characteristics, construction, working Diode Rectifiers – Half Wave and Full Wave Filters – C, LC and PI Filters	R1,R2	
2	10	Bipolar Junction Transistor	NPN and PNP Transistor – Operation and characteristics Common Base Configuration – characteristics and working Common Emitter Configuration – characteristics and working Common Base Configuration – characteristics and working High frequency model of BJT Classification of amplifiers, negative feedback	R1,R2	
3	13	Field Effect Transistors	Working Principle, Classification MOSFET Small Signal model N-Channel/ P-Channel MOSFETs – characteristics, enhancement and depletion mode, MOSFET as a Switch Common Source Amplifiers. Uni-Junction Transistor – equivalent circuit and operation	R1,R2	
4	14	SCR DIAC & TRIAC	SCR – Construction, operation, working, characteristics DIAC - Construction, operation, working, characteristics TRIAC - Construction, operation, working, characteristics SCR and MOSFET as a Switch, DIAC as bidirectional switch Comparison of SCR, DIAC, TRIAC, MOSFET	R1,R2	
5	11	Amplifiers and Oscillators	Feedback Amplifiers – Properties of negative Feedback, impact of feedback on different parameters Basic Feedback Amplifier Topologies: Voltage Series, Voltage Shunt Current Series, Current Shunt Oscillator – Basic Principles, Crystal Oscillator, Non-linear/ Pulse Oscillator	R1,R2	

REFERENCE RESOURCES

R1- Electronics Devices and Circuits by S. Salivahanan, N Suresh Kumar: Mc Graw Hill Education

R2- Electronics Devices and Circuits by Jacob Millman: Mc Graw Hill Education

01/08/2026

Signature of Teacher

Signature of H.O.D.