

Government Polytechnic Hamirpur Lecture Planning (Theory)

Branch : Electrical Engg.

Subject : INTRODUCTION TO ELECTRICAL GENERATION SYSTEM

Teacher : Ms. Parveen Dogra

Semester: 3rd

Session: Aug 25 - Dec 25

Cass Room : L1

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-	

Parveen
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Signature of Teacher with Date

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Reference Resource:

R1: Nag. P. K. Power Plant Engineering, McGraw Hill, New Delhi.

R2. Gupta, B.R., Generation of Electrical Energy, S. Chand & Co. New Delhi,

R3. Gupta, J.B. A Course in Electrical Power- S. K Kataria and Sons, New Delhi. 2014

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG

Semester: 3rd

Subject :ELECTRICAL AND ELECTRONICS MEASUREMENT

Session: AUG-2025

Teacher: SHIKHA

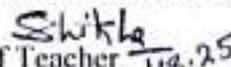
Class Room: L1

S.N o.	No. of Lect ures	Chapter/ Unit Description	Detail of Contents	Referenc e Resources	Re marks
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

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**Government Polytechnic Hamirpur
Lecture Planning (Theory)**

Branch : Electrical Engg.

Subject : ELECTRICAL TESTING AND COMMISSIONING

Teacher : Ms.Parveen Dogra

Semester: 5th

Session: Aug 25 - Dec 25

Class Room : L2

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Rem
1.	1-14	Electrical Safety and Insulation	Do's and don'ts regarding safety in domestic electrical appliances as well for substation/power station operators, Electrical safety in industry/power stations/ substations at the time of operation/ control/maintenance. Fire detection alarm, fire-fighting equipments Factors affecting life of insulating materials. Measuring insulation resistance by different methods such as i) Polarization, ii) Dielectric, absorption, iii) Megger and to predict the condition of insulation.	R1,R2,R3,	
2.	15-26	Installation and Erection	Concept of foundation for installation of machinery. Requirements of foundation for static and rotating electrical machinery. Concept of leveling and aligning Procedure for leveling and aligning alignment of direct coupled drive, effects of misalignment Installation of transformer and procedure of installation of transformer, Requirements of installation of pole mounted transformer	-do-	
3.	27-44	Testing and Commissioning	Concept of testing, Objectives of testing. Roles of I.S.S. in testing of electrical equipment, Types of tests and concepts, Routine tests, type tests, supplementary test, special tests, Methods of testing – Direct/Indirect/Regenerative testing. Tolerances for the various items for equipment –transformer, induction motor, dc motor, synchronous machines Commissioning, Tests before Commissioning for transformer, induction motor, alternator	-do-	
4.	45-56	Troubleshooting Plans	Internal and external causes for failure / abnormal operation of equipment. List of mechanical faults, electrical faults and magnetic faults in the electrical equipment, remedies, applications Use of tools like megger, earth tester and growler	-do-	
5.	57-70	Maintenance	Concept of maintenance, types of maintenance, routine, preventive and breakdown maintenance. Causes of failure of electrical machines. Preventive maintenance-procedure or developing maintenance schedules for electrical machines. Factors affecting preventive maintenance schedules, Concept of TPM, Pillars of TPM Identification of different types of faults developed such as mechanical/ electrical/ magnetic faults.	-do-	

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1.8.25

Signature of Teacher with Date

R. Sharma

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Reference Resource:

R1: Deshpande.M. V. PHI Learning Pvt. Ltd., 2010, Design and Testing of Electrical Machines
R2: Rao, B V S Asia Club House, First Reprint, 2011, Operation and Maintenance of Electrical Equipment R3:
Rosenberg. Mc GRAW-HILL, 1st Edition, May 2003, Maintenance and Repairs, ISBN No

Govt. Polytechnic Hamirpur (H.P.)
Lesson Planning (Theory)

Branch : ELECTRICAL ENGG

Subject : ELECTRONICS DEVICES AND CIRCUITS

Teacher: Priyanka Kapoor

Semester: 3rd

Session: AUG-2025

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

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Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG

Semester: 3rd

Subject : ELECTRICAL MOTORS AND TRANSFORMERS

Session: AUG-2025

Teacher: SHIKHA

Class Room: L1

S.N o.	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 by Mehta, V. K. and Mehta, Rohit,

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

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