

Government Polytechnic Kullu, Distt. Kullu H.P.

Department of Electrical Engineering

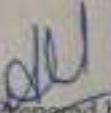
Lesson Plan

Name of Faculty	Er. Akash
Discipline	Electrical Engineering
Semester	4th
Subject	Fundamentals Of Power Electronics (L-3,Ds-1, Hrs./Week)
Lesson Plan Duration	Jan. – May 2026

Week	Chapter	Topic to be covered
1 st (27Jan. – 31 Jan.)	Unit – I Power Electronic Devices	Power electronic devices Power transistor: construction, working principle, V-I characteristics and uses
2 nd (02Feb. – 07Feb.)	Unit – I Power Electronic Devices	IGBT: Construction, working principle, V-I characteristics and uses.
3 rd (09Feb. – 13Feb.)	Unit – I Power Electronic Devices	Concept of single electron transistor (SET) - aspects of Nano-technology.
4 th (16Feb. – 21Feb.)	Unit – II Thyristor Family Devices	SCR: construction, two transistor analogy, types, working and characteristics. SCR mounting and cooling
5 th (23Feb. – 29Feb.)	Unit – II Thyristor Family Devices	Types of Thyristors: SCR, LASCR, SCS, GTO, UJT, PUT, DIAC and TRIAC Thyristor family devices: symbol, construction, operating principle and V-I characteristics
6 th (02 Mar. – 07Mar.)	Unit – II Thyristor Family Devices	Protection circuits: over-voltage, over-current, Snubber, Crowbar.
7 th (09Mar. – 13Mar.)	Unit- III Turn-on and Turn- off Methods of Thyristors	SCR Turn-On methods: High Voltage thermal triggering, Illumination triggering, dv/dt triggering, Gate triggering. Gate trigger circuits – Resistance and Resistance-Capacitance circuits
Class Test – 1		In Second Week of March 2026.
8 th - (16Mar. – 20Mar.)	Unit- III Turn-on and Turn- off Methods of Thyristors	SCR triggering using UJT, PUT: Relaxation Oscillator and Synchronized UJT circuit. Pulse transformer and opto-coupler based triggering.
9 th (23Mar. – 28 Mar.)	Unit- III Turn-on and Turn- off Methods of Thyristors	SCR Turn-Off methods: Class A- Series resonant commutation circuit, Class B- Shunt Resonant commutation circuit, Class C-Complimentary Symmetry commutation circuit, Class D –Auxiliary commutation, Class E- External pulse commutation, Class F- Line or natural commutation.
10 th (30Mar. – 04Apr.)	Unit- IV Phase Controlled Rectifiers	Phase control: firing angle, conduction angle. Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load: Circuit diagram, working, input- output waveforms
11 th (06Apr. – 10Apr.)	Unit- IV Phase Controlled Rectifiers	Equations for DC output and effect of freewheeling diode. Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode.
Class Test – 2		In Second Week of April 2026.
12 th (13Apr. – 15Apr)	Unit- IV Phase Controlled Rectifiers	Equations for DC output and effect of freewheeling diode. Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode.

13 th (20 Apr. – 25 Apr.)	Unit- IV Phase Controlled Rectifiers	SCRs in one arm and diodes in another arm.
	House Test	In Second Week of May 2026.
14 th (11 May. – 17 May.)	Unit- V Industrial Control Circuits	Applications: Burglar's alarm system, Battery charger using SCR, Emergency light system, Temperature controller using SCR and; Illumination control / fan speed control TRIAC, SMPS.
15 th (18 May- 29 May)	Unit- V Industrial Control Circuits	UPS: Offline and Online , SCR based AC and DC circuit breakers.

- **NOTE:** Lesson Plan is Tentative, subject to availability of Time, Students & Faculty.


Prepared by
(Er. Akash)


Signature of HOD / 
(Er. Aman Anand)

Government Polytechnic Kullu, Distt. Kullu H.P.

Department of Electrical Engineering

Lesson Plan

Name of Faculty	Er. Akash
Discipline	Electrical Engineering
Semester	4th
Subject	Fundamentals Of Power Electronics Laboratory (P-2 Hrs./Week)
Lesson Plan Duration	Jan. – May 2026

Week	Practical No.	Practical Name
1 st	Practical-I	Test the proper functioning of power transistor.
2 nd	Practical-II	Test the proper functioning of IGBT.
3 rd	Practical-III	Test the proper functioning of DIAC to determine the break over voltage.
4 th	Practical-IV	Determine the latching current and holding current using V-I characteristics of SCR.
5 th	Practical-V	Test the variation of R, C in R and RC triggering circuits on firing angle of SCR.
6 th	Practical-VI	Test the effect of variation of R, C in UJT triggering technique.
7 th	Practical-VII	Perform the operation of Class – A, B, C, turn off circuits.
8 th	Practical-VIII	Perform the operation of Class –D, E, F turn off circuits.
9 th	Practical-IX	Use CRO to observe the output waveform of half wave controlled rectifier with resistive load and determine the load voltage.
10 th	Practical-X	Draw the output waveform of Full wave controlled rectifier with R load, RL load, freewheeling diode and determine the load voltage.
11 th	Practical-XI	Determine the firing angle using DIAC and TRIAC phase controlled circuit on output power under different loads such as lamp, motor or heater
12 th	Practical-XII	Test the performance of given SMPS, UPS
13 th		Revision and evaluation
14 th		Revision and evaluation

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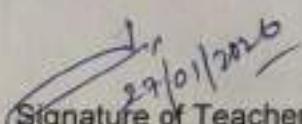
Lesson Plan

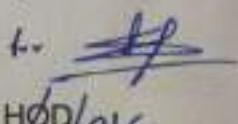
Name of Faculty	Er Naval Kishor
Discipline	Electrical Engineering
Semester	4th
Subject	Induction, Synchronous & Electric Machines Lab (P-2 Hrs./Week)
Lesson Plan Duration	Jan-May 2026

Week	Practical NO.	Practical Name
1 st (27 Jan. – 02 Feb.)	1	Identify the different parts (along with function and materials) for the given single phase and three phase induction motor.
2 nd (3 Feb. – 9 Feb.)	2	Connect and run the three phase squirrel cage induction motors (in both directions) using the DOL, star-delta, auto-transformer starters (any two)
3 rd (10 Feb-16 Feb.)	3	Conduct the No-load and Blocked-rotor tests on given 3-f squirrel cage induction motor and determine the equivalent circuit parameters
4 th (17 Feb . –23 Feb.)	4	Measure the open circuit voltage ratio of the three phase slip ring induction motor.
5 th (24 Feb - 02 Mar.)	5	Perform the direct loading test on the given three phase alternator and determine the regulation and efficiency.
6 th (3 Mar. – 9 Mar.)	6	Determine the regulation and efficiency of the given three phase alternator from OC and SC tests (Synchronous impedance method)
CLASS TEST -1		2nd week of March 2025
7 th (16 Mar. – 22 Mar.)	7	Conduct the test on load or no load to plot the 'V' curves and inverted 'V' curves (at no-load) of 3-f synchronous motor.
8 th (23 Mar. – 29 Mar.)	8	Dismantling and reassembling of single phase motors used for ceiling fans, universal motor for mixer.
9 th	9	

(30 April – 5 April)		Control the speed and reverse the direction of stepper motor
CLASS TEST -2	10	2 nd week of April 2025
10 th (13 April – 19 April)	10	Control the speed and reverse the direction of the AC servo motor
11 th (20 April. – 26 April.)	11	Control the speed and reverse the direction of the DC servo motor
12 th (27 April – 3 may.)	12	Conduct the No-load and Blocked-rotor tests on given 3-f squirrel cage induction motor and plot the Circle diagram
13 th (4 May -10 May)	13	Perform the direct load test on the three phase squirrel cage induction motor and plot the i) efficiency versus output, ii) power factor versus output, iii) power factor versus motor current and iv) torque–slip/speed characteristics.
House Test		2 nd week of May 2025
14 th (13 May -19 May.)	14	Conduct the direct load test to determine the efficiency and speed regulation for different loads on the given single phase induction motor; plot the efficiency and speed regulation curves with respect to the output power
15 th (19 May-27 May.)	Revision & Doubt Clearance	Revision & Doubt Clearance

NOTE: Lesson Plan is Tentative, subject to availability of Time, Students & Faculty.


27/01/2026
Signature of Teacher
(Er. Naval Kishor)


Signature of HOD/OIC
(Er. Aman Anand)

stepper

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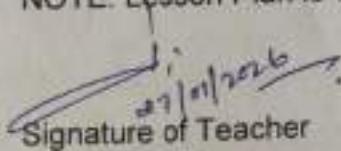
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Name of Faculty	Er Naval Kishor
Discipline	Electrical Engineering
Semester	4th
Subject	Induction, Synchronous & Electric Machines(L-4 Hrs./Week)
Lesson Plan Duration	Jan-May 2026

Week	Topic	Theory
1 st (27 Jan. -02 Feb.)	Unit – I Three Phase Induction Motor	Working principle: production of rotating magnetic field, Synchronous speed, rotor speed and slip. Constructional details of 3 phase induction motors: Squirrel cage induction motor and Slip ring induction motor.
2 nd (3 Feb. – 9 Feb.)	Unit – I Three Phase Induction Motor	Rotor quantities: frequency, induced emf, power factor at starting and running condition. Characteristics of torque versus slip (speed), Torques: starting, full load and maximum with relations among them. Induction motor as a generalized transformer with phasor diagram. Four quadrant operation, Power flow diagram.
3 rd (10 Feb-16 Feb.)	Unit – I Three Phase Induction Motor	Starters: need and types; stator resistance, auto transformer, star delta, rotor resistance and soft starters. Speed control methods: stator voltage, pole changing, rotor resistance and VVVF. Motor selection for different applications as per the load torque-speed requirements. Maintenance of three phase induction motors.
4 th (17 Feb . –23 Feb.)	Unit – II Single phase induction motors	Double field revolving theory, principle of making these motors self-start. Construction and working: Resistance start induction run, capacitor start induction run, capacitor start capacitor run, shaded pole, repulsion type, series motor, universal motor, hysteresis motor.
5 th (24 Feb - 02 Mar.)	Unit – II Single phase induction motors	Torque-speed characteristics for all of the above motors.
6 th (3 Mar. – 9 Mar.)	Unit – II Single phase induction motors	Motor selection for different applications as per the load torque-speed requirements. Maintenance of single phase induction motors
CLASS TEST -1		2 nd week of March 2026
7 th (16 Mar. – 22 Mar.)	Unit- III Three phase Alternators	Principle of working, moving and stationary armatures. Constructional details: parts and their functions, rotor constructions
8 th (23 Mar. –29 Mar.)	Unit- III Three phase Alternators	Windings: Single and Double layer E.M.F. equation of an Alternator with numerical by considering short pitch factor and distribution factor.

		Alternator loading: Factors affecting the terminal voltage of alternator;
9 th (30 April – 5 April)	Unit- III Three phase Alternators	Armature resistance and leakage reactance drops. Armature reaction at various power factors and synchronous impedance.
	CLASS TEST -2	2 nd week of April 2026
10 th (13 April – 19 April)	Unit- III Three phase Alternators	Voltage regulation: direct loading and synchronous impedance methods. Maintenance of alternators
11 th (20 April, – 26 April.)	Unit- IV Synchronous motors	Principle of working /operation, significance of load angle. Torques: starting torque
12 th (27 April – 3 may.)	Unit- IV Synchronous motors	running torque, pull in torque, pull out torque. Synchronous motor on load with constant excitation (numerical), effect of excitation at constant load (numerical).
13 th (4 May -10 May)	Unit- IV Synchronous motors	V- Curves and Inverted V-Curves. Hunting and Phase swinging. Methods of Starting of Synchronous Motor. Losses in synchronous motors and efficiency (no numerical). Applications areas
	House Test	2 nd week of May 2026
14 th (13 May -19 May.)	Unit- V Fractional horse power (FHP) Motors	Construction and working: Synchronous Reluctance Motor, Switched Reluctance Motor, BLDC, Permanent Magnet Synchronous Motors,
15 th (19 May-27 May.)	Unit- V Fractional horse power (FHP) Motors	stepper motors, AC and DC servomotors. Torque speed characteristics of above motors. Applications of above motors.

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Signature of Teacher
(Er. Naval Kishor)


Signature of HOD
(Er. Aman Anand)

Lesson Plan

Name of Faculty	Er. Lalit Kumar
Discipline	Electrical Engineering
Semester	4th
Subject	B&MHPP(L-4 Hrs./Week)
Lesson Plan Duration	Jan-May 2026

Week	Topic	Theory
1 st (27 Jan. – 02 Feb.)	Unit – I Basics of Biomass-based Power Plants	Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste. Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobar gas
2 nd (03 Feb. – 09 Feb.)	Unit – I Basics of Biomass-based Power Plants	Layout of a Bio-chemical based (e.g. biogas) power plant. Layout of a Thermo-chemical based (e.g. Municipal waste) power plant
3 rd (10 Feb-17 Feb.)	Unit – I Basics of Biomass-based Power Plants	Layout of a Agro-chemical based (e.g. bio-diesel) power plant Selection of biomass power plants.
	Unit – II Biomass Gasification Power Plants	The basic principle to convert Agriculture and forestry products and wood processing remains (including rice husks, wood powder, branches, offcuts, corn straws, rice straws, wheat straws, cotton straws, fruit shells, coconut shells, palm shells, bagasse, corncobs) into combustible gas
4 th (18 Feb . –24 Feb.)	Unit – II Biomass Gasification Power Plants	General Construction and working of a typical gasifier Power generating in gas engine: Strengths and limitations of Agriculture and forestry products gasifier
5 th (25 Feb - 03 Mar.)	Unit – II Biomass Gasification Power Plants	Preventive maintenance steps different types of biomass gasifiers Revision & Doubt Clearance
6 th (05 Mar. – 11 Mar.)	Unit – III Different Types of Gasifiers	Construction and working of the following types of gasifiers: Rice Husk Gasification Power Plant and their specifications Straw Gasification Power Plant and their specifications
CLASS TEST -1		2nd week of March 2026
7 th (12 Mar. –19 Mar.)	Unit – III Different Types of Gasifiers	Bamboo Waste, Bamboo Chips Gasification Power Plant and their specifications Coconut shell, coconut peat, coconut husk, Gasification Power Plant and their specifications

8 th (20 Mar. -28 Mar.)	Unit- III Different Types of Gasifiers	Bagasse/Sugar Cane Trash Gasification Power Plant and their specifications Gobar gas plant and its specifications
9 th (30 Mar. -06 April)	Unit- III Different Types of Gasifiers System	Breakdown maintenance of biomass power plant at the module level. Revision & Doubt Clearance
10 th (07 April. - 16 April.)	Unit- IV Micro-hydro Power Plants	Locations of micro-hydro power plant Energy conversion process of hydro power plant.
CLASS TEST -2		2nd week of April 2026
11 th (17 April. - 23 April.)	Unit- IV Micro-hydro Power Plants	Classification of hydro power plant: High, medium and low head. General Layouts of typical micro-hydro power plant.
12 th (24 April -30 April)	Unit- IV Micro-hydro Power Plants Unit- V Different types of Micro-hydro power plants	Strengths and limitations of micro-hydro power plants Construction and working of High head – Pelton turbine and their specifications
13 th (02 May-08 May.)	Unit- V Different types of Micro-hydro power plants	Construction and working of Medium head – Francis turbine and their specifications Construction and working of Low head – Kaplan turbine and their specifications
House Test		2ND week of May 2026
14 th (11 May-16 May.)	Unit- V Different types of Micro-hydro power plants	Preventive and breakdown maintenance of micro-hydro power plants Safe Practices for micro-hydro power plants.
15 th (18 May-23 May)	Revision & Doubt Clearance	Revision & Doubt Clearance
16 th (25 May-26 May)	Revision & Doubt Clearance	Revision & Doubt Clearance

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Signature of Teacher
(Er.Lalit Kumar)


Signature of HOD/pk
(Er. Aman Anand)

Department of Electrical Engineering
Lesson Plan

Name of Faculty	Er. Lalit Kumar
Discipline	Electrical Engineering
Semester	4 th
Subject	BE (P-2 Hrs/Week) B M HPP
Lesson Plan Duration	Jan-May 2026

Week	Practical No.	Practical Name
1 st (27 Jan. -31 st Jan.)	Practical-1	Identify different components of a typical Biomass power plant.
2 nd (02 Feb. -7 Feb.)		
3 rd (9 Feb-114 Feb.)	Practical-2	Identify different biomass resources and evaluate their energy potential.
4 th (16 Feb. -20 Feb.)		
5 th (23 Feb - 28 Feb.)	Practical-3	Determine the carbon content of solid biomass.
6 th (02 Mar. - 07 Mar.)		
7 th (09 Mar. -13 Mar.)	Practical-4	Assemble the Biogas power plant.
8 th (16 Mar -20 Mar.)		
9 th (23 Mar. -28 Mar.)	Practical-5	Dismantle the Biogas power plant
10 th (30 Mar. - 04 April.)		
11 th (06 April- 10 Apr.)	Practical-6	Identify the components of the high head micro hydro power plant
12 th (13 April -18 Apr)		
13 th (20 April -25 Apr)	Practical-7	Identify the components of the medium head micro hydro power plant
14 th (27 April -2 May.)		
15 th (4 May-8 May)	Practical-8	Identify the components of the low head micro hydro power plant
16 th (11 May-16 May)	Practical-9	Assemble a high head micro hydro power plant
17 th (18 May-23 May)	Practical-10	Assemble a medium head micro hydro power plant

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Signature of Teacher
(Er. Lalit Kumar)



Signature of HOD /p/c

Department of Electrical Engineering

Lesson Plan

Name of Faculty	Er. Sandeep Bhardwaj
Discipline	Electrical Engineering
Semester	4th
Subject	EPTD(L-4 Hrs./Week)
Lesson Plan Duration	Jan-May 2026

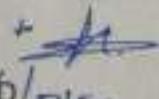
Week	Topic	Theory
1 st (27 Jan. – 03 Feb.)	Unit – I Basics of Transmission and Distribution	Single line diagrams with components of the electric supply transmission and distribution systems. Classification of transmission lines: Primary and secondary transmission; standard voltage level used in India. Classification of transmission lines: based on type of voltage, voltage level, length and others
2 nd (04 Feb. – 10 Feb.)	Unit – I Basics of Transmission and Distribution	Characteristics of high voltage for power transmission. Method of construction of electric supply transmission system – 110 kV, 220 kV, 400 kV. Method of construction of electric supply distribution systems – 220 V, 400V, 11 kV, 33 kV
3 rd (11 Feb - 18 Feb.)	Unit – I Basics of Transmission and Distribution	Method of construction of electric supply distribution systems – 220 V, 400V, 11 kV, 33 kV
	Unit – II Transmission Line Parameters and Performance	Line Parameters: Concepts of R, L and C of line parameters
4 th (19 Feb. – 28 Feb.)	Unit – II Transmission Line Parameters and Performance	types of lines. Performance of short line: Efficiency, regulation and its derivation, effect of power factor, vector diagram for different power factor.
5 th (01 Mar - 07 Mar.)	Unit – II Transmission Line Parameters and Performance	Performance of medium line representation, nominal 'T', nominal 'π' and end condenser methods. Transposition of conductors and its necessity. Skin effect and proximity effect
6 th (08 Mar. – 15 Mar.)	Unit- III Extra High Voltage Transmission	Extra High Voltage AC (EHVAC) transmission line: Necessity, high voltage substation components such as transformers and other switchgears, advantages, limitations and applications and lines in India. Ferranti and Corona effect.
CLASS TEST -1		2 nd week of March 2026
7 th (16 Mar. – 24 Mar.)	Unit- III Extra High Voltage Transmission	High Voltage DC (HVDC) Transmission Line: Necessity, components, advantages, Limitations and applications. Layout of mono-polar, bi-Polar and homo-polar transmission lines. Lines in India.
8 th (25 Mar. – 31 Mar.)	Unit- III Extra High Voltage Transmission	Features of EHVAC and HVDC transmission line. Flexible AC Transmission line: Features, d types of FACTS controller. New trends in wireless transmission of electrical power.

9 th (1 April – 11 April)	Unit- IV A.C Distribution System	AC distribution: Components classification, requirements of an ideal distribution system, primary and secondary distribution system. Feeder and distributor, factors to be considered in design of feeder and distributor
10 th (12 April. – 18 April.)	Unit- IV A.C Distribution System	Types of different distribution schemes: radial, ring, and grid, layout, advantages, disadvantages and applications. Voltage drop, sending end and receiving end voltage
CLASS TEST -2		2nd week of April 2026
11 th (19 April. – 26 April)	Unit- IV A.C Distribution System	Distribution Sub-Station: Classification, site selection, advantages, disadvantages and applications. Single Line diagram (layout) of 33/11KV Sub-Station, 11KV/400V sub-station, Symbols and functions of their components.
12 th (27 April - 05 May)	Unit- V Components of Transmission and Distribution Line	Overhead Conductors: Properties of material, types of conductor with trade names, significance of sag. Line supports: Requirements, types of line structures and their specifications, methods of erection. Line Insulators
13 th (06 May - 11 May.)	Unit- V Components of Transmission and Distribution Line	Properties of insulating material, selection of material, types of insulators and their applications, 26 causes of insulator failure, derivation of equation of string efficiency for string of three suspension insulator, methods of improving string efficiency.
House Test		2nd week of May 2025
14 th (12 May - 18 May.)	Unit- V Components of Transmission and Distribution Line Revision & Doubt Clearance	Underground Cables: Requirements, classification, construction, comparison with overhead lines, cable laying and cable jointing. Revision & Doubt Clearance
15 th (19 May - 27 May)	Revision & Doubt Clearance	Revision & Doubt Clearance

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