Government Polytechnic Kullu, Distt. Kullu (H.P)175138
Department of Electrical Engineering
Lesson Plan

Name of Faculty	Shikha
Discipline	Electrical Engineering
Semester	5th
Subject	SWITCHGEAR AND PROTECTION (L-5 Hrs./Week)
Lesson Plan Duration	August – December 2024

Week	Topic	Theory
1st (12Aug. –19Aug.)	**Unit – I Basics of Protection**	Necessity, functions of protective system, Normal and abnormal conditions.
2nd (20Aug. – 27Aug.)	**Unit – I Basics of Protection**	Types of faults and their causes. Protection zones and backup protection
3rd (28Aug. – 03Sep.)	**Unit – II Circuit Interruption Devices**	Isolators - Vertical break, Horizontal break and Pantograph type. HRC fuses – Construction, working, characteristics and applications.
4th (04Sep– 10Sep.)	**Unit – II Circuit Interruption Devices**	Arc formation process, methods of arc extinction (High resistance and Low resistance), Arc voltage, Recovery voltage, Re-striking voltage, RRRV.
5th (11Sept. –18 Sept.)	**Unit – II Circuit Interruption Devices**	HT circuit breakers: Sulphur-hexa Fluoride (SF6), Vacuum circuit breaker – (Working, construction, specifications and applications).
Class Test – 1		**In Second Week of September 2024.**
6th (19Sept. –25Sept)	**Unit– II Circuit Interruption Devices**	L.T. circuit breaker: Air circuit breakers (ACB), Miniature circuit breakers (MCB), Moulded case circuit breakers (MCCB) and Earth leakage circuit breaker (ELCB)) - Working and applications. Brief introduction to gas insulated switchgear.
7th (26Sept. – 03 Oct)	**Unit– III Protective Relays**	Fundamental quality requirements: Selectivity, Speed, Sensitivity, Reliability, Simplicity, Economy. Basic relay terminology - Protective relay, Relay time, Pick up, Reset current, current setting, Plug setting multiplier, Time setting multiplier.
8th (04Oct. – 10Oct.)	**Unit– III Protective Relays**	Protective relays: Classification, principle of working, construction and operation of – Electromagnetic attraction (Attracted armature type, Solenoid type and Watt-hour meter type only) relays. Electromagnetic Induction relays: Over current relays: Block diagram, working. Distance relaying- Principle, operation of Definite distance relays.
9th (11Oct. – 19 Oct.)	Unit– III Protective Relays	Directional relay: Need and operation. Operation of current and voltage differential relay. Brief introduction to Thermal Relay. Brief introduction to Static and Microprocessor based relays and their applications.

10th (21 Oct. – 26 Oct.)	Unit– IV Protection of Alternator and Transformer Alternator Protection	. Faults, Differential protection over current, earth fault, overheating and field failure protection. Reverse power protection.
Class Test – 2		In Third Week of October 2024.
11th (28 Oct. – 04 Nov.)	Unit– IV Protection of Alternator and Transformer Alternator Protection	**Transformer Protection** Different Faults (brief introduction), Differential, over current, earth fault, over heating protection, Limitations of differential protection. Buchholz relay: Construction, operation, merits and demerits.
12th (05 Nov. – 12 Nov.)	Unit– V Protection of Motors, Bus-bar and Transmission Line Motor	Faults, Short circuit protection, Overload protection, Single phase preventer.
House Test		In Second Week of November 2024.
13th (13Nov. – 20 Nov.)	Unit– V Protection of Motors, Bus-bar and Transmission Line Motor	**Bus bar and Transmission line** Faults on Bus bar and Transmission Lines. Bus bar protection: Differential and Fault bus protection.
14th (21 Nov. – 27Nov.)	Unit– V Protection of Motors, Bus-bar and Transmission Line Motor	Transmission line: Over current, Distance and Pilot wire protection.
15th (28Nov-02 Dec)	Revision	Revision & doubt clearance

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

Shikha

Signature of Teacher 12/08/24

(Shikha)

12/08/2024

Signature of HOD

(Er. Aman Anand)

Government Polytechnic Kullu, Distt. Kullu (H.P)175138
Department of Electrical Engineering
Lesson Plan

Name of Faculty	Er Aman Anand
Discipline	Electrical Engineering
Semester	5th
Subject	EC&A (L-5 Hrs./Week)
Lesson Plan Duration	August – December 2024

Week	Topic	Theory
1st (12Aug. –19Aug.)	**Unit – I Energy Conservation Basics**	Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario.Energy conservation
2nd (20Aug. – 27Aug.)	**Unit – I Energy Conservation Basics**	Energy audit; concepts and difference Star Labelling: Need and its benefits
3rd (28Aug. – 03Sep.)	**Unit – II Energy Conservation in Electrical Machines**	Need for energy conservation in induction motor. Energy conservation techniques in induction motor by: Motor survey Matching motor to load
4th (04Sep– 10Sep.)	**Unit – II Energy Conservation in Electrical Machines**	Operating in star mode. Rewinding of motor. Replacement by energy efficient motor, Periodic maintenance
5th (11Sept. –18 Sept.)	**Unit – II Energy Conservation in Electrical Machines**	Energy efficient motor; significant features, advantages, applications and limitations. Need for energy conservation in transformer: Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer
Class Test – 1		**In Second Week of September 2024.**
6th (19Sept. –25Sept)	**Unit– III Energy conservation in Electrical Installation systems**	Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level. Technical losses; causes and measures to reduce these (no expression only theory part) a) Controlling I 2R losses
7th (26Sept. – 03 Oct)	**Unit– III Energy conservation in Electrical Installation systems**	b) Optimizing distribution voltage c) Balancing phase currents Energy conservation in lighting sources:
8th (04Oct. – 10Oct.)	**Unit– III Energy conservation in Electrical Installation systems**	a) Replacing Lamp sources. b) Using energy efficient luminaries
9th (11Oct. – 19 Oct.)	**Unit– IV Energy conservation through Cogeneration and Tariff**	Co-generation and Tariff; concept, significance for energy conservation Co-generation Types of cogenerations on basis of sequence of energy use (basic introduction to Topping cycle & Bottoming cycle)
10th (21 Oct. – 26 Oct.)	**Unit– IV Energy conservation**	Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration). Factors

	through Cogeneration and Tariff	governing the selection of cogeneration system, advantages of cogeneration.
Class Test – 2		**In Third Week of October 2024.**
11th (28 Oct. – 04 Nov.)	**Unit– IV Energy conservation through Cogeneration and Tariff**	Tariff: Types of tariff structure: Special tariffs; Time-off-day tariff, Peak-off-day tariff, Power factor tariff, Maximum Demand tariff, Load factor tariff. Application of tariff system to reduce energy bill.
12th (05 Nov. – 12 Nov.)	**Unit– V Energy Audit of Electrical System**	Energy audit (definition as per Energy Conservation Act) Energy audit instruments and their use
House Test		**In Second Week of November 2024.**
13th (13Nov. – 20 Nov.)	**Unit– V Energy Audit of Electrical System**	Questionnaire for energy audit projects. Energy flow diagram (Sankey diagram)
14th (21 Nov. – 27Nov.)	**Unit– V Energy Audit of Electrical System**	Questionnaire for energy audit projects.Energy flow diagram (Sankey diagram)
15th (28Nov-02 Dec)	**Revision**	Revision & doubt clearance

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

Signature of Teacher
(Er. Aman Anand)

Principal
Govt. Polytechnic,
Kullu at Seobagh (H.P.)

Government Polytechnic Kullu, Distt. Kullu (H.P)175138
Department of Electrical Engineering
Lesson Plan

Name of Faculty	Er Lalit Kumar
Discipline	Electrical Engineering
Semester	5th
Subject	Solar Power Technologies (L-5 Hrs./Week)
Lesson Plan Duration	August – December 2024

Week	Topic	Theory
1st (12Aug. –19Aug.)	**Unit – I Unit – I Solar Energy**	Solar Map of India: Global solar power radiation Different types of Solar water heaters: Construction, working.
2nd (20Aug. – 27Aug.)	**Unit – I Unit – I Solar Energy**	Different types of solar cookers, Solar Drying process, solar lighting, and Preventive maintenance of all of the above.
3rd (28Aug. – 03Sep.)	**Unit – II Concentrated Solar Power (CSP)**	Concentrated Solar Power (CSP) plants or solar thermal electric systems
4th (04Sep– 10Sep.)	**Unit – II Concentrated Solar Power (CSP)**	Parabolic Trough: Construction, working and specifications Parabolic Dish: Construction, working and specifications
5th (11Sept. –18 Sept.)	**Unit – II Concentrated Solar Power (CSP)**	Fresnel Reflectors: Construction, working and specifications Preventive maintenance of all of the above
Class Test – 1		**In Second Week of September 2024.**
6th (19Sept. –25Sept)	**Unit– III Solar PV Systems**	Solar PV cell: Types, construction, working of solar cells. Solar PV working principle: Series and parallel connections of solar modules
7th (26Sept. – 03 Oct)	**Unit– III Solar PV Systems**	Solar Photovoltaic (PV) system: components, layout and working. Solar modules and solar arrays.
8th (04Oct. – 10Oct.)	**Unit– III Solar PV Systems** **Unit– IV Solar PV Electronics**	Solar PV systems and typical specifications. Maintenance of all of the above. Solar Charge controllers: working and specifications, switchgear and cables Batteries: Different types for solar PV systems
9th (11Oct. – 19 Oct.)	**Unit– IV Solar PV Electronics**	Solar Inverters: working and specifications Solar Power tracking: construction, working
10th (21 Oct. – 26 Oct.)	**Unit– IV Solar PV Electronics**	tilt angle, maximum power point tracking (MPPT) Maintenance of these systems.
Class Test – 2		**In Third Week of October 2024.**

11th (28 Oct. – 04 Nov.)	**Unit– V Solar PV Off-grid and Grid Tied Systems**	Solar off grid systems: layout and specifications
12th (05 Nov. – 12 Nov.)	**Unit– V Solar PV Off-grid and Grid Tied Systems**	Solar Grid tied (on grid) systems: Working principle of grid-tied dc-ac inverter, grid synchronization and active power export.
House Test		**In Second Week of November 2024.**
13th (13Nov. – 20 Nov.)	**Unit– V Solar PV Off-grid and Grid Tied Systems**	Brief introduction to Solar-Wind Hybrid systems.
14th (21 Nov. – 27Nov.)	**Revision**	Revision & doubt clearance
15th (28Nov-02 Dec)	**Revision**	Revision & doubt clearance

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Signature of Teacher
(Er. Lalit Kumar)

Signature of HOD
(Er. Aman Anand)

Government Polytechnic Kullu, Distt. Kullu (H.P)175138
Department of Electrical Engineering
Lesson Plan

Name of Faculty	Er Naval Kishor
Discipline	Electrical Engineering
Semester	5th
Subject	Electric Vehicles (L-5 Hrs./Week)
Lesson Plan Duration	August – December 2024

Week	Topic	Theory
1st (12Aug. –19Aug.)	**Unit – I Introduction to Hybrid Electric Vehicles**	Evolution of Electric vehicles Introduction to advanced Electric drive vehicle technology
2nd (20Aug. – 27Aug.)	**Unit – I Introduction to Hybrid Electric Vehicles**	Vehicle types-Electric vehicles (EV), Hybrid Electric drive (HEV), Plugin Electric vehicle (PIEV), Advantages of HEV over ICE.
3rd (28Aug. – 03Sep.)	**Unit – II Dynamics of hybrid and Electric vehicles**	General description of vehicle movement Factors affecting vehicle motion
4th (04Sep– 10Sep.)	**Unit – II Dynamics of hybrid and Electric vehicles**	- Vehicle resistance, tyre ground adhesion, rolling resistance, aerodynamic drag. Classification of motors used in Electric vehicles (brief introduction)
5th (11Sept. –18 Sept.)	**Unit – II Dynamics of hybrid and Electric vehicles**	Basic architecture of hybrid drive trains, types of HEVs, Energy saving potential of hybrid drive trains.
Class Test – 1		**In Second Week of September 2024.**
6th (19Sept. –25Sept)	**Unit– III DC-DC Converters for EV and HEV**	EV and HEV configuration based on power converters,
7th (26Sept. – 03 Oct)	**Unit– III DC-DC Converters for EV and HEV**	Classification of converters – unidirectional and bidirectional, Principle of step down operation
8th (04Oct. – 10Oct.)	**Unit– III DC-DC Converters for EV and HEV** **Unit– IV DC-AC Inverter & Motors for EV and HEVs**	Brief introduction of Boost and Buck- Boost converters. DC-AC Converters Principle of operation of half bridge DC-AC inverter (R load, R-L load)
9th (11Oct. – 19 Oct.)	**Unit– IV DC-AC Inverter & Motors for EV and HEVs**	Electric Machines used in EVs and HEVs(brief introduction), principle of operation,
10th (21 Oct. – 26 Oct.)	**Unit– IV DC-AC Inverter & Motors for EV and HEVs**	working of Permanent magnet motors, switched reluctance motor, applications of above motors.

Class Test – 2		**In Third Week of October 2024.**
11th (28 Oct. – 04 Nov.)	**Unit– V Batteries used in Electric Vehicles**	General description of batteries, material required for making batteries (brief introduction).
12th (05 Nov. – 12 Nov.)	**Unit– V Batteries used in Electric Vehicles**	Types of batteries (brief introduction) – Lithium-Ion Batteries, Nickel-Metal Hydride Batteries, Lead Acid Batteries and Ultra capacitors.
House Test		**In Second Week of November 2024.**
13th (13Nov. – 20 Nov.)	**Unit– V Batteries used in Electric Vehicles**	Recycling of Batteries, limitations of Electric Vehicles.
14th (21 Nov. – 27Nov.)	**Revision**	Revision & doubt clearance
15th (28Nov-02 Dec)	**Revision**	Revision & doubt clearance

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

Signature of Teacher
(Er. Naval Kishor)

Signature of HOD
(Er. Aman Anand)

Government Polytechnic Kullu at Seobagh,Distt. Kullu H.P-175138

Department of Electrical Engineering

Lesson Plan

Name of Faculty	Er. Devender Kumar
Discipline	Electrical Engineering
Semester	5th
Subject	Electrical Testing And Commissioning
Lesson Plan Duration	August – December 2024

Week	Chapters	Topics
1st (12Aug. - 17Aug.)	Unit – I 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
2nd (16Aug. – 18Aug.)	Unit – I Electrical Safety and Insulation	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.
3rd (19Aug. – 24 aug.)	Unit – II 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
4th (27 Sept. – 31 Sept.)	Unit – II Installation and Erection	effects of mis-alignment Installation of transformer and procedure of installation of transformer, Requirements of installation of pole mounted transformer
5th (2 Sept. –7 Sept.)	Unit– III 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.
6th (9 to13 sep)		Class test 1

7th (16Sept. – 21 Sept.)	Unit– III Testing and Commissioning	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
8th (23Sept. – 30 Sept.)	Unit– IV Troubleshooting Plans	Internal and external causes for failure / abnormal operation of equipment. List of mechanical fault
9th (01 Oct. – 5 Oct.)	Unit– IV Troubleshooting Plans	electrical faults and magnetic faults in the electrical equipment, remedies, applications Use of tools like megger, earth tester and growler.
10th (7 Oct. – 10 Oct.)	Unit– V Maintenance	Concept of maintenance, types of maintenance, routine, preventive and breakdown maintenance
11th (14Oct. – 19 Oct.)	Unit– V Maintenance	. Causes of failure of electrical machines. Preventive maintenance-procedure
12th 21 to 26 oct		**Class test -2**
13th (28. – 8Nov.)	Unit– V Maintenance	developing maintenance schedules for electrical machines. Factors affecting preventive maintenance schedules
11 to 16 nov		**House test**
14th (18 Nov. – 26 Nov.)	Unit– V Maintenance	. Concept of TPM, Pillars of TPM Identification of different types of faults developed such as mechanical/ electrical/ magnetic faults
15th (26 Nov. – 2 Dec.)		**Revision**

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Signature of Teacher
(Er. Davender Kumar)

Signature of HOD/OIC
(Er. Aman Anand)

Government Polytechnic Kullu at Seobagh,Distt. Kullu H.P-175138

Department of Electrical Engineering

Lesson Plan

Name of Faculty	Er. Devender Kumar
Discipline	Electrical Engineering
Semester	5th
Subject	illumination practices
Lesson Plan Duration	August – December 2024

Week	Chapters	Topics
1st (12Aug. - 14Aug.)	Unit – I Fundamentals of illumination	Basic illumination, Terminology, Laws of illumination Polar curves (definition only
2nd (16Aug. – 19Aug.)	Unit – I Fundamentals of illumination	Measurement of illumination Lighting calculation methods (brief introduction only)
3rd (20Aug. – 24 aug.)	Unit – II Types of lamps	Incandescent lamp, ARC lamps – AC and DC arc lamps, Fluorescent lamp. Types of other lamps: Mercury vapour lamp, HPMV lamp
4th (27 Sept. – 31 Sept.)	Unit – II Types of lamps	Mercury iodide lamp, Sodium vapour lamp, Halogen Lamps, Ultraviolet Lamps, Neon Lamps, Neon Sign Tubes. Metal halides, HID and Arc lamps, LED lamps, CFL, Lasers. Selection Criteria for lamps.
5th (2 Sept. –7 Sept.)	Unit– III Illumination Control and Dimmer Circuits	Purpose of lighting control and Dimmer circuits. Working principle and operation of Dimmer circuits. Transformer and their types, Dimmer Transformer
6th (9 to13 sep)		**Class test 1**
7th (16Sept. – 21 Sept.)	Unit– III Illumination Control and Dimmer Circuits	Auto transformer dimmer, two winding transformer dimmer Electronic Dimmer: Brief introduction and applications (only
8th (23Sept. – 30 Sept.)	Unit– IV Illumination for Interior Applications	Standard for various locations of Interior Illumination. Design considerations for interior location of residences,
9th (01 Oct. – 5 Oct.)	Unit– IV Illumination for Interior Applications	Commercial & Industrial premises. Illumination schemes for different interior locations of Residential, Commercial & industrial unit.

10th (7 Oct. – 10 Oct.)	Unit– V Illumination for Exterior Applications	Factory Lighting, Street Lighting (Latest Technology)
11th (14Oct. – 19 Oct.)	Unit– V Illumination for Exterior Applications	Flood Lighting, Railway Lighting,
12th 21 to 26 oct		Class test -2
13th (28. – 8Nov.)	Unit– V Illumination for Exterior Applications	, Agriculture and Horticulture lighting
11 to 16 nov		House test
14th (18 Nov. – 26 Nov.)	Unit– V Illumination for Exterior Applications	Health Care Centres / Hospitals, Decorating Purposes, Stage Lighting
15th (26 Nov. – 2 Dec.)		Revision

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Signature of Teacher
(Er. Devender Kumar)

Signature of HOD/OIC
(Er. Aman Anand)

Lesson Plan

Name of Teacher :Er Lalit Kumar Subject : Student Centered Activities Class :5th Sem Elect. Engg.

S. No.	Month	Date	Activity to be covered
1	Aug-Sept	*12th Aug to 21th Sept*	**Declamation Contest** **Topics:** Current affairs, technology in engineering, environmental issues.
			Cleanliness Drive around college campus.
			Various Gym Activities Introduce a "Fitness Challenge" program Offer diverse activities: weight training, cardio, yoga, dance fitness.
2	Sept-Oct	*23th Sept to 30 Oct*	**Sports activities** - Table tennis compitition .
			Music contest.
			Yoga Session.
3	Nov-Dec	*1st Nov to 2nd Dec*	**Weekly scheduled discussions** **Topics:** Ethics in engineering, sustainable development, AI in everyday life.
			Greater awareness of social and environmental issues.
			Exposure to cutting-edge technologies.

Faculty Incharge
Er Lalit Kumar

H.O.D. - Electrical Engg.
Er Aman Anand