

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG

Semester: 5th

Subject : SOLAR POWER TECHNOLOGIES

Session: AUG-2024

Teacher: ARCHIT BHARTI

Class Room: L1

S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	10	Solar Energy	Solar Map of India: Global solar power radiation Different types of Solar water heaters: Construction, working. Different types of solar cookers, Solar Drying process, solar lighting, and Preventive maintenance of all of the above.	R1,R2	
2	14	Concentrated Solar Power (CSP)	Concentrated Solar Power (CSP) plants or solar thermal electric systems, Parabolic Trough: Construction, working and specifications Parabolic Dish: Construction, working and specifications Fresnel Reflectors: Construction, working and specifications Preventive maintenance of all of the above	R1,R2	
3	14	Solar PV Systems	Solar PV cell: Types, construction, working of solar cells. Solar PV working principle: Series and parallel connections of solar modules. Solar Photovoltaic (PV) system: components, layout and working. Solar modules and solar arrays. Solar PV systems and typical specifications. Maintenance of all of the above.	R1,R2	
4	18	Solar PV Electronics	Solar Charge controllers: working and specifications, switchgear and cables Batteries: Different types for solar PV systems, Solar Inverters: working and specifications Solar Power tracking: construction, working, tilt angle, maximum power point tracking (MPPT) .Maintenance of these systems	R1,R2	
5	14	Solar PV Off-grid and Grid Tied Systems	Solar off grid systems: layout and specifications Solar Grid tied (on grid) systems: Working principle of grid-tied dc-ac inverter, grid synchronization and active power export. Brief introduction to Solar-Wind Hybrid systems.	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

Signature of Teacher

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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 24 - Dec 24**

Cass Room :

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 mis-alignment 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-	

Parveen
Signature of Teacher with Date

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PLANNED THEORY SYLLABUS COVERAGE

GP Hamirpur		Department: Electrical Engg.		Subject: OPEN ELECTIVE (Non Conventional Energy Systems)		
		Sem. & Branch: 5th & Elect. Engg		Duration : 3years		
SYLLABUS COVERAGE		Total Periods: Theory:56				
Sr No	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	12(1-12)	Unit – I Ocean Energy Technologies:	Ocean energy map of India and its implications; Specification, Construction and working of the following ocean energy technologies: • Tidal power technologies • Wave power technologies • Ocean Thermal Energy Conversion (OTEC) technologies			
2	12(13-24)	Unit – II (13 Hrs) Solar PV and Concentrated Solar Power Plants	• Solar Map of India: Solar PV • Concentrated Solar Power (CSP) plants, construction and working of Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors • Solar Photovoltaic (PV) power plant: components layout, construction, working.			
3	10(25-34)	Unit – III (13 Hrs) Large Wind Power Plants	Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and working.			

Sr	Period Nos	Topic	Details	Instruction	Additional	Remarks
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No				Reference	Study Recommended	
4	12(35-46)	Unit- IV Small Wind Turbines	<ul style="list-style-type: none"> • Horizontal axis small wind turbine: direct drive type, components and working. • Horizontal axis small wind turbine: geared type, components and working. • Vertical axis small wind turbine: direct drive and geared, components and working. • Types of towers and installation of small wind turbines on roof tops and open fields. 			
5	10(47-56)	Unit- V Biomass-based Power Plants	<ul style="list-style-type: none"> • Types of fuel used for Biomass power plants: Solid, Liquid and gaseous fuels • Layout of a Bio-chemical based (e.g. biogas) power plant. 101 • Layout of a Thermo-chemical based (e.g. Municipal waste) power plant. • Layout of a Agro-chemical based (e.g. bio-diesel) power plant. 			

Priyanka Kapoor

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DATE -----	<i>[Signature]</i>

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : ELECTRICAL ENGG.

Semester : 5th

Subject : Energy Conservation and Audit

Course Code : EEPC305

Teacher : Devender Kumar, Sr. Lect. EE

Class Room :


S.No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	4	Energy Conservation Basics	Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference, Star Labelling: Need and its benefits.	R1 R2 R3	
2	12	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. Operating in star mode. Rewinding of motor. Replacement by energy efficient motor, Periodic maintenance 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.	R1 R2 R3	
3	13	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 ² R losses. b) Optimizing distribution voltage c) Balancing phase currents Energy conservation in lighting sources: a) Replacing Lamp sources. b) Using energy efficient luminaries.	R1 R2 R3	

4	11	Energy conservation through Cogeneration and Tariff	Co-generation and Tariff; concept, significance for energy conservation Co-generation Types of cogeneration on basis of sequence of energy use (basic introduction to Topping cycle & Bottoming cycle), Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration). Factors governing the selection of cogeneration system, advantages of cogeneration. 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.	R1 R2 R3	
5	10	Energy Audit of Electrical System	Energy audit (definition as per Energy Conservation Act) Energy audit instruments and their use. Questionnaire for energy audit projects. Energy flow diagram (Sankey diagram), Energy Audit report format.	R1 R2 R3	

REFERENCE RESOURCES

- R-1 : Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria & Sons, New Delhi
- R-2 : Sharma, K. V., Venkateshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd
- R-3 : O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi


Signature of Teacher with Date


Signature of H.O.D.

Govt. Polytechnic Hamirpur (H.P.)

Practical Planning & Coverage

Branch: ELECTRICAL ENGG. Semester: 5th
 Subject: SG And P Lab. Session: August 2024 To Dec. 2024
 Teacher: Ashok Kumar Sharma Laboratory: EWP

Pract No	Description of Practical	Reference for Procedure/ Writeup	Likely Dates	Actual Dates	Signature
1	Identify various switchgears in the laboratory and write their specifications		12.08.2024 To 20.08.2024		
2	Test HRC fuse by performing the load test		27.08.2024 To 09.09.2024		
3	Test MCB by performing the load test.		10.09.2024 To 23.09.2024		
4	Dismantle MCCB/ELCB and identify various parts		24.09.2024 To 01.10.2024		
5	Dismantle ACB/VCB and identify different parts.		07.10.2024 To 21.10.2024		
6	Set the plug and time (with PSM, TSM) of induction type electromagnetic relay		22.10.2024 To 12.11.2024		
7	Test electromagnetic over-current relay by performing load test.		18.11.2024 To 02.12.2024		

Reference:—

- 1 Mehta V. K; Rohit Mehta, Principles of Power System, S. Chand and Co., New Delhi., ISBN: 978-81-2192-
2. Rao.Sunil S., Switchgear and Protection, Khanna Publishers, New Delhi, ISBN: 978-81-7409-232-3.
- 3.Singh, R. P., Switchgear and Power System Protection, PHI Learning, New Delhi, ISBN: 978-81-203-3660-
4. Gupta. J. B.. Switchgear and Protection, S. K. Kataria and Sons, New Delhi, ISBN: 978-93-5014-372-8

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Sig. of HOD
