

## ACADEMIC LESSON PLAN OF SUMMER 2024

Discipline: Electrical	Semester: 6 <sup>th</sup> (sec-B)	Name of the Teaching Faculty: LUCKY RANI BEHURIA
Subject: Renewable Energy (TH-4)	No. of days/per week class allotted: 4p/week Tutorial: 1p/week	Semester From: 16 <sup>th</sup> January 2024 to 26 <sup>th</sup> April 2024
Week	Class/week	Theory Topics
1 <sup>st</sup>	1 <sup>st</sup>	1.1. Environmental consequences of fossil fuel use.
	2 <sup>nd</sup>	1.2. Importance of renewable sources of energy.
	3 <sup>rd</sup>	1.3 Sustainable Design and development.
	4 <sup>th</sup>	1.4. Types of RE sources.
	5 <sup>th</sup>	Tutorial
2 <sup>nd</sup>	1 <sup>st</sup>	1.5. Limitations of RE sources
	2 <sup>nd</sup>	1.6. Present Indian and international energy scenario of conventional and RE sources
	3 <sup>rd</sup>	2.1. Solar photovoltaic system-Operating principle.
	4 <sup>th</sup>	2.2. Photovoltaic cell concepts
	5 <sup>th</sup>	Tutorial
3 <sup>rd</sup>	1 <sup>st</sup>	2.2.1. Cell, module, array, Series and parallel connections.
	2 <sup>nd</sup>	2.3. Classification of energy Sources.
	3 <sup>rd</sup>	2.4. Extra-terrestrial and terrestrial Radiation.
	4 <sup>th</sup>	2.5. Azimuth angle, Zenith angle, Hour angle, Irradiance, Solar constant.
	5 <sup>th</sup>	Tutorial
4 <sup>th</sup>	1 <sup>st</sup>	2.6. Solar collectors, Types, and performance characteristics,
	2 <sup>nd</sup>	2.6. Solar collectors, Types, and performance characteristics,
	3 <sup>rd</sup>	2.7. Applications: Photovoltaic - battery charger, domestic lighting, street lighting.
	4 <sup>th</sup>	2.7. Applications: Photovoltaic - water pumping, solar cooker, Solar Pond.
	5 <sup>th</sup>	Tutorial
5 <sup>th</sup>	1 <sup>st</sup>	3.1. Introduction to Wind energy.
	2 <sup>nd</sup>	3.2. Wind energy conversion.
	3 <sup>rd</sup>	3.3. Types of wind turbines
	4 <sup>th</sup>	3.3. Types of wind turbines
	5 <sup>th</sup>	Tutorial
6 <sup>th</sup>	1 <sup>st</sup>	3.4. Aerodynamics of wind rotors.
	2 <sup>nd</sup>	3.5. Wind turbine control systems; conversion to electrical power:
	3 <sup>rd</sup>	3.6. Induction and synchronous generators.
	4 <sup>th</sup>	3.7. Grid connected and self-excited induction generator operation.
	5 <sup>th</sup>	Tutorial
7 <sup>th</sup>	1 <sup>st</sup>	3.8. Constant voltage and constant frequency generation with power electronic control.
	2 <sup>nd</sup>	3.9. Single and double output systems.
	3 <sup>rd</sup>	3.10. Characteristics of wind power plant.
	4 <sup>th</sup>	4.1. Energy from Biomass.
	5 <sup>th</sup>	Tutorial
8 <sup>th</sup>	1 <sup>st</sup>	4.2. Biomass as Renewable Energy Source
	2 <sup>nd</sup>	4.3. Types of Biomass Fuels - Solid, Liquid and Gas.
	3 <sup>rd</sup>	4.3. Types of Biomass Fuels - Solid, Liquid and Gas.
	4 <sup>th</sup>	4.4. Combustion and fermentation.
	5 <sup>th</sup>	Tutorial
9 <sup>th</sup>	1 <sup>st</sup>	4.5. Anaerobic digestion
	2 <sup>nd</sup>	4.6. Types of biogas digester.
	3 <sup>rd</sup>	4.6. Types of biogas digester.
	4 <sup>th</sup>	4.6. Types of biogas digester.
	5 <sup>th</sup>	Tutorial
10 <sup>th</sup>	1 <sup>st</sup>	4.7. Wood gasifier.
	2 <sup>nd</sup>	4.8. Pyrolysis,.
	3 <sup>rd</sup>	4.9. Applications: Bio gas, Bio diesel

	4 <sup>th</sup>	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	5 <sup>th</sup>	Tutorial
11 <sup>th</sup>	1 <sup>st</sup>	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	2 <sup>nd</sup>	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	3 <sup>rd</sup>	5.2. Ocean Thermal Energy Conversion (OTEC).
	4 <sup>th</sup>	5.2. Ocean Thermal Energy Conversion (OTEC).
	5 <sup>th</sup>	Tutorial
12 <sup>th</sup>	1 <sup>st</sup>	5.3. Geothermal Energy – Classification.
	2 <sup>nd</sup>	5.3. Geothermal Energy – Classification.
	3 <sup>rd</sup>	5.3. Geothermal Energy – Classification.
	4 <sup>th</sup>	5.4. Hybrid Energy Systems.
	5 <sup>th</sup>	Tutorial
13 <sup>th</sup>	1 <sup>st</sup>	5.3. Geothermal Energy – Classification.
	2 <sup>nd</sup>	5.4. Hybrid Energy Systems.
	3 <sup>rd</sup>	5.6. Diesel-PV, Wind-PV, Microhydel-PV.
	4 <sup>th</sup>	5.6. Diesel-PV, Wind-PV, Microhydel-PV.
	5 <sup>th</sup>	Tutorial
14 <sup>th</sup>	1 <sup>st</sup>	5.6. Diesel-PV, Wind-PV, Microhydel-PV.
	2 <sup>nd</sup>	5.7. Electric and hybrid electric vehicles.
	3 <sup>rd</sup>	5.7. Electric and hybrid electric vehicles.
	4 <sup>th</sup>	5.7. Electric and hybrid electric vehicles.
	5 <sup>th</sup>	Tutorial
15 <sup>th</sup>	1 <sup>st</sup>	5.4. Hybrid Energy Systems.
	2 <sup>nd</sup>	5.5. Need for Hybrid Systems.
	3 <sup>rd</sup>	Revision - Biomass Power
	4 <sup>th</sup>	Revision - Biomass Power
	5 <sup>th</sup>	Tutorial

*Lucky Rani Behuria*

Signature of Teaching Faculty