

### ACADEMIC SESSION: 2023-24

<b>Discipline: Electrical Engineering</b>	<b>Semester: 6th</b>	<b>Name of the Teaching Faculty: KIRAN KUMAR BHOI</b>
<b>Subject: Renewable Energy</b>	<b>No. of days / week class allotted</b>	<b>Semester From date: 16/01/2024 to 26/04/2024</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory/ Practical Topics</b>
1 <sup>ST</sup>	1 <sup>st</sup>	Environmental consequences of fossil fuel use.
	2 <sup>nd</sup>	Importance of renewable sources of energy.
	3 <sup>rd</sup>	Sustainable Design and development
	4 <sup>th</sup>	Types of RE sources.
2 <sup>ND</sup>	1 <sup>st</sup>	Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources
	2 <sup>nd</sup>	Question discussion
	3 <sup>rd</sup>	Solar photovoltaic system-Operating principle
	4 <sup>th</sup>	Photovoltaic cell concept Cell, module, array, Series and parallel connections
3 <sup>RD</sup>	1 <sup>st</sup>	Array, Series and parallel connections
	2 <sup>nd</sup>	Maximum power point tracking (MPPT).
	3 <sup>rd</sup>	Classification of energy Sources.
	4 <sup>th</sup>	Extra-terrestrial and terrestrial Radiation
4 <sup>TH</sup>	1 <sup>st</sup>	Azimuth angle, Zenith angle, Hour angle, Irradiance, Solar constant.
	2 <sup>nd</sup>	Solar collectors, Types
	3 <sup>rd</sup>	performance characteristics
	4 <sup>th</sup>	Applications: Photovoltaic - battery charger, domestic lighting
5 <sup>TH</sup>	1 <sup>st</sup>	street lighting, water pumping,
	2 <sup>nd</sup>	Solar cooker
	3 <sup>rd</sup>	Solar Pond.
	4 <sup>th</sup>	Question discussion
6 <sup>TH</sup>	1 <sup>st</sup>	Introduction to Wind energy
	2 <sup>nd</sup>	Wind energy conversion



	3 <sup>rd</sup>	Types of wind turbines
	4 <sup>th</sup>	Aerodynamics of wind rotors.
7 <sup>TH</sup>	1 <sup>st</sup>	Wind turbine control systems;
	2 <sup>nd</sup>	conversion to electrical power:
	3 <sup>rd</sup>	Induction and synchronous generators
	4 <sup>th</sup>	Grid connected and self excited induction generator operation.
8 <sup>TH</sup>	1 <sup>st</sup>	. Constant voltage and constant frequency
	2 <sup>nd</sup>	Generation with power electronic control.
	3 <sup>rd</sup>	Single and double output systems
	4 <sup>th</sup>	Characteristics of wind power plant.
9 <sup>TH</sup>	1 <sup>st</sup>	Question discussion
	2 <sup>nd</sup>	Energy from Biomass
	3 <sup>rd</sup>	Biomass as Renewable Energy Source
	4 <sup>th</sup>	Types of Biomass Fuels
10 <sup>TH</sup>	1 <sup>st</sup>	Solid, gas, liquid
	2 <sup>nd</sup>	Combustion and fermentation
	3 <sup>rd</sup>	Anaerobic digestion
	4 <sup>th</sup>	Types of biogas digester
11 <sup>TH</sup>	1 <sup>st</sup>	Wood gassifier.
	2 <sup>nd</sup>	Pyrolysis
	3 <sup>rd</sup>	Applications: Bio gas
	4 <sup>th</sup>	Bio diesel
12 <sup>th</sup>	1 <sup>st</sup>	Question discussion
	2 <sup>nd</sup>	Tidal Energy: Energy from the tides
	3 <sup>rd</sup>	Barrage and Non-Barrage Tidal power systems.
	4 <sup>th</sup>	Ocean Thermal Energy Conversion (OTEC)
13 <sup>th</sup>	1 <sup>st</sup>	Types of Ocean Thermal Energy Conversion (OTEC)
	2 <sup>nd</sup>	Geothermal Energy
	3 <sup>rd</sup>	Classification
	4 <sup>th</sup>	Question discussion



14 <sup>th</sup>	1 <sup>st</sup>	Hybrid Energy Systems.
	2 <sup>nd</sup>	Need for Hybrid Systems
	3 <sup>rd</sup>	Diesel-PV
	4 <sup>th</sup>	Wind-PV
15 <sup>th</sup>	1 <sup>st</sup>	Microhydel-PV
	2 <sup>nd</sup>	Electric vehicles.
	3 <sup>rd</sup>	Hybrid electric vehicles.
	4 <sup>th</sup>	Question discussion

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