

SUBJECT-Th4. RENEWABLE ENERGY SYSTEMS				
APRIL	UNIT-I	1. Introduction to Renewable energy:	5	
		1.1. Environmental consequences of fossil fuel use.		
		1.2. Importance of renewable sources of energy.		
		1.3. Sustainable Design and development.		
		1.4. Types of RE sources.		
		1.5. Limitations of RE sources.		
		1.6. Present Indian and international energy scenario of conventional and RE sources		
APRIL	UNIT-II	2. Solar Energy:	15	
		2.1. Solar photovoltaic system-Operating principle.		
		2.2. Photovoltaic cell concepts		
		2.2.1. Cell, module, array, Series and parallel connections. Maximum power point tracking (MPPT).		
		2.3. Classification of energy Sources.		
		2.4. Extra-terrestrial and terrestrial Radiation.		
		2.5. Azimuth angle, Zenith angle, Hour angle, Irradiance, Solar constant.		
		2.6. Solar collectors, Types and performance characteristics,		
		2.7. Applications: Photovoltaic - battery charger, domestic lighting, street lighting, water pumping, solar cooker, Solar Pond.		
MAY	UNIT-III	3. Wind Energy:	12	
		3.1. Introduction to Wind energy.		
		3.2. Wind energy conversion.		
		3.3. Types of wind turbines		
		3.4. Aerodynamics of wind rotors.		
		3.5. Wind turbine control systems; conversion to electrical power:		
		3.6. Induction and synchronous generators.		
		3.7. Grid connected and self excited induction generator operation.		
		3.8. Constant voltage and constant frequency generation with power electronic control.		
		3.9. Single and double output systems.		
		3.10. Characteristics of wind power plant.		
MAY	UNIT-IV	4. Biomass Power:	12	
		4.1. Energy from Biomass.		
		4.2. Biomass as Renewable Energy Source		
		4.3. Types of Biomass Fuels - Solid, Liquid and Gas.		
		4.4. Combustion and fermentation.		
		4.5. Anaerobic digestion.		
		4.6. Types of biogas digester.		
		4.7. Wood gassifier.		

		4.8. Pyrolysis,.		
		4.9. Applications: Bio gas, Bio diesel		
JUNE	UNIT-V	5. Other Energy Sources	16	
		5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.		
		5.2. Ocean Thermal Energy Conversion (OTEC).		
		5.3. Geothermal Energy – Classification.		
		5.4. Hybrid Energy Systems.		
		5.5. Need for Hybrid Systems.		
		5.6. Diesel-PV, Wind-PV, Microhydel-PV.		
		5.7. Electric and hybrid electric vehicles.		