ME292: Non-Conventional Energy Resources

Teaching Scheme			Credits	Marks Distribution				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	0	0	3	70	30	0	0	100

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	**Introduction:** Energy Consumption & Standard of living, Forms of Energy, Classification of Energy Resources, Application of non-conventional energy sources, Energy scenario.	04
2	**Solar Energy:** Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, Solar air heaters-types, solar driers, storage of solar energy-thermal storage, solar pond , solar water heaters, solar distillation, solar still, solar cooker, solar heating & cooling of buildings, photo voltaic - solar cells & its applications.	05
3	**Wind Energy:** Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.	05
4	**Biomass Energy:** Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration, filling a digester for starting, maintaining biogas production, Fuel properties of bio gas, utilization of biogas.	05

5	**Geothermal Energy:** Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.	05
6	**Ocean Energy:** Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations. Ocean Thermal Energy-Availability, theory and working principle, performance and limitations.	05
7	**Magneto Hydrodynamic Power Conversion:** Principle of working of MHD Power plant, performance and limitations. THERMOELECTRIC POWER CONVERSION & THERMIONIC POWER CONVERSION- Principle of working, performance and limitations.	04
8	**Fuel Cell:** Principle of working of various types of fuel cells and their working, performance and limitations. HYDROGEN ENERGY- Hydrogen Production methods, Hydrogen storage, hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles.	04
9	**Energy Conservation And Management:** Energy economics, energy conservation, energy audit, general concept of total energy system, scope of alternative energy system in India.	03
	Total Hrs.	**40**

Reference Books:

1. G. D. Rai, "*Non-Conventional Energy Sources*", 4th Edition, Khanna Publishers, 2000.
2. S.P.Sukhatme, "*Solar Energy*", 3rd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2008.

3. B H Khan, "Non-*Conventional Energy Resources*", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
4. S.Hasan Saeed and D.K.Sharma, "*Non-Conventional Energy Resources*", 3rd Edition, S.K.Kataria & Sons, 2012.
5. G.N.Tiwari and M.K.Ghosal, "*Renewable Energy Resource: Basic Principles and Applications*", Narosa Publishing House, 2004.