

ME371: NON-CONVENTIONAL ENERGY SOURCES
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To exploit renewable energy resources and effective technologies.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				Total Marks
L	T	P		Theory		Practical		
			ESE	CE	ESE	CE		
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	<u>INTRODUCTION:</u> Energy Consumption & Standard of living, Forms of Energy, Classification of Energy Resources, Application of non-conventional energy sources, Energy scenario.	04
2	<u>SOLAR ENERGY:</u> 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.	10
3	<u>WIND ENERGY:</u> 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

Unit No.	Topics	Teaching Hours
4	<p><u>BIOMASS ENERGY:</u></p> <p>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.</p>	08
5	<p><u>GEOHERMAL ENERGY:</u></p> <p>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</p> <p><u>OCEAN ENERGY:</u>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.</p>	10
6	<p><u>MISCELANEOUS TECHNOLOGIES:</u></p> <p><u>Magneto hydrodynamic power conversion :</u></p> <p>Principle of working of MHD Power plant, performance and limitations.</p> <p>THERMOELECTRIC POWER CONVERSION & THERMIONIC POWER CONVERSION- Principle of working, performance and limitations.</p> <p><u>Fuel cell :</u></p> <p>Principle of working of various types of fuel cells and their working, performance and limitations</p> <p>HYDROGEN ENERGY- Hydrogen Production methods, Hydrogen storage, hydrogen transportation, utilization of hydrogen gas, hydrogen as alternative fuel for vehicles.</p>	05
TOTAL		42

List of References:

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

Course Outcomes (COs):

At the end of this course students will be able to ...

1. Identify energy demand and relate with available energy resources
2. Analyze harnessing of solar energy.
3. Analyze harnessing of wind energy
4. Analyze harnessing of Biomass energy
5. Analyze harnessing of Geothermal and Ocean energies.
6. Analyze Magneto hydrodynamics and Fuel cell technology.