

GUJARAT TECHNOLOGICAL UNIVERSITY

Mechanical Engineering

B. E. SEMESTER: VI

Subject Name: **Alternate Energy Sources**

Subject Code: **161904**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	0	3	70	30	50

Sr. No.	Course Content	Total Hrs.
1.	Introduction: Man and energy, energy forms, World's and India's production and reserves of energy, Global and national energy scenarios, Need for alternate sources.	03
2.	Solar Energy: Solar geometry, extraterrestrial radiation, spectral distribution, solar radiation at the earth's surface, earth-sun angles, derived solar angles, sunrise, sunset and day length,	03
	2.1 Instruments for solar radiation measurements, estimation of average solar radiation, radiation on tilted surface. Solar collectors material, types and performance analysis,	03
	2.2 Collector efficiency, overall loss coefficient, collector efficiency factor, solar air heaters- types, performance, applications, focusing collector and its types, tracking, performance, non-focusing type collectors, CPC, optical losses.	03
3.	Applications of Solar Energy: Solar water heaters, heating and cooling of buildings, solar pumping, solar cooker, solar still, solar drier, solar refrigeration and A/C, solar pond, solar power plant, heliostat, solar furnace, solar chimney power plant, photovoltaic system for power generation, solar cell modules and arrays, solar cell types, material, applications, advantages and disadvantages.	04
4.	Wind Energy: Introduction, power in wind, power coefficient, wind mills-types, design consideration, performance, site selection, advantages and disadvantages, applications, wind energy development in India.	03

5.	Biogas and Biomass: Introduction, types of biogas plants, biogas generation, factors affecting biogas generation, design consideration, advantages and disadvantages	04
	5.1 site selection, applications, scope of biogas energy in India, biomass energy, energy plantation, gasification, types and application of gasifiers, design of gasifiers,	02
6.	Ocean Energy Introduction, OTEC principle, open cycle OTEC system, closed cycle, hybrid cycle, site selection.	03
	6.1 Energy from tides, estimation of tidal power, tidal power plants, single basin, double basin, site requirements, advantages and limitations,	03
	6.2 wave energy, wave energy conversion devices, advantages and disadvantages, small scale hydro power	03
7.	Geothermal Energy: Introduction, vapour dominated system, liquid dominated system, binary cycle, hot dry rock resources, magma resources, advantages and disadvantages, applications, geothermal energy in India: prospects	04
8.	MHD Power Plants: Introduction, Principle of MHD power generation, open cycle plant, closed cycle plant, liquid metal system, advantages of MHD plants	03
9.	Energy Management: Energy economics, energy audit, energy conservation, cogeneration, waste heat recovery, concept of total energy system, combined cycle plant, energy management, scope of alternate energy sources in India	04

Text Books:

1. Non- Conventional Energy Source by G. D. Rai , Khanna Pub.
2. Solar Energy by S. P. Sukhatme , Tata Mc Graw Hill Pub
3. Non conventional energy resources by B. H. Khan Tata Mcgraw Hill Pub
4. Principles of Solar Energy / Frank Krieth & John F Kreider John Wiley & sons, New York.

Reference books

1. Solar Energy : Fundamentals and Applications by H.P. Garg & Jai Prakash, TataMcGraw Hill
2. Solar Engineering of Thermal Processes by J.A. Duffic and W.A.Beckman, John Wiley & sons, New York.
3. Alternate energy sources and application by N.K .Giri Khanna Pub
4. Non conventional energy sources by Raja et.al. Scitech Publications Chennai