

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL ENGINEERING

B. E. SEMESTER: VII

Subject Name: **Energy Technology (Department Elective-I)**

Subject Code: **170505**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	An Introduction to Energy Sources energy sources (conventional & non-conventional), renewable energy resources, primary & secondary energy sources, energy chain, energy demand, national energy strategy & plan, energy management, energy audit & conservation	2
2.	Definitions, Units & Measures proximate & ultimate analysis, calorific values, rank of coal, coking & caking, gasification, basis for reporting results of analysis, units & conversion factors	4
3.	Solid Fuels wood & charcoal, peat, lignite, sub-bituminous & bituminous coals, semi-anthracite and anthracite coals, cannel & boghead coal, origin of coal, composition of coal, analysis & properties of coal, problems	6
4.	Processing of Solid Fuels coal preparation, washability curve, dry & wet washing methods of coal, washer efficiency, gasification & liquefaction of solid fuels, problems	6
5.	Solar Energy solar constant, solar radiation & related terms, measurement of solar radiation, solar energy collectors – flat plate collector, air collector, collectors with porous absorbers, concentrating collectors, applications & advantages of various collectors, selective absorber coatings, solar energy storage systems (thermal, electrical, chemical & mechanical), solar pond,	6

	applications of solar energy	
6.	Wind Energy basic principles, power in wind, force on blades & turbines, wind energy conversion, site selection, basic components of wind energy conversion systems (WECS), classification of WECS, wind energy collectors, applications of wind energy	6
7.	Energy from Biomass introduction, energy plantation, biomass conversion technologies, photosynthesis, biogas generation, factors affecting biogas generation, classification of biogas plants & their comparisons, types of biogas plants (including those used in India), biogas from plant wastes, community plants & site selection, digester design considerations, design calculations, methods of maintaining & starting biogas plants, properties & utilisation of biogas, thermal gasification of biomass, pyrolysis, alternative liquid fuels	6
8.	Geothermal Energy geothermal resources, hydrothermal resources, liquid dominated systems, geopressured resources, petrothermal systems, magma resources, energy conservation & comparison with other resources, applications of geothermal energy	6
9.	Energy from Oceans OTEC, methods (open cycle & close cycle) energy from tides, components of tidal power plants, operation, methods of utilisation of tidal energy, storage, ocean waves, wave energy conversion devices	6
10.	Fuel Cell introduction, hydrogen – oxygen fuel cell, ion exchange membrane cell, fossil fuel cell, molten carbonate cell, advantages & disadvantages, conversion efficiency, polarisation, type of electrodes, applications of fuel cells	6
11.	Hydrogen & Methanol properties of Hydrogen, production of hydrogen, thermochemical methods, fossil fuel methods, solar methods, storage & transportation, safety & management	6
12.	Magneto Hydro-Dynamic (MHD) Power Generation principle, MHD system, open cycle system, closed cycle system, design problems & developments, advantages, materials for MHD generators, magnetic field & super conductivity	6

13.	Nuclear Energy fission, fusion, fuel for nuclear fission reactor (exploration, mining, milling, concentrating, refining, enrichment, fuel fabrication, fuel use, reprocessing, waste disposal), storage & transportation, fast & slow neutrons, multiplication factors & reactor control, uranium enrichment process, nuclear reactor power plant, fast breeder reactor, boiling water reactor, pressurised heavy & light water reactor	6
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Practical and Term Work:

Experiments based on above topics should be given to the students.

Text Book:

1. Energy Sources 2nd Ed. by G. D. Rai, Khanna Publications, New Delhi

Reference Books:

1. Fuels & combustion by Samir Sarkar, Orient Longmans(1974)
2. Solar Energy by Sukatame, Tata McGraw Hill, New Delhi
3. Energy Technology by Rao & Parulaker