PARUL UNIVERSITY - Faculty of Engineering and Technology

Department of Mechanical Engineering

SYLLABUS FOR 5th Sem BTech PROGRAMME

Renewable Energy Sources (203109346)

Type of Course: BTech

Prerequisite: Basic knowledge of Renewable energy sources such as geothermal, wind, solar, ocean and bio-energy.

Rationale: This course develops fundamental understanding about the need for renewable energy sources and energy scenario of a country. Students will learn the concepts about renewable energy sources like solar energy, wind energy, energy from biomass, geothermal energy, energy from the ocean.

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					Total
				External		Internal			
Lect Hrs/ Week	Tut Hrs/ Week	Lab Hrs/ Week		T	P	T	CE	P	
2	0	0	2	60	-	20	20	-	100

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical, **CE** - CE, **T** - Theory, **P** - Practical

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	**Introduction**: Thermodynamic laws related to Energy and Power, Energy conversion and unit system. Brief history and need of renewable energy,Global and National scenarios, Prospects of renewable energy sources.	10%	3
2	**Solar Energy**: Solar Radiation Geometry, Solar radiation - Outside the earth atmosphere and at earth surface, Instruments for measurement of solar radiation and sunshine, local solar time, derived solar angles, sunrise, sunset and day length. Non concentrating collectors, Solar air heaters-types, solar driers, storage of solar energy-thermal storage, solar pond, solar water heaters, solar distillation and solar still, solar cooker, solar heating & cooling of buildings, photo voltaic - solar cells & its applications.	35%	10
3	**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.	17%	5
4	**Bio Energy**: Introduction, types of biogas plants, biogas generation, factors affecting biogas generation, design consideration, advantages and disadvantages, site selection, applications, scope of biogas energy in India, biomass energy, energy plantation.	13%	4

5	**Ocean Energy**: Introduction, OTEC principle, open cycle OTEC system, closed cycle, hybrid cycle, site selection, Energy from tides, estimation of tidal power, tidal power plants, single basin, double basin, site requirements, advantages and limitations, wave energy, wave energy conversion devices, advantages and disadvantages, small scale hydro power.	12%	4
6	**Geothermal Energy**: Introduction, Vapor dominated system, Liquid dominated system, Binary Cycle, Hot Dry Rock resources, Magma Resources, Geothermal Energy in India.	13%	4

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Renewable Energy Sources and Emerging Technologies
   D.P Kothari , K.C. Singal ,Rakesh Ranjan.; PHI Publication
2. Non-Convectional Resources
   G.S.Sawhney; PHI Publication
3. Non Conventional Energy Sources
   G. D. Rai; khanna publishers; fifth, 2012
4. Solar Energy: Principles of Thermal Collections and Storage
   S.P. Sukhatme; McGraw Hill Publishing Co.

Course Outcome:

After Learning the course the students shall be able to:

1. List out different renewable energy sources: solar energy, wind energy, bio-energy, tidal energy, ocean thermal energy, geothermal energy, etc.
2. Evaluate different energy production methods: solar energy, wind energy, bio energy etc.
3. Discuss the key aspects of renewable energy sources: solar energy, wind energy, bio-energy, tidal energy, geothermal energy etc.
4. Describe various applications of solar energy, wind energy, bio-energy, tidal energy, ocean thermal energy, geothermal energy, etc.
5. Calculate energy conversion methods used for solar energy, wind energy and bio-energy.