

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Physics)
Semester: III
Syllabus with Effect from: June - 2014

Paper Code: PS03EPHY08		Total Credit: 4
Title Of Paper: Wind Energy & Ocean Energy		
Unit	Description in detail	Weightage (%)
I	Introduction to wind energy, Application of wind energy and historical background, Merits and limitations of wind energy conversions, Nature of wind and origin of wind, Wind energy quantum and variables in wind energy conversion systems, Wind power density, Power in a wind stream, Wind turbine efficiency, Power of a wind turbine for given incoming wind velocity. Forces on the blades of a propeller, Wind velocities and height from ground and site selection, Examples of wind farm site, Mean wind velocity, and wind velocity duration curve, Energy pattern factor and wind power duration characteristics	25%
II	Introduction to wind turbine generator and terms and definitions, Types and characteristics of wind turbine generators, Horizontal axis propeller type wind turbine generator, Three blade HAWT. Dimensioning of HAWT, Vertical axis wind turbines, Vertical axis-Darreis rotor wind turbine, Vertical axis wind turbine with H-rotor, Wind turbine rotor speeds, Practical P.V. characteristics, Power coefficients versus tip speed ratio for various types of wind turbines, Operation and control of wind turbine generator unit, Wind to electrical energy conversion system, Power versus velocity characteristics of WTG unit	25%
III	Advantages and limitations of ocean energy conversion technologies, Introduction to the ocean wave energy conversion, Ocean waves and parameters of a progressive wave, Equation of a progressive and energy and power ocean waves, Summary of equations, Motion of water particles in the wave and wave data collection. Wave machine, Dolphin-buoy type ocean wave energy converter, Three-raft energy converter – Nodding Duck oscillating cam wave machine – ring-cam roller follower design, Oscillating hydraulic piston-accumulator wave machine-oscillating hydraulic piston wave energy pumped storage plant – Dam-Atoll wave machine.	25%
IV	Forces on the wave machines and associated structures-mooring systems-recent advances in ocean wave energy technology, some recent wave machine concepts, Merits of ocean wave energy – limitations and demerits of wave energy and wave energy plants. Introduction to the tidal energy conversion- tidal currents- tidal energy conversion, Tidal power – average theoretical power per tide-ocean tidal energy schemes-terms and definitions, Single basin tidal schemes – double basin schemes and multi-basin schemes.	25%

Basic Text & Reference Books:-

- Energy Technology (Non conventional, Renewable and conventional) By S. Rao and Dr. P. B. Perulkar
- Solar Energy conversion, An introductory course By A. E. Dikon and J. D. Loslie
- Photoelectrochemical Solar Cells By Suresh Chandra
- Principles of Energy Conversion By Archie W. Cupl. Jr.

