Course Number and Name
BGE002 – WIND AND SOLAR ENERGY
Credits and Contact Hours
3&45
Course Coordinator's Name
Dr.Shanmuganandh
Text Books and References

TEXTBOOKS:

1. Rai G.D. , Non – Conventional sources of energy, Khanna Publications, 4th edition, 2004.

REFERENCES:

1. David M. Eggleston and Forrest S.Stoddard, Wind Turbine Engineering Designing – Van Noustrand 1987.
2. Le Gouries D, Wind Power Plants, Theory and Design - Permagon Press, 1982.
3. Putnam Palmer C., Power from Wind – Van Noustrand, 1984.
4. www.global-greenhouse-warming.com/**renewable-energy-eBooks**.html

Course Description
To equip students with adequate knowledge on the need for alternate energy sources, Potential of solar and wind options

Prerequisites	Co-requisites
BME	NEW AND RENEWABLE SOURCES OF ENERGY
required, elective, or selected elective (as per Table 5-1)	
Non Major elective	

Course Outcomes (COs)	
CO1	Student learns about modelling of wind rotor
CO2	Student learns the wind rotor design
CO3	Student learns the speed control
CO4	Student learns the use of solar energy in the far future
CO5	Student learns the installation methods for solar panel
CO6	Student understands the use of voltaic cell

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	H											
CO2			H		L				H		L	
CO3	H					M						
CO4			H		L		M					L
CO5									H			
CO6	H				L							L

List of Topics Covered

UNIT I WIND ROTOR AND ITS MODELING 9

Scope of wind power, wind turbine design- Approach elementary aerodynamic models for rotors, Ranking-Fronde actuator disc theory- Wake rotation ,two dimensional air foil theory, Glauert momentum vortex theory-Optimal rotor – Modification, Experimental verification of aero dynamic model.

UNIT II WIND ROTOR DESIGN AND PERFORMANCE ESTIMATION 9

Wind model rotor sizing- Rotor specification, Rotor design – Number of blades, blade design. Performance estimation, sitting economics of wind power.

UNIT III 9

General requirements, synchronous generators, Induction generators-Squirrel cage-Variable speed-Wound rotor-Resistance controlled-with cyclone converter-practical aspects. Speed control-Stall and Pitch control-Electronic control, power control, Electrical cut-in.

UNIT IV SOLAR ENERGY 9

Principle of conversion of solar radiation into heat, types of solar thermal collectors-Flat plate and concentrating collectors(parabolic, trough, Minor ,strip, Fresnel lens and compound parabolic concentrator),compression of collectors selective absorber coating, solar thermal power plant.

UNIT V SOLAR ENERGY STORAGE AND APPLICATIONS 9

Solar energy storage systems-Thermal, Electrical, Chemical, Mechanical and Electro-magnetic, Solar pond. Applications of solar energy-Solar thermo electric conversion-Solar photo voltaic, Solar heating and cooling of buildings, Solar distillation, Solar pumping and terrestrial application. System of solar cell power plant-direct grid connection through electronic control devices.