

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NEED514	Renewable Energy Resources	3	0	0	3

Course Objective
<ul style="list-style-type: none"> The prime objective for installing renewable energy sources is to advance economic development, recover energy security, advance access to energy sector, and mitigate climate change problem. In this review, the various obstacles faced by the renewable sector are to be identified and accordingly it will be solved.
Learning Outcomes
<p>Upon successful completion of this course, students will develop:</p> <ul style="list-style-type: none"> Importance of renewable energy resources and their types Understanding basic design and working principle behind small hydro, solar, biomass, wind energy systems and other.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction: Energy sources & demand in different sectors, Conventional & Non-conventional energy sources; Importance of new and renewable energy sources in the present energy scenario and type of resources.	5	Information about the Importance of new and renewable energy sources in the present energy scenario and type of resources
2	Small Hydro Power Plant: Small hydro power potential and classification of SHP projects; Basic components of civil works; Selection of electro-mechanical equipment; mini/micro-hydel, Pump-storage plant and electric power generation from tidal Energy.	8	Knowledge about the mini/micro-hydel, Pump-storage plant and electric power generation from tidal Energy
3	Biomass: Estimation of Biomass resources, Biomass Technologies for thermal and biological conversion; Biomass based Electricity Generation and application of bio-fuels.	8	The method of handling Biomass Technologies for thermal and biological conversion.
4	Solar Energy: Solar Energy estimation and different routes of solar energy applications; Technologies for solar thermal power generation and Storage; Photovoltaic power generation system; Applications.	8	Appropriate development of PV Technologies and solar thermal power generation and Storage
5	Wind Energy: Estimation of wind energy potential and site selection; Types of wind mills, their basic characteristics and applications; Recent Technologies of wind energy conversion system (WECS), wind farms.	8	Appropriate development of Recent Technologies of wind energy conversion system (WECS), wind farms
6	Other Renewable Energy Sources: Ocean energy-potential, method of harnessing; Geothermal Energy; New technologies for renewable energy; Integrated renewable energy systems.	5	After the successful completion, student will get idea of Other Renewable Energy Sources.
Total Contact Hours		42	

Text Books:

1. D. D. Hall and R. P. Grover, "Biomass Regenerable Energy", John Wiley, New York, 1987.
2. J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", second edition, John Wiley, New York, 1991
3. J. Twidell and T. Weir, "Renewable Energy Resources", E & F N Spon Ltd, London, 1986.

Reference Books:

1. Lysen, "Introduction to Wind Energy", Georgia Institute.
2. ICIMOD, "Small Hydro Design Manual", Vol. I to IV, AHEC Publication.
3. Godfrey Boyle, (Editor) "Renewable Energy Power for a Sustainable Future", 2nd Edition, Oxford University Press.
4. Sukhatme, S.P., "Solar Energy Principles of Thermal Collection and Storage", 2nd Edition, Tata McGraw Hill.
5. Clare, R., "Tidal Power: Trends and Development", Thomas Telford.
6. Goswami, F. Kreith and J. F. Kreider, Principles of Solar Engineering, Taylor and Francis, Philadelphia, 2000.