OPEN ELECTIVE COURSES

22EEOE01	RENEWABLE ENERGY SOURCES		SEMESTER			VI
PREREQUISTIES		**CATEGORY**	**OE**	**Credit**		**3**
Basic Electrical and Electronics Engineering		**Hours/Week**	**L**	**T**	**P**	**TH**
			3	**0**	**0**	**3**
Course Objectives:						
1.	To impart knowledge on the different renewable energy sources and technologies.					
UNIT I	**INTRODUCTION**		**9**	**0**	**0**	**9**
World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilization – Renewable Energy Scenario in Tamil Nadu, India and around the World – Potentials – Achievements / Applications – Economics of Renewable Energy Systems.						
UNIT II	**SOLAR ENERGY**		**9**	**0**	**0**	**9**
Solar Radiation – Measurements of Solar Radiation – Flat Plate and Concentrating Collectors – Solar Direct Thermal Applications – Solar Thermal Power Generation – Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.						
UNIT III	**WIND ENERGY**		**9**	**0**	**0**	**9**
Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects.						
UNIT IV	**BIO – ENERGY**		**9**	**0**	**0**	**9**
Biomass Direct Combustion – Biomass Gasifiers – Biogas Plants – Digesters – Ethanol Production – Bio Diesel – Cogeneration – Biomass Applications.						
UNIT V	**OTHER RENEWABLE ENERGY SOURCES**		**9**	**0**	**0**	**9**
Tidal Energy – Wave Energy – Open and Closed Ocean Thermal Energy Conversion(OTEC) Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage – Fuel Cell Systems – Hybrid Systems.						
Total (45L+0T) = 45 Periods						

Text Books:	
1.	Rai. G.D., "Non-Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.
2.	Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.
3.	Godfrey Boyle, "Renewable Energy, Power for A Sustainable Future", Oxford University Press, U.K., 1996.
Reference Books:	
1.	Chetan Singh Solanki, Solar Photovoltaics, "Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2009.
2.	Tiwari. G.N., Solar Energy – "Fundamentals Design, Modelling & Applications", Narosa Publishing House, New Delhi, 2002.
3.	Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.
4.	Johnson Gary, L. "Wind Energy Systems", Prentice Hall, New York, 1985
5.	David M. Mousdale – "Introduction to Biofuels", CRC Press, Taylor & Francis Group, USA 2010

Course Outcomes: Upon completion of this course, the students will be able to:			**Bloom's Taxonomy Mapped**
CO1	:	Recall the available renewable Energy Sources	L1: Remembering
CO2	:	Illustrate the types of generators.	L4: Analysing
CO3	:	Apply different types of mechanism for energy conversion.	L3: Applying
CO4	:	Analyze the benefits and challenges in harnessing renewable Energy.	L4: Analysing
CO5	:	Recognize and apply appropriate renewable energy sources.	L2: Understanding

COURSE ARTICULATION MATRIX

COs/ POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	3	1	1	3	1	1	1	1	1	1	1	1	2	1	1
CO3	1	2	2	1	1	1	1	1	1	1	1	1	2	1	1
CO4	3	1	1	3	2	1	1	1	1	1	1	1	2	1	1
CO5	2	1	1	2	1	1	2	1	1	1	1	1	2	1	1
Avg	2.2	1.2	1.2	2	1.4	1	1.2	1	1	1	1	1	1.7	1.2	1

3/2/1-indicates strength of correlation (3- High, 2-Medium, 1- Low)