DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	**RENEWABLE POWER GENERATION TECHNOLOGIES**		
Course Code	**EE673**	**No. of Credits**	**03**
Department	**EEE**	**Faculty**	**Dr. P. Srinivasa Rao Nayak**
Pre-requisites Course Code	**Basic Electronics and Machines, Power Electronics**		
Course Coordinator(s) (if, applicable)			
Other Course Teacher(s)/Tutor(s) E-mail	**---**	**Telephone No.**	**0431-2503269**
Course Type	☐ **Core course**	☑ **Elective course**	

COURSE OVERVIEW

Students get exposure to the fundamental of solar energy and PV cell. Further they will be exposed to design and analysis of PV system for grid connected and standalone applications with battery and without battery. Students will understand the significance of wind technology and its energy conversion systems. Hybrid energy systems such as wind-diesel, Wind-PV, Geothermal-tidal etc. are also focused in this course.

COURSE OBJECTIVES

This course makes the student to aware of various forms of renewable energy and to understand in detail the wind energy conversion system and photovoltaic conversion system.

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**

Upon completion of the course, the students will be able to

1. Appraise the need and possibility of extracting solar energy and converting into electrical energy using PV cell.
2. Design and analyze stand-alone and grid connected PV system.
3. Describe the dynamics of wind turbine and electrical generator.
4. Select and design suitable configuration of the wind energy conversion system based on application.
5. Suggest, design and analyze hybrid energy systems.

CO no.	PO 1	PO 2	PO 3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
1	M	L	M	H	H	M	M	L	NA	NA	L	M	M	M
2	L	L	H	H	H	H	M	H	NA	M	M	H	M	L
3	M	L	M	H	M	M	H	M	M	H	M	M	M	L
4	M	L	M	M	L	M	H	H	NA	M	M	M	L	M
5	H	M	H	H	M	M	M	H	L	H	M	M	H	M

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1	Weeks 1 to 2 (6 contact hours)	Basics of solar radiation,PV cell, equivalent circuit and PV module and array	Lecture C&T/ PPT or any suitable mod
2	Weeks 3 to 5 (8 contact hours)	PV System design for Standalone and grid- connected applications, Maximum Power Point Tracking	Lecture C&T/ PPT or any suitable mod
3	Week 5 (1 contact hours)	numerical examples/ problem solving	Group work (exercise)
4	Weeks 6 to 7 (6 contact hours)	Wind energy- energy in the wind- rotor types, tower - control and monitoring system- power speed characteristics	Lecture C&T/ PPT or any suitable mod
5	Weeks 8 to 10 (8 contact hours)	Performance analysis of Wind turbine generator systems with various generator at fixed and variable speed	Lecture C&T/ PPT or any suitable mod
6	Week 10 (1 contact hours)	numerical examples/ problem solving	Group work (exercise)
7	Weeks 11 to 12 (6 contact hours)	Hybrid energy systems	Lecture C&T/ PPT or any suitable mod

Mode of Assessment

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	1st Mid Semester Examination (Written test) (1st and 2nd Units)	6th Week	60 Minutes	20
2	2nd Mid Semester Examination (Written test) (3rd and 4th Units)	11th Week	60 Minutes	20
3	Take Home / Team Task	3rd to 11th week	Work will be carried out along with the course	10
4	Retest (Written Test) (1st to 4th Unit)	12th week	60 Minutes	20
5	End Semester Examination (Written test)	14th week	180 Minutes	50

Note:

1. **Attending all the assessments (Assessment 1-3 and 5) are MANDATORY for every student.**

2. **If any student is not able to attend Assessment-1 (1st Mid Sem) / Assessment-2 (2nd Mid Sem) due to genuine reason, student is permitted to attend the Assessment- 4 (retest) with 20% weightage (20 marks).**

3. **In any case, retest will not be considered as an improvement test.**

ESSENTIAL READINGS :

Text Books:

1. *G.D. Rai, 'Non- Conventional Energy Sources, Khanna Publishers, 4th Edition, 2005.*
2. *Kishore VVN, 'Renewable Energy Engineering and Technologies', TERI, 2009.*

Reference Books:

1. *Chetan Singh Solanki, 'Solar Photovoltaics -Fundamentals, Technologies and Applications', PHI Learning Pvt. Ltd., New Delhi, 2011*
2. *Van Overstraeton and Mertens R.P., 'Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol,1996.*
3. *John F.Walker& Jenkins. N , 'Wind energy Technology', John Wiley and sons, Chichester, UK, 1997.*
4. *Freries LL ,'Wind Energy Conversion Systems', Prentice Hall, U.K., 1990*

COURSE EXIT SURVEY

Shall be obtained at the end of the course

COURSE POLICY

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum 75 % physical attendance in these contact hours to attend the end semester examination.

2. Any student, who fails to maintain 75% attendance need to appear for the retest. Student who scores more than 50 % marks in the retest will be eligible for attending the end semester examination.

3. Students not having 75% minimum attendance at the end of the semester and also fail in retest (scoring less than 50%) will have to RE-DO the course.

ACADEMIC HONESTY & PLAGIARISM

1. Copying in any form during assessments is considered as academic dishonesty and will attract suitable penalty.

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** 25/7/17 **HOD** 26/07/2017