MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

		Department	of Electrical and El	ectronics E	Engineering						
Name of the	he Subject	Renewable Energy Systems (RES)			Name of the Mr. C. Venkatesh						
Sub	bject Code	EE8703		7	Year / Sem IV/V	m IV/VII					
A	Acad Year	2022 - 2023		Batch 2019	- 2023						
			Course Obje	ctive	•						
To impart l	knowlwdg	e on the following topics									
Awarness a	about rene	wable energy sources and technologies									
Adequate i	inputs on a	variety of issues in harnessing renewable end	ergy								
Recognize	current an	d possible future role of renewable energy so	urces								
			Course Outo	ome							
CO1 : Abil	lity to creat	te awarness about renewable energy sources a	and technologies.								
		dequate inputs on a variety of issues									
		nize current and possible future role of renew	vable energy sources.								
		in the various renewable energy resources an			•						
CO4: Abili		III LIIC VALIOUS TEHEWADIC CHELLY TESOUICES AH	a technologies and tr	ieir abblicai	ions						
				ен аррисан	ions						
		rstand basics about biomass energy and Fuel			ions						
			Cells				<u> </u>				
			Cells Lesson Pla		Mode of Teach (BB / PPT / NP' / MOOC / etc	TEL Blooms Level (L1-	со	PO			
CO5: Abili		rstand basics about biomass energy and Fuel Topic(s)	Cells Lesson Pla T / R*	Periods Required	Mode of Teach (BB / PPT / NP / MOOC / etc	TEL Blooms Level (L1-	СО	РО			
CO5: Abili	ity to under	rstand basics about biomass energy and Fuel Topic(s)	Cells Lesson Pla T / R* Book	Periods Required	Mode of Teach (BB / PPT / NP / MOOC / etc	TEL Blooms Level (L1-	CO	PO PO1			
Sl. No.	Classifica	Topic(s) UNIT I REN tion of energy sources uental consequences of fossile fuel use -	Cells Lesson Pla T / R* Book	Periods Required	Mode of Teach (BB / PPT / NP' / MOOC / etc	TEL L6)	CO1	PO1			
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	ion method : Out of 10						
UNIT	II WIND ENERGY						
10	Power in Wind - Important Terms and Definitions	T1/R2	1	PPT	L1	CO1, CO4	PO1
11	Types of Wind Power Plant - Horizontal Axis Wind Turbine - Components and Working	T1/R2	1	PPT	L2	CO1	PSO1
12	Vertical Axis Wind Turbine - Components and Working Functions	T1/R2	1	PPT	L2	CO1	PSO2
13	Wind Turbine Operation - Power versus Wind Speed	T1/R2	1	PPT	L3	CO1	PO4
14	Components of Wind Power Plant	T1/R2	1	PPT	L2	CO4	PO4
15	Working Principles of Wind Turbine	T1/R2	1	PPT	L2	CO4	PO2
16	Turbine Height and Site Selection	T1/R2	1	PPT	L2	CO2	PO2
17	Grid Integration Issues of Wind Power Plants	T1/R2	1	PPT	L2	CO2	PO1
18	Power, Frequency and voltage fluctuations due to random wind speed variation	T1/R2	1	PPT	L2	CO2	PO1
Marks (III SOLAR PV AND THERMAL SYSTEMS						
	III SOLAR PV AND THERMAL SYSTEMS Solar Radiation, Solar Radiation Geometry	T2/R1	1	PPT	L2	CO3	PO1
UNIT	T		1 1	PPT PPT	L2 L3	CO3	PO1
UNIT 19	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different	T2/R1					
UNIT 19 20	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different Methods Solar Thermal Power Plant - Components and	T2/R1 T2/R1	1	PPT	L3	CO3	PO1
UNIT 19 20 21	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different Methods Solar Thermal Power Plant - Components and Working	T2/R1 T2/R1 T2/R1	1	PPT PPT	L3	CO3	PO1
UNIT 19 20 21 22	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different Methods Solar Thermal Power Plant - Components and Working Basic Principles of SPV Conversion Types of Solar Cells Types of Solar PV Systems	T2/R1 T2/R1 T2/R1 T2/R1	1 1	PPT PPT PPT	L3 L2 L1	CO3 CO4 CO3	PO1 PO12 PSO1
UNIT 19 20 21 22 23	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different Methods Solar Thermal Power Plant - Components and Working Basic Principles of SPV Conversion Types of Solar Cells Types of Solar PV Systems Solar Cell, Module, Arrey - Components and Working	T2/R1 T2/R1 T2/R1 T2/R1 T2/R1	1 1 1 1	PPT PPT PPT	L3	CO3 CO4 CO3 CO4	PO1 PO12 PSO1 PO1
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UNIT 19 20 21 22 23 24 25 26 27 Suggest Seminar	Solar Radiation, Solar Radiation Geometry Measurement of Solar Radiation - Different Methods Solar Thermal Power Plant - Components and Working Basic Principles of SPV Conversion Types of Solar Cells Types of Solar PV Systems Solar Cell, Module, Arrey - Components and Working I-V Characteristics, Efficiency of solar cells and Photovoltoic Panels Maximum Power Point Tracking - Applications ed Activity: Assignment / Case Studies / Tuorials/ Qu	T2/R1	1 1 1 1 1 1 1	PPT PPT PPT PPT PPT PPT PPT	L3 L2 L1 L2 L2 L2 L2 L2 L2 L3 L2	CO3 CO4 CO3 CO4 CO4 CO4 CO3	PO1 PO12 PSO1 PO1 PO1 PO2 PO2

29	Biomass energy Conversion Process	T3/R2	1	PPT	L2	CO5	PO12
30	Geothermal Energy - Basics - Advantages and Disadvantages	T3/R2	1	PPT	L2	CO1	PO12
31	Geothermal Electricity	T3/R2	1	PPT	L2	CO4	PO12
32	Geothermal Energy - Direct Use	T3/R2	1	PPT	L1	CO1	PO12
33	Hydorpower - Advantages and Disadvantages	T3/R2	1	PPT	L1	CO4	PO2
34	Classifications of Hydropower - Components of Small Hydro Power Plant	T3/R2	1	PPT	L2	CO4	PO2
35	Classifications of Water Turbine	T3/R2	1	PPT	L2	CO4	PO1
36	Turbine Theory - Problems	T3/R2	1	PPT	L3	CO4	PO1

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any : Assignment

Evaluation method : Marks Out of 10

UNIT V OTHER ENERGY SOURCES

37	Tidal Energy, Resources, Tidal Power Generation in India	T2/R2	1	PPT	L2	CO1	PO12
38	Calculation of Tidal Power, Tidal Power Basin - Types	T2/R2	1	PPT	L3	CO4	PO4
39	Wave energy, Power Associated with Sea Waves	T3/R2	1	PPT	L2	CO1	PO12
40	Principles of Ocean Thermal Energy Conversion	T3/R2	1	PPT	L2	CO1	PO12
41	Closed, Open and Hybrid Ocean Thermal energy Conversion	T3/R2	1	PPT	L2	CO4	PO3
42	Different Methods of Hydrogen Production	T3/R2	1	PPT	L2	CO4	PO1
43	Hydrogen Storage and Delevary	T3/R2	1	PPT	L2	CO4	PO1
44	Fuel Cells, Fuel Functionality - Hydrogen - Oxygen Fuel Cells	T2/R2	1	PPT	L1	CO5	PO12
45	Schematic and working functins of different fuel cells	T2/R2	1	PPT	L2	CO5	PO1

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any : Quiz

Evaluation method : Marks Out of 10

Content Beyond the Syllabus Planned

- 1 Solar energy connection for residential purpose
- 2 Environment Impact and consequence of Nuclear power accidents in the world

Text Books

- 1 Joshua Earnest, Tore Wizeliu, Wind Plants and Project development, PHI Learning Pvt Ltd, New Delhi, 2011.
- 2 D.P.Kothari, K.C.Signal, Rakesh Ranjan "Renewable energy sources and Emerging Technologies", PHI Learning Pvt Ltd, New Delhi, 2013.
- 3 Scott Grinnell, "Renewable energy & Sustaibnable Design', CENGAGELearning, USA, 2016.

Reference Books

1 A.K.Mukerjee and Nivedita Thakur, "Photovoltoic System: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011.

2	Richard .													
3	Chetan S	ingh Solan	ki, '' Solaı	Photovol	toicz : Fund				plications	, '' PHI Le	arning Pr	ivate Limi	ited, New I	Delhi, 20
	latter of 1/2		.h.a. a.a.u.a. //	tab 2			URL Re	eferences						
1		/www.youtube.com/watch?v=6soloSTti00												
3		//www.energy.gov/eere/wind/how-do-wind-turbines-work //www.energy.gov/eere/fuelcells/fuel-cell-basics												
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Level 1 (L1) : Remembering Level 2 (L2) : Understanding Level 3 (L3) : Applying Lower Order Thinking					Fixed Hour				• 0			Higher Order	Projects	
					Exams	Level 5 (L5): Evaluating Level 6 (L6): Creating						Thinking	Mini Projects	
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CO3	3	1	1	1		1	1					3	2	1
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CO1		nding the		newable e	nergy sourc	es stronng	ly correlat	ed with PS	S1 (Apply	knowledge	e of Maths	, Science a	and Engine	eering)
CO2	Understa	nding abou	ıt the prin		nponents an		g of wind p	ower plan	t strongly	correlated	with PS1	(Apply ki	nowledge o	of Maths,
CO3	Students	acquired k	nowledge	about sol	fe long learn ar cells corr	elate with	Engineein	g Knowled	lge (PS1),	Life long l	earning(P	S12) and I	Design and	
CO4	Understa	ent of Solunding abou	ntion (PS3) at the bion) nass corre	late Engine	ering Kno	wlwdge (P	S1), Life lo	ong learni	ng(PS12) a	nd Design	and deve	lopment of	Solution
	(PS3) Gained k	nowledge a	about the	various re	newable ene	ergy source	es stronly	correlated	with Engi	ineering K	nowledge	(PO1), Lif	e long	
CO5	Learnign	(PS12).					· ·					· · · · ·		
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