



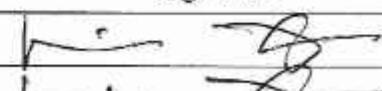
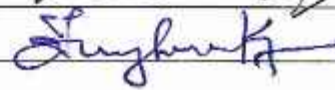
TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester	
23ME5E01	RENEWABLE ENERGY TECHNOLOGIES	V	ME	05	2025-26	09-07-2025	
COURSE OUTCOMES							
1	Illustrate the importance of solar radiation and solar PV modules.[K3]						
2	Discuss the storage methods in PV systems .[K2]						
3	Describe the solar energy storage for different applications .[K2]						
4	Illustrate the principles of wind energy, and bio-mass energy [K2]						
5	Summarize in the geothermal energy, ocean energy and fuel cells .[K2]						
6	Discuss the ocean and geothermal technologies.[K2]						
UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity		Text Book / Reference	Contact Hour	Delivery Method
SOLAR RADIATION							
1	Illustrate the importance of solar radiation and solar PV modules.[K3]	1.1.1	Role and potential of new and renewable sources		T1,R1	1	PPT/ FCR/Videos/TPS/ PBL
		1.1.2	The solar energy option, solar radiation data, numerical problems.		T1,R1	1	
		1.1.3	Environmental impact of solar power, structure of the sun,		T1,R1	1	
		1.1.4	the solar constant, sun-earth relationships,		T1,R1	1	
		1.1.5	Coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation		T1,R1	1	
		1.1.6	Solar radiation on titled surface, instruments for measuring solar radiation and sun shine,		T1,R1	1	
		SOLAR PV MODULES AND PV SYSTEMS					
		1.2.1	PV Module Circuit Design, Module Structure		T1,R1	1	
		1.2.2	Packing Density, Interconnections, Mismatch and Temperature Effects		T1,R1	1	

		1.2.3	Electrical and Mechanical Insulation,	T1,R1	1	
		1.2.4	Lifetime of PV Modules, Degradation and Failure, PV Module Parameters	T1,R1	2	
		1.2.5	Efficiency of PV Module, Solar PV Systems	T1,R1	1	
		1.2.6	Design of Off Grid Solar Power Plant. Installation and maintenance.	T1,R1	1	
		CBS	Solar Radiation on tilted surface	T1	1	
					Total	14
STORAGE IN PV SYSTEMS						
II	Discuss the storage methods in PV systems .[K2]	2.1	Battery Operation, Types of Batteries	T1,R1	1	PPT/ PBL/FCR/TPS
		2.2	Battery Parameters	T1,R1	1	
		2.3	Application	T1,R1	2	
		2.4	Selection of Batteries for Solar PV System	T1,R1	1	
		2.5	Battery Maintenance	T1,R1	2	
		2.6	Measurements	T1,R1	1	
		2.7	Battery Installation for PV System	T1,R1	1	
		CBS	Solar PV arrays	T1	1	
					TOTAL	10
SOLAR ENERGY COLLECTION						
III	Describe the solar energy storage for different applications .[K2]	3.1.1	Flat plate collectors	T1,R1	1	PPT /FCR/Videos/PBL/MBL/TPS
		3.1.2	Concentrating collectors	T1,R1	1	
		3.1.3	Orientation	T1,R1	1	
		3.1.4	Classification of concentrating collectors	T1,R1	1	
		SOLAR ENERGY STORAGE AND APPLICATIONS				
		3.2.1	Different methods	T1,R1	1	
		3.2.2	Sensible, latent heat and stratified storage	T1,R1	1	
		3.2.3	Solar ponds	T1,R1	1	
		3.2.4	Solar applications	T1,R1	1	
		3.2.5	Solar heating/cooling technique	T1,R1	1	
		3.2.6	Solar distillation and drying,	T1,R1	1	
		3.2.7	Solar cookers, central power tower concept and solar chimney	T1,R1	2	

WIND ENERGY							
IV	Illustrate the principles of wind energy, and bio-mass energy [K2]	4.1.1	Sources and potentials	T1,R1	1	PPT /FCR/TPS/MBL/Videos/PBL	
		4.1.2	Horizontal and vertical axis windmills	T1,R1	1		
		4.1.3	Performance characteristics	T1,R1	1		
		4.1.4	Betz criteria	T1,R1	1		
		4.1.5	Types of winds	T1,R1	1		
		4.1.6	Wind data measurement	T1,R1	1		
		BIO-MASS					
		4.2.1	Principles of bio-conversion	T3,R1	1		
		4.2.2	Anaerobic/aerobic digestion	T3,R1	1		
		4.2.3	Types of bio-gas digesters	T3,R1	1		
		4.2.4	Gas yield, utilization for cooking	T3,R1	1		
		4.2.5	Bio fuels,.	T3,R1	1		
		4.2.6	I.C. engine operation and economic aspects	T3,R1	1		
Total				12			
V	Summarize in the geothermal energy, ocean energy and fuel cells .[K2] Discuss the ocean and geothermal technologies.[K2]	GEOTHERMAL ENERGY				PPT /FCR/TPS/Videos/PBL	
		5.1.1	Origin, Applications	T2,R1	1		
		5.1.2	Types of Geothermal Resources,	T2,R1	1		
		5.1.3	Relative Merits	T2,R1	1		
		OCEAN ENERGY					
		5.2.1	Ocean Thermal Energy	T1,R1	1		
		5.2.2	Open Cycle & Closed Cycle	T2,R1	1		
		5.2.3	OTEC Plants	T1,R1	2		
		5.2.4	Environmental Impacts, Challenges	T2,R1	1		
		FUEL CELLS					
		5.3.1	Introduction, Applications	T2,R1	1		
		5.3.2	Classification, Different Types of Fuel Cells	T2,R1	1		
		5.3.3	Phosphoric Acid Fuel Cell, Alkaline Fuel Cell	T2,R1	1		
5.3.4	PEM Fuel Cell, MC Fuel Cell	T2,R1	1				
Total				12			
CUMULATIVE PROPOSED PERIODS				60			

Text Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
T1	Sukhatme S.P. and J.K.Nayak, Solar Energy – Principles of Thermal Collection and Storage, 3 rd Edition, Tata McGraw Hill publications, 2015.
T2	Khan B.H, Non-Conventional Energy Resources, 3 rd Edition, Tata McGraw Hill publications, 2017.
Reference Books:	
S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
R1	J. Paulo Davim, Green Manufacturing Processes and Systems - /Springer 2013
R2	Shobha Nath Singh, Non-Convention Energy Resources, , Pearson, 2018.
Web Details	
1	https://www.youtube.com/watch?v=yar51GJVqgg
2	https://www.youtube.com/watch?v=_zloyPowt0Q

SNO	Details	Name	Signature
i.	Course Coordinator	Dr. R. Lalitha Narayana	
ii.	Module Coordinator	Dr. R. Lalitha Narayana	
iii.	Programme Coordinator	Dr. Francis Luther King M	


Principal