

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY	
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Programme		Master of Technology				Branch/Spec.	Electrical (Renewable Energy)		
Semester		II				Version	1.0.0.0		
Effective from Academic Year			2025-2026			Effective for the batch Admitted in		July 2025	
Course code		3EE21PE12	Course Name			Biomass and Tidal Energy			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	0	0	3	Theory	40	60	100
Hours	3	0	0	0	3	Practical	00	00	00

Pre-requisites:

Course Outcomes:

On successful completion of the course, the students will be able to:

CO1	Understand the principles, characteristics, classification and power plants of biomass and tidal power generation.
CO2	Analyze the influence of , design and process governing parameters in biomass and in tidal power generation.
CO3	Evaluate the availability, production and generation of electrical power from biomass and tidal.
CO4	Applying the knowledge of biomass and tidal power learning in real time applications.

Theory syllabus

Unit	Content	Hrs
1	Biomass Energy: Introduction, Types, Characteristics, Carbon neutrality conversion mechanisms, Fuel assessment studies, Densification technologies, Comparison with coal, Proximate & Ultimate Analysis, Thermo gravimetric analysis, Differential thermal analysis, Differential scanning calorimetry, Advantages and drawbacks.	08
2	Biomethanation & Combustion: Microbial systems, Parameters affecting gas production, Effect of additives on biogas yield, Biogas plants, Types, design and construction, Complete and incomplete combustion, Fixed bed and fluid bed combustion, Fuel and ash handling systems, Steam cost comparison with conventional fuels.	11
3	Gasification & Liquified Biofuels: Chemistry of gasification, Types, Performance evaluation, Dual fuelling in IC engines, Engine characteristics on gas mode, Pyrolysis, Classification, Process governing parameters, Carbonization techniques, Biodiesel production, Process and chemistry, Production of alcoholic fuels.	11
4	Tidal Energy: Introduction, Tidal current, High and low tides, Tidal power, Average theoretical power per tide (rise and fall), Equation and expressions, Tidal work or energy conversion, Terms and definitions, Ocean tidal energy conversion schemes, Single basin, Double basin and multi basin scheme.	08
5	Tidal Power Plant: Tidal power plant in the world, Tidal energy resources in India, The rance tidal power plants in france, Kislayaguna plants Russia, Interaction between tidal power plant and electrical grid, Economic aspects about tidal energy conversion plant.	07

Practical content

Assignments and tutorials are based on above syllabus.

Text Books					
1.	Mathematics	NCERT	Class 10	100	100
2.	Science	NCERT	Class 10	100	100
3.	Social Science	NCERT	Class 10	100	100
4.	English	NCERT	Class 10	100	100
5.	Hindi	NCERT	Class 10	100	100
6.	Arts & Crafts	NCERT	Class 10	100	100
7.	Physical Education	NCERT	Class 10	100	100
8.	Music	NCERT	Class 10	100	100
9.	Drawing	NCERT	Class 10	100	100
10.	Computer Science	NCERT	Class 10	100	100
11.	Environmental Studies	NCERT	Class 10	100	100
12.	Health & Physical Education	NCERT	Class 10	100	100
13.	Mathematics	NCERT	Class 10	100	100
14.	Science	NCERT	Class 10	100	100
15.	Social Science	NCERT	Class 10	100	100
16.	English	NCERT	Class 10	100	100
17.	Hindi	NCERT	Class 10	100	100
18.	Arts & Crafts	NCERT	Class 10	100	100
19.	Physical Education	NCERT	Class 10	100	100
20.	Music	NCERT	Class 10	100	100
21.	Drawing	NCERT	Class 10	100	100
22.	Computer Science	NCERT	Class 10	100	100
23.	Environmental Studies	NCERT	Class 10	100	100
24.	Health & Physical Education	NCERT	Class 10	100	100
25.	Mathematics	NCERT	Class 10	100	100
26.	Science	NCERT	Class 10	100	100
27.	Social Science	NCERT	Class 10	100	100
28.	English	NCERT	Class 10	100	100
29.	Hindi	NCERT	Class 10	100	100
30.	Arts & Crafts	NCERT	Class 10	100	100
31.	Physical Education	NCERT	Class 10	100	100
32.	Music	NCERT	Class 10	100	100
33.	Drawing	NCERT	Class 10	100	100
34.	Computer Science	NCERT	Class 10	100	100
35.	Environmental Studies	NCERT	Class 10	100	100
36.	Health & Physical Education	NCERT	Class 10	100	100
37.	Mathematics	NCERT	Class 10	100	100
38.	Science	NCERT	Class 10	100	100
39.	Social Science	NCERT	Class 10	100	100
40.	English	NCERT	Class 10	100	100
41.	Hindi	NCERT	Class 10	100	100
42.	Arts & Crafts	NCERT	Class 10	100	100
43.	Physical Education	NCERT	Class 10	100	100
44.	Music	NCERT	Class 10	100	100
45.	Drawing	NCERT	Class 10	100	100
46.	Computer Science	NCERT	Class 10	100	100
47.	Environmental Studies	NCERT	Class 10	100	100
48.	Health & Physical Education	NCERT	Class 10	100	100
49.	Mathematics	NCERT	Class 10	100	100
50.	Science	NCERT	Class 10	100	100
51.	Social Science	NCERT	Class 10	100	100
52.	English	NCERT	Class 10	100	100
53.	Hindi	NCERT	Class 10	100	100
54.	Arts & Crafts	NCERT	Class 10	100	100
55.	Physical Education	NCERT	Class 10	100	100
56.	Music	NCERT	Class 10	100	100
57.	Drawing	NCERT	Class 10	100	100
58.	Computer Science	NCERT	Class 10	100	100
59.	Environmental Studies	NCERT	Class 10	100	100
60.	Health & Physical Education	NCERT	Class 10	100	100
61.	Mathematics	NCERT	Class 10	100	100
62.	Science	NCERT	Class 10	100	100
63.	Social Science	NCERT	Class 10	100	100
64.	English	NCERT	Class 10	100	100
65.	Hindi	NCERT	Class 10	100	100
66.	Arts & Crafts	NCERT	Class 10	100	100
67.	Physical Education	NCERT	Class 10	100	100
68.	Music	NCERT	Class 10	100	100
69.	Drawing	NCERT	Class 10	10	

1.	David Boyles,"Bio Energy Technology Thermodynamics and costs", Ellis Horwood Chichester.
2.	D. P. Kothari, K. C. Singal, Rakesh Ranjan," Renewable Energy Sources and Emerging Technologies", PHI Learning Private Limited, New Delhi.

Reference Books	
1.	KhandelwalKC, Mahdi SS,” Biogas Technology–A Practical Handbook,”Tata McGraw Hill.
2.	S.Hasan Saeed, Sharma, D K, “Non-conventional Energy Sources”, S.K. Kataria & Sons.
ICT/MOOCs	
1.	NPTEL :: Chemical Engineering - NOC: Biomass Conversion and Biorefinery
2.	nptel.ac.in/courses/108105058
3.	Emerging Technologies in Renewable Energy Sources - Course
4.	Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems - Course

Mapping of CO with PO and PSO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	1	1	1	1	1	1	1	3	2	2
CO2	2	2	2	1	1	1	2	1	1	1	2	1	3	2	1
CO3	3	3	3	2	2	1	1	1	1	1	1	1	2	2	2
CO4	2	2	2	2	2	1	2	1	1	2	1	1	3	2	1