

**LECTURE PLAN of UG COURSES**  
**DEPARTMENT OF RENEWABLE ENERGY ENGINEERING**  
College of Technology and Engineering, MPUAT, Udaipur

Course Code: REE 231

Cr. Hr. 3(2+1)

Course Title: Fundamental of Renewable  
Energy Sources

Course Teacher : Dr. N. L. Pnawar

1. Introduction to renewable power sources.
2. Indian energy scenario and global renewable power potential.
3. Energy consumption pattern in Indian agriculture.
4. Comparing Renewable Wind Energy to Nonrenewable Energies
5. Introduction to ocean energy
6. Solar Energy Basics.
7. Solar radiation theory.
8. Fundamental of Solar collectors
9. Solar PV system design
10. Solar Energy and Advanced Technologies.
11. Solar Electricity: Potential and Generation
12. Numerical problems related to SPV power generation
13. Environmental Impact and economics of Solar PV system
14. Basic concepts wind energy
15. Different wing machine for power generation.
16. Torque determination in different wind machine.
17. Power estimation and application of wind mill.
18. Numerical problems related to wind power generation
19. Wind energy and environmental Impacts.
20. Introduction of thermo chemical conversion of biomass.
21. Principle and classification of gasifiers.
22. Design of biomass gasifier.
23. Application of gasifiers for thermal and electric power generation
24. Numerical problems related to gasification-based power generation
25. Dendro thermal power generation.
26. Environmental issues and techno economics of biomass gasification technology.
27. Introduction biogas technology and mechanisms.
28. Study of different biogas plant
29. Factor affecting biogas generation
30. Design of biogas plant for different feedstock.
31. Biogas and environmental issues
32. Numerical problems related to biogas power generation

## Lecture Schedule

**Course REE 352 RENEWABLE POWER SOURCES (PCC)**

**Cr. Hrs. 3 (2 +0+1)**

**Teacher: Dr. Sudhir Jain, Professor**

**Course Outcome:** At the end of the course, the student will be able to: The course enables the student to outline the power generation potential from various renewable energy sources and performance evaluation of these devices.

Lecture no.	Topic
1.	<b>Unit-I</b>
	Energy consumption pattern
2.	Energy resources in India.
3.	Renewable energy options.
4.	Renewable energy potential.
5.	Renewable energy utilization.
6.	Fundamentals of Renewable energy technology
7.	Fundamentals of hydrogen cell technology.
8.	Fundamentals of fuel cell technology.
9.	<b>Unit-II</b>
	Biogas technology and mechanisms.
10.	Use of different commercial sized biogas plant.
11.	Contd. different commercial sized biogas plant
12.	Community sized biogas plant
13.	Power generation of power from biogas.
14.	Power generation from urban, municipal and industrial waste.
15.	Contd. Power generation from urban, municipal and industrial waste.
16.	Contd. Power generation from urban, municipal and industrial waste.
17.	<b>Unit-III</b>
	Solar thermal and photovoltaic Systems for power generation.
18.	Central receiver (Chimney) and distributed type solar power plant,
19.	Contd. Central receiver (Chimney) and distributed type solar power plant,
20.	Contd. Central receiver (Chimney) and distributed type solar power plant,
21.	Fundamentals of ocean thermal energy conversion technology.
22.	Contd. Fundamentals of ocean thermal energy conversion technology.
23.	Fundamentals of magneto hydro dynamic.
24.	Contd. fundamentals of magneto hydro dynamic.
25.	<b>Unit-IV</b>
	Wind farms.
26.	Aero-generators.
27.	Wind power generation system.
28.	Power generation from biomass (gasification & Dendro thermal).
29.	Power generation from biomass (gasification & Dendro thermal), Contd.
30.	Power generation from biomass (gasification & Dendro thermal), Contd.
31.	Mini and micro small hydel plants.
32.	Mini and micro small hydel plants, Contd.

### Practical

1. Performance evaluation of solar water heater.

2. Performance evaluation of solar cooker.
3. Characteristics of solar photovoltaic panel.
4. Performance evaluation of solar air heater/dryer.
5. Performance evaluation of biomass gasifier engine system (throatless & downdraft)
6. Performance evaluation of a fixed dome type biogas plant.
7. Performance evaluation of floating drum type biogas plant.
8. Estimation of calorific value of biogas & producer gas.
9. Testing of diesel engine operation using dual fuel and gas alone.

Course Code: REE361(PCC)

Cr. Hr. 3(2+0+1)

Course Title: Bio-Energy systems: Design  
and Applications

Course Teacher : Dr. N. L. Panwar

**Course Outcome:** The main objective of this course is to provide fundamentals of utilization of crop residues and agro industrial waste for energy production through different conversion routes and to understanding the biofuels system, renewable feedstock and their production so that following the completion of this course, students will have the expertise to solve agro industrial, social, and environmental problems with appropriate techniques and tools.

1. Introduction to fermentation process and its requirement.
2. Aerobic and anaerobic fermentation.
3. Industrial application of fermentation process.
4. Classification of anaerobic digester.
5. Heat transfer in anaerobic digester.
6. Introduction to land fill technology.
7. Potential and scope of land fill technology in Indian context
8. Introduction to Wastelands for energy plantation.
9. Classification of waste land and their use through energy plantation.
10. Selection of species, methods of field preparation, and transplanting.
11. Harvesting of biomass and coppicing characteristics.
12. Classification of biomass.
13. Physio-chemical characteristics of biomass.
14. Higher and lower heating value solid, liquid and Gaseous fuels.
15. Introduction and principle of physical conversion of biomass.
16. Introduction of thermo chemical conversion of biomass.
17. Preparation of fuel for gasifier.
18. Principle and classification of gasifiers.
19. Design of biomass gasifier.
20. Application of gasifiers for thermal and electric power generation
21. Cleaning and cooling of producer gas.
22. Utilization of agro residues for energy production.
23. Introduction and principle of densification.

24. Introduction and principle of pyrolysis.
25. Properties and applications of pyrolytic oil.
26. Introduction of dendro thermal power generation.
27. Design of open combustion furnaces for industrial applications.
28. Greenhouse gas mitigation potential through biomass.
29. Introduction and principle biochemical conversion of biomass.
30. Introduction and principle of biodiesel production.
31. Introduction and principle of alcohol production.
32. Vehicular application of biodiesel.
33. Vehicular application of alcohol.