

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Chemical Engineering

M.E. Semester: II

Subject Name: **Energy Technology (Inter Disciplinary Elective – II)**

Sr. No.	Course Content
1.	<b>An Introduction to alternative energy sources</b> Conventional and non-conventional energy sources, Renewable and Non renewable sources, Primary and secondary energy sources, energy demand, National energy strategy and plan, Principle of energy conservation and energy audit.
2.	<b>Solid fuel:</b> Fossil fuel - Introduction, Importance, Limits and alternatives, Levels and flows, Environmental effects. Gasification and liquefaction of solid fuels .Classification of coal, origin of coal, proximate and ultimate analysis of coal, calorific values, rank of coal, Analysis and properties of coal, coal preparation method, coal washing by froth flotation, coal storage and transportation.
3.	<b>Solar Energy:</b> Introduction, Measurement of solar radiation, Solar constant, solar radiation measurements, Principles of the conversion of Solar radiation into heat, solar energy collectors, solar power- photovoltaic, Solar heating, solar thermal power, solar energy storage system (Thermal, Electrical, Chemical, Mechanical) , Applications of solar energy.
4.	<b>Wind Energy:</b> Introduction, Basic principles of wind energy conversion, Power in wind, Types of wind turbine, Basic components of wind energy conversion systems (WECS), Classification of WEC system, Classification of wind energy collectors – advantages, disadvantages, Applications of wind energy.
5.	<b>Tidal energy:</b> Introduction, Basic principle of Tidal power and advantages and limitations of tidal power generation,, OTEC methods (open cycle and close cycle methods), storage devices, Ocean waves and wave energy conversion devices, Applications of tidal energy, problems.
6.	<b>Geothermal energy:</b> Introduction, Nature of geothermal fields, Geothermal Sources, Geothermal heat pump, Magma resources, Advantage- disadvantages of geothermal energy over other energy forms, Applications of geothermal energy.
7.	<b>Energy from Biomass:</b> Introduction, Materials used for bio-gas generation, Fuel properties of bio-gas and its applications, Methods for obtaining energy from biomass –Pyrolysis, Classification of Biomass Gasifiers, Applications of the gasifiers.

8.	<b>Fuel Cell:</b> Introduction, Classification of fuel cells – Hydrogen –Oxygen fuel cell, Ion –exchange fuel cell, Molten carbonate fuel cell, Advantages –disadvantages of fuel cells .
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### **Text Books:**

1. Energy Sources 2<sup>nd</sup> Ed. , Khanna Publications, New Dehli. By G.D. Rai.
2. Fuel Combustion Energy Technology, Dhanpat Rai Publications by S.N. Saha.

### **Reference Books:**

1. Energy Technology by Rao & Parulaker.
2. Fuel & Combustion , Orient Lonmans by Samir Sarkar.
3. Solar Energy, Tata McGraw Hill, New Delhi by Sukatame.