EE-404A	NON-CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE)	L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

1. To know the depletion rate of conventional energy resources and importance of renewable energy resources.
2. To know the importance of Energy Storage Devices.
3. To know alternate viable energy sources to meet the energy requirements.
4. To discuss about solar energy, wind energy, tidal energy and geothermal energy as alternate resources.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. know the national scene of energy production, utilization, consumption and energy storage systems.
2. understand about the basics of solar energy, collectors & generation of electricity from solar energy &photovoltaic's.
3. understand the assessment of wind energy potential, wind turbines and wind generators.
4. know about ocean energy, temperature differences & principles, extraction of energy from waves.
5. understand about geothermal, types & how biogas is produced & digester for power generation.

UNIT I *Text Book - 1,2* **(12)**

Principle of Renewable Energy : Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management.

Energy Storage Systems : Pumped Hydro - Compressed air storage-Energy storage by fly wheels-Electrical battery storage - Thermal sensible energy storage - Latent heat energy storage.

UNIT II *Text Book - 2* **(12)**

Solar Energy : Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion-solar thermal central receiver systems, Solar pond, Distributed systems.

Photovoltaic's : Photovoltaic energy conversion - solar cell - Construction - conversion efficiency & output-VI characteristics.

UNIT III *Text Book - 2* **(12)**

Wind energy : Planetary and local winds - vertical axis and horizontal axis wind mills.

Principles of wind power : maximum power - actual power - wind turbine operation - electrical generator.

UNIT IV *Text Book - 1,2* **(12)**

Energy from Oceans : Ocean temperature differences - principles of OTEC plant operations.

Wave energy : devices for energy extraction - tides - simple single pool tidal system, two pool tidal system.

UNIT V *Text Book - 1* **(12)**

Geothermal Energy : Origin and types: Hydrothermal, Geo-pressurized & Petro thermal.

Bio fuels : Classification - direct combustion for heat and electricity generator - anaerobic digestion for biogas - biogas digester - power generation.

LEARNING RESOURCES:

TEXT BOOK(s):

1. JohnTwidell & Toney Weir - Renewable Energy Sources, E&F.N. Spon
2. EL-Wakil - Power Plant Technology, McGraw-Hill Publications.

REFERENCE BOOK(s):

1. G.D.Rai - Non-Conventional Energy Sources, Khanna Publishers.
2. Abbasi & Abbasi - Renewable Energy Sources, Their impact on global warming and pollution, PHI.

WEB RESOURCES:

1. http://www.tn.gov.in/spc/tenthplan/CH_11_2.PDF
2. http://bieap.gov.in/Nonconventionalenergysources
3. http://www.em-ea.org/Guide%20Books/book4/4.12App%20of%20Non%20conventional