EE-404A

NON-CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE)

LTPC

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