

SEMESTER <i>Seventh</i>	DEPARTMENT <i>Power Engineering</i>	COURSE TITLE <i>Renewable Energy</i>
COURSE CODE <i>EP703</i>	HOURS: 3 UNITS: 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>

1. Introduction to Types of Energy and Energy Resources.

Evaluate the followings:

- The fuel based system.
- The impact of fossil based systems.
- The non conventional energy, variations and availability.
- The renewable energy sources and features.

2. Solar Thermal Systems.

To get familiar with:

- Conduction, reflectivity, radiation and transmissivity.
- Solar radiation spectrum measurements technologies, data and estimation.
- Types of solar collectors.
- Performance testing of solar collectors.
- Solar energy storage.
- Applications: water heating, buildings' heating and cooling

3. Solar Photovoltaic Systems.

Discuss the followings:

- Operating principles of photovoltaic systems.
- Photovoltaic cell concepts.
- Cell, module array.
- Series and parallel connections.
- Maximum power point tracking.
- Applications: battery charging, pumping, lighting, cooling.

4. Wind Energy.

- Role of wind as a renewable energy.
- Wind turbines
- Electrical equipment.
- Wind energy systems.
- Performance and operation management.
- Grid integration and power quality.

5. Biomass Energy.

- Biomass availability, types of its conversion and system design.
- Biogas generation.
- Energy plantation.

6. Hybrid System.

- Range and type of hybrid systems.
- Case studied of: diesel, PV, wind, biomass systems and solar.

References:

- 1- *Wind and Solar Power Systems*, Mukund R. Patel, CRC Press,1999.
- 2- *Renewable and Efficient Electric Power Systems* – Gilbert M. Masters, IEEE Press – Published by John Wiley and Sons, Inc. Hoboken, New Jersey, USA, 2004.
- 3- *Solar energy, Renewable Energy and the Environment*, Robert Foster, Majid Ghassemi, znd Alma Cota, 2010 by Taylor and Francis Group, LLC

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