NIRMA UNIVERSITY
INSTITUTE OF TECHNOLOGY, SCHOOL OF ENGINEERING

Mechanical Engineering Department
Open Electives (except Dept. of Mechanical, Chemical and Electrical Eng.)

L	T	P	C
3	0	0	3

Course Code	**2MEOE27**
Course Title	**Renewable Energy Sources**

Course Outcomes(CO):

After successful completion of the course, student will be able to

1. interpret the importance of Renewable Energy Sources in the present era,
2. explain various methods for power generation by using different type of non-conventional and renewable energy sources,
3. apply the knowledge of converting energy resources like solar, wind , biomass, tidal, wave, ocean thermal, and geothermal energy for power generation,
4. outline the working and applications of fuel cells and usage of bio-fuels.

Syllabus **Teaching hours: 45**

UNIT I **Introduction** **03 hours**

Energy scenario of India and World, Need of Renewable Energy sources.

UNIT II **Solar Energy** **15 hours**

Solar energy, extra-terrestrial and terrestrial radiations, radiation geometry, variation of insolation and its measurement, computation of solar radiation on horizontal and tilted surfaces, solar flat plate collectors, their configuration, material of construction and general characteristics, concentrating collectors, receiver systems, heliostat, optical losses, types of solar energy storage, solar energy applications.

UNIT III **Wind energy** **09 hours**

Analysis of wind speeds, different types of wind turbines, use of meteorological data for site selection, materials of construction, performance characteristics, and applications

UNIT IV	**Biomass** Biomass, energy plantation, biomass gasifiers, types, construction of biogas plants, scope and future	**08 hours**
UNIT V	Tidal, wave and ocean thermal energy conversion plants, geothermal plants, small hydro plants, magneto hydrodynamic plants, fuel cells, use of non-conventional fuels, bio fuels and their applications	**10 hours**
Self - Study	The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.	

Suggested Readings:

1. Twidell John and Weir Tony, Renewable Energy Resources by, Taylor and Francis
2. Sukhatme S.P. and J K Nayak, Solar Energy, McGraw Hill.
3. Walker and Jenkins,Wind Energy Technology, Wiley
4. Bent Sorensen, Renewable Energy-Physics, Engineering, Environmental Impact, Economics, Academic Press.
5. Rai G.D ,Solar Energy Utilization, Khanna Publishers
6. Rai G.D.,Non-conventional Energy Sources, Khanna Publishers

L=Lecture T= Tutorial P=Practical, C=Credit

w.e.f. academic year 2020-21 and onwards