Sem.	Subject code	Course title	No. of hours	Credits	Paper type
IV	17U4PSM3	Energy conversion	2	2	SBE Major (Skill Based Elective)

Objectives:

(i). The students should be introduced to conventional energy sources and also about their drawbacks in present world. (ii) The students should be introduced to topics on solar radiation and its measurements, Wind energy, geothermal sources and ocean energy systems.

Learning outcome:

(i) The students will be able to compare new energy sources with older conventional energy systems (ii) They will understand how far new energy systems are better than older once. (iii) They will understand the various solar radiation measuring instruments, horizontal axis WECS machine, vapor dominated and liquid dominated and geothermal designs and ocean thermal energy conversion systems.

Unit I: Introduction to Energy Sources

General Introduction to energy sources–Conventional energy sources–Coal, oil, natural gas - Non-conventional source–Solar, wind, ocean and geothermal energy.

Unit II: Solar Energy

Solar Radiation and its measurements–Solar constant–Pyrheliometers–Angstrom compensation pyrheliometers–Pyranometer–Solar photovoltaics–Principle of solar cell–Solar distillation-Solar pumping- Solar Furnace-Working principle-Advantages and limitations

Unit III: Wind Energy

Wind energy–Basic principles of wind energy–Power in the wind-Basic components of WECS–Wind energy collectors–Horizontal axial machines.

Unit IV: Geothermal energy

Geothermal energy–Geothermal sources–Hydro thermal resources–Vapor dominated system–liquid dominated system-Flashed steam system.

Unit V: Ocean Energy

Energy from oceans–OTEC–Open cycle OTEC system–Energy from tides–Basic principle of Tidal power–Estimation of energy in a single basin tidal system.

Text Book(s):

1. Non- Conventional energy sources, G.D.Rai, Kanna Publishers, Vth Edn., 9th Reprint, (2013).
   Unit I: Pages 1–10, 15–24 ,26-30.
   Unit II: Page 47-53, 60-63, 178-183, 195-202.
   Unit III: Pages 227–235, 256–260, 262-266.
   UnitIV: Pages 439-447, 452-455.

Unit V: Pages 495-501, 510-513, 526-527.

Books for Reference:

1. Solar Energy Utilization, G.D.Rai, Khanna Pub., Vth Edn., (1995).
2. Solar energy, S. P. Sukhatme, TMH, IInd Edn., (1998).
3. Power Plant Technology, A.K. Wahil, MHI, (1993).

Websites:

1. https://www.cleanenergyresourceteams.org