Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	**Course Name**	**Course Code**	**Marks:100**
M. Tech. in Thermal Engg.	New and Renewable Energy Resources	MET 510	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
II	3	3-0-0	3 Hours

Unit - I

Introduction: Energy and development; Energy demand and availability; Energy crisis; Conventional and non-conventional; Renewable and non-renewable energy resources; Environmental impact of conventional energy usage; Basic concepts of heat and fluid flow useful for energy systems. **(07 Hours)**

Unit - II

Solar Energy Systems: Solar radiations data; Solar energy collection; Storage and utilization; Solar water heating; Air heating; Power generation; Refrigeration and air conditioning; Solar energy system economics. **(08 Hours)**

Unit - III

Micro and Small Hydro Energy Systems: Resource assessment of micro and small hydro power; micro; mini and small hydro power systems; economics; pump as turbine; special engines for low heads; velocity head turbines. **(07 Hours)**

Unit - IV

Biomass Energy Systems: Availability of biomass- agro; Forest; Animal; municipal and other residues; Bioconversion technologies; Cooking fuels; Biogas; producer gas; Power alcohol from biomass; Power generation; Internal engine modifications and performance; System economics. **(08 Hours)**

Unit - V

Wind Energy Systems: Wind data; Wind energy estimation; Horizontal and vertical axis wind mills; Wind farms; Maximum power and efficiency; Performance and economics of wind energy. **(07 Hours)**

Unit - VI

Integrated Energy Systems: Concept of integration of conventional and non-conventional energy resources and systems; Integrated energy system design and economics. **(08 Hours)**

Recommended Books:

1. Solar Engineering of Thermal Processes; Duffie & Beckman; John Wiley and sons; 4th Edition; 2013.
2. Energy: The Biomass Option; H. N. Bungay; John Wiley and sons; 1st Edition; 1981.
3. Energy & Environment; Fowler; 1st Edition; McGraw Hill; 1971.
4. Solar Energy; S.P. Sukhatme; Tata McGraw Hill; 1st Edition; 2008.
5. Fundamentals of Renewable Energy Resources; A. V. D. Rosa; Elsevier Publications; 2013.
6. Fundamental of Renewable Energy Systems; D. Mukherjee and S. Chakrabarti; New Age International; 1st Edition; 2005.