INTEGRAL UNIVERSITY, LUCKNOW

(Specialization paper for Research Scholar of EE Department)

EE-701 Renewable Energy and the Environment

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Unit I

Understanding human energy needs; alternative generation systems; renewable energy sources including wind, solar. biomass, hydro, ocean and geothermal; socio-economic implications of sustainable energy; climate change controversy. (6)

Unit II

Biomass Energy System: Availability of biomass-agro, forest, animal and municipal waste; Total Volatile solids; Mixed Liquor Suspended Solids (MLSS); Biomass Conversion technologies; urban waste to energy conversion; biomass gasification; Biogas production from waste biomass; classification of biogas plants; biomass system economics in India , Dual fuel generator. (8)

Unit III

Solar cell model. Solar cell losses, Solar cell efficiency, Mismatching in PV modules, Ratings of PV modules, Hot spots in modules and its remedy, System Integration, Battery basics, Losses, classification of batteries, battery parameters, factors affecting battery performance, batteries for PV systems, DC-DC converters for PV systems, Charge controllers, Algorithms for MPPT, Stand Alone system, grid connected systems. (12)

Unit IV

Hybrid Systems: PV-Diesel hybrid systems, PV-wind hybrid systems, PV-Fuel cell hybrid systems, Issues with hybrid systems, Grid connected systems, Payback period, Lifecycle costing, legal aspects, Future trends and possibilities. (6)

Unit V

Wind Energy, advantage and disadvantages, Wind turbine systems, Type of wind generators, Criteria for choice of wind generators, Electric Vehicles, Hybrid electric vehicles. (8)

Text Books:

1. Boyle, Godfrey, Renewable Energy Power for a Sustainable Future, 2nd Edition, Oxford University Press, 2004.
2. Chetan Singh Solanki, Solar Photovoltaics's Fundamentals, technologies and Applications, PHI New Delhi, 2009.