

SOLAR ENGINEERING

EC 339

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Unit 1:

Solar Radiation and measurement, solar insolation, extraterrestrial solar radiation, solar constant, spectral Distribution variation, Solar radiation on earth surface, direct and diffuse radiation.

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Unit 2:

Solar Electric (Direct) conversion, Optical properties of semiconductor, Theory of photovoltaic diode heterogeneous junction, Schottky Diode

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Unit 3:

Silicon Solar Cell, Thin Film and screen printed solar cell their fabrication, life and efficiency, transparent electrodes, MIS solar cells

(8)

Unit 4 & 5:

Silicon solar module, solar panel, concentrating system, Agriculture, domestic, Industrial and telecommunication application

(16)

References

1. Hore/ Solar Cells
2. Solar Cells/ Charles E Backes (Ed) IEEE
3. Solar Cell Array Design Handbook

Wind Engineering (EC-340)

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Unit 1

Historical Background, Power contained in wind, thermodynamics in wind energy. Efficiency limit for wind energy conversion. Types of wind energy conversion Devices. [8]

Unit 2

Wind site Analysis and selection. Wind speed Measurements, wind speed statistics, site and Turbine selection. Basics of Induction and Synchronous Machines. [8]

Unit 3

Power Electronics.

Classification & components of Power electronics converter. Power semiconductor Devices, Diode, Thyristors Bipolar Power Transistor. Power MOSFET, IGBT, Uni-controlled Rectifier, Phase controlled converters. DC-DC PWM converters, The invertors DC-AC conversion.

[8]

Unit 4

Grid connected and self excited induction Generator operation. Constant voltage, Constant frequency Generators. Variable Voltage Variable frequency generation. [8]

Unit 5

Hybrid energy systems.

Diesel Generation and Photo-voltaic System. Wind Diesel hybrid system. Wind photo-voltaic system. [8]

TEXT BOOK :

1. S. N. Bhadra, D. Kastha & S. Banerjee, Wind Electrical Systems, Oxford University Press India, First Edition.

REFERENCES:

1. Spera, D.A., Wind Turbine Technology: Fundamental concepts of Wind Turbine Engineering, ASME Press, 1994.
2. Duffie, A and Beckmann, W. A., Solar Engineering of Thermal Processes, John Wiley, 1991.
3. Freris, L.L., Wind Energy Conversion Systems, Prentice Hall, 1990