

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electrical & Electronics Engineering, V-Semester

Departmental Elective EX- 503 (A) Electrical Power Generation & Economy

Unit-I

Introduction: Energy sources and their availability, Principle types of power plants, their special features and applications, Present status and future trends. Hydro Electric Power Plants: Essentials, Classifications, Hydroelectric survey, Rainfall run-off, Hydrograph, Flow duration curve, Mass curve, Storage capacity, Site selection, Plant layout, various components, Types of turbines, Governor and speed regulation, Pumped storage, Small scale hydro–electric plants (mini and micro).

Unit-II

Thermal Power Plant: General developing trends, Essentials, Plant layout, Coal–its storage, Preparation, Handling, Feeding and burning, Cooling towers, Ash handling, Water treatment plant, High pressure boilers and steam turbines, Components of thermal power plant.

Unit-III

Non-Conventional Power Generation: Geothermal power plants, Electricity from biomass, Direct energy conversion systems (Solar and Wind), Thermo-electric conversion system, Fuel cells, Magneto-Hydro dynamic system..

Unit-IV

Gas Turbine Power Plants: Field of use, Components, Plant layout, Comparison with steam power plants, combined steam and gas power plants. Nuclear Power Plant: Nuclear fuels, Nuclear energy, Main components of nuclear power plant, Nuclear reactors types and applications, Radiation shielding, Radioactive and waste disposal safety aspect..

Unit-V

Power Plant Economics: Cost of electrical energy, Selection of type of generation and generation equipment, Performance and operating characteristics of power plants, Economic scheduling principle, Load curves, Effect of load on power plant design, Load forecasting, electric tariffs, Peak load pricing.

REFERENCE BOOKS

1. Deshpande, M.V., Power Plant Engineering, Tata McGraw Hill (2004).
2. Gupta, B.R., Generation of Electrical Energy, S. Chand (1998).
3. Deshpande, M.V., Electrical Power System Design, McGraw Hill (2004).
- Wood, A.J. and Wollenberg, B.F., Power Generation and Control, John Wiley (2004).

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Electrical & Electronics Engineering, V-Semester

Departmental Elective EX- 503 (B) Wind & Solar Energy

Unit-I

Solar Energy-Basic Concepts: Introduction, The Sun as Source of Energy, The Earth, Sun, Earth Radiation Spectrum, Extra-terrestrial and Terrestrial Radiations, Spectral Power Distribution of Solar Radiation, Depletion of Solar Radiation. Measurement of Solar Radiation, Solar Radiation Data, Solar Time, Solar Radiation Geometry, Solar Day Length, Extra-terrestrial Radiation on Horizontal Surface, Empirical Equations for Estimating Terrestrial Solar Radiation on Horizontal Surface, Solar Radiation on Inclined Plane Surface

Unit-II

Solar Thermal Systems: Introduction, Solar Collectors, Solar Water Heater, Solar Passive Space Heating and Cooling Systems, Solar Industrial Heating Systems, Solar Refrigeration and Air Conditioning Systems, Solar Cookers.

Unit-III

Solar Photovoltaic Systems: Introduction, Solar Cell Fundamentals, Solar Cell Characteristics, Solar Cell Classification, Solar Cell Technologies, Solar Cell, Module, and Array Construction, Maximizing the Solar PV Output and Load Matching. Maximum Power Point Tracker. Balance of System Components, Solar PV Systems, Solar PV Applications.

Unit-IV

Wind Energy: Introduction, Basic Principles of Wind Energy Conversion, History of Wind Energy, Wind Energy Scenario – World and India. The Nature of the Wind, The Power in the Wind, Forces on the Blades, Wind Energy Conversion, Wind Data and Energy Estimation, Site Selection Considerations. Wind energy systems: Environment and Economics Environmental benefits and problems of wind energy, Economics of wind energy.

Unit-V

Basic Components of a Wind Energy Conversion(WEC) System: Classification of WEC systems, Advantages and Disadvantages of WECS, Types of Wind Machines (Wind Energy Collectors), Analysis of Aerodynamic Forces Acting on the Blade, Performance of Wind- machines, Generating Systems, Energy Storage, Applications of Wind Energy, Environmental Aspects.

References Books:

1. Wind Energy Comes of Age by Paul Gipe, John Wiley & Sons Inc.
2. Wind power project & development by Joshua Earnest
3. Solar Engineering and Thermal Processes, J. A. Duffie and W.A. Beckman, 2nd Edition John Wiley and sons.
4. Solar Energy, G. N. Tiwari, Narosa Publishing House

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Electrical & Electronics Engineering, V-Semester

Departmental Elective EX- 503 (C) Renewable Power Generation

Unit-I

World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilisation – Renewable Energy Scenario in Tamil nadu, India and around the World – Potentials – Achievements / Applications – Economics of renewable energy systems.

Unit-II

Solar Radiation – Measurements of Solar Radiation – Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation – Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

Unit-III

Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects

Unit-IV

Biomass direct combustion – Biomass gasifiers – Biogas plants – Digesters – Ethanol production – Bio diesel – Cogeneration – Biomass Applications

Unit-V

Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage – Fuel Cell Systems – Hybrid Systems.

REFERENCE BOOKS

1. Rai. G.D., “Non Conventional Energy Sources”, Khanna Publishers, New Delhi, 2011.
2. Twidell, J.W. & Weir, A., “Renewable Energy Sources”, EFN Spon Ltd., UK, 2006.
3. Gupta, B.R., Generation of Electrical Energy, S. Chand (1998).
4. Solar Energy, G. N. Tiwari, Narosa Publishing House