

Thermal and Nuclear Power Plants

Module I :

Energy scenario. Overview of steam power plant. Analysis of steam cycles. Feedwater heaters. Deaerator and drain cooler. Optimization of cycle parameters, reheat and regeneration. Analysis of multi-fluid coupled cycles. Cogeneration of power and process heat. Combined cycle power generation. Fuels. Combustion mechanisms. Draft systems. Combustion control. Furnaces for burning coal in fluidized beds and in pulverized form. Coal handling installation.

Module II :

Different types of boilers and their specific uses. Boiler mountings and accessories. Feedwater treatment. Boiler maintenance. Circulation theory. Downcomers and risers. Drum and its internals. Economiser. Convective and radiant super heaters. Superheat temperature control. Recuperative and regenerative air preheaters. Dust and ash removal systems. Environmental aspects of power generation

Module III :

Basic concepts of reactor physics, radioactivity. Neutron Scattering. Thermal and fast reactors. Nuclear cross-sections. Neutron flux and reaction rates. Moderator criteria. Reactor core design. Conversion and breeding. Types of reactors. Characteristics of boiling water, pressurized water, pressurized heavy water, gas cooled and liquid metal cooled reactors. Future trends in reactor design and operation. Thermal-hydraulics of reactors. Heavy water management. Containment system for nuclear reactor. Reactor safety radiation shields. Waste management. Indian nuclear power programme.

Text Book:

M.M.El. Wakil., *‘Nuclear Power Engineering’*, McGraw Hill Book Company, New York, 1987.

2. S. Glasstone and A. Setonske., *‘Nuclear Reactors, Engineering’*, 3rd Ed., CBS Publishers and Distributors, 1992.

Reference

Loftness, *‘Nuclear Power Plants’*, D. Van Nostrand Company Inc, Princeton, 1964.

S. Sarg et al., *‘Physics of Nuclear Reactors’*, Tata McGraw Hill Publishing Company Ltd., 1985.

T. J. Connolly., *‘Fundamentals of Nuclear Energy’*, John Wiley, 1978.