



STEAM AND GAS POWER SYSTEMS

PROF. RAVI KUMAR

Department of Mechanical Engineering
IIT Roorkee

TYPE OF COURSE : Rerun | Core | UG/PG

COURSE DURATION : 8 weeks (21 Feb' 22 - 15 Apr' 22)

EXAM DATE : 24 Apr 2022

INTENDED AUDIENCE : It is a core course for UG students of Mechanical Engineering.

INDUSTRIES APPLICABLE TO : BHEL, NTPC and other private power industries

COURSE OUTLINE :

This Course provides a simple understanding of the steam and gas power systems. The course contains the analysis of vapour power cycle i.e. Rankine cycle, steam generators and their accessories, Performance of Boilers and combustion of fuel, high pressure boilers, flow through steam and gas nozzles, different type of steam turbines for power generation and condensers. The gas turbine cycle, working of gas turbines, centrifugal compressors, axial compressors and combustion chamber of gas turbines.

ABOUT INSTRUCTOR :

Prof. Ravi Kumar is a Professor in the Department of Mechanical & Industrial Engineering, Indian Institute of Technology Roorkee. He has been teaching thermal engineering courses in the Department and is actively involved in the research related with Solar Energy. He is a member of ASME, ASHRAE and IIFIIR.

COURSE PLAN :

- Week 1:** Review of Thermodynamics, Rankine Cycle, Performance of Rankine Cycle, Binary Vapour Cycle and Co-generation, Problem Solving
- Week 2:** Steam Generators, Fire Tube Boilers, Water Tube Boilers, Boiler Mountings and Accessories, High Pressure Boilers- LaMont and Benson Boilers
- Week 3:** High Pressure Boilers- Loeffler and Velox Boilers, Draught, Performance of Boilers, Combustion of Fuel, Problem Solving
- Week 4:** Boiler Trial, Nozzles and Diffusers-Momentum and Continuity Equations, Nozzles and Diffusers-Efficiency and Critical Pressure, Nozzles and Diffusers-General Relationship and supersaturated Flow, Problem Solving
- Week 5:** Steam Turbines, Compounding of Steam Turbines, Impulse Steam Turbines, Impulse Steam Turbine Performance, Problem Solving
- Week 6:** Impulse-Reaction Steam Turbines, Impulse-Reaction Turbine, Performance, Multistaging of Turbines, Condensers, Problem Solving
- Week 7:** Gas Turbine Cycles, Gas Turbine Cycle- Performance Evaluation, Gas Turbine Cycle- Effect of Operating Variables, Problem Solving, Centrifugal Compressors
- Week 8:** Centrifugal Compressor Characteristics, Axial Flow Compressors, Axial Flow Compressor Characteristics, Combustion Systems, Problem Solving