

Steam and Gas Turbines

Fundamentals of steam and gas turbines: Thermodynamics review – First & second Laws, Rankine and Brayton cycles; Steam turbine types – Impulse and reaction turbines; Gas turbine Types – Aero-derivative, Heavy-duty, Industrial; Working principles, Efficiency and heat rate; Components: Compressors, Combustion chambers, Turbines, Blades, Nozzles, Condensers.; Performance evaluation and modifications, Compounding in steam turbines: Performance metrics – Power output, Efficiency, Heat rate; Cycle improvements: Reheating, Regeneration, Intercooling; Binary vapour cycle, Cogeneration; Compressor and Turbine performance: Centrifugal vs Axial flow; Maintenance, Monitoring and Troubleshooting, Preventive & predictive maintenance techniques; Overhauling procedures, Component replacement; Vibration analysis, Thermography, Oil analysis; Troubleshooting common failures: Blade erosion, Overspeed, Flameouts, Emergency shutdown and Response protocols.; Control Systems, Case Studies & Emerging Technologies.

Control systems in steam & gas turbines; Start-up/Shutdown sequences, Safety considerations; Case studies – Diagnostic challenges and solutions; Alignment and balancing techniques; Advanced diagnostic tools – Borescope, Condition monitoring; Environmental and HSE Standards.