

Syllabus for Level-11 Post Code: NCB/CME-06

Cement Plant Operation: Cement manufacturing process from quarry to dispatch, Operation of crushers, stacker reclaimers and material handling systems, Operation of raw mills, coal mills and cement mills, Operation and maintenance aspects of rotary kiln, preheater and clinker cooler, Cement grinding systems including Ball Mill, VRM and Roller Press

Project Engineering in Cement Plants: Basic and detailed engineering concepts, Equipment selection and technical specifications, Preparation and interpretation of PFDs, P&IDs and layout drawings, Tendering, bid evaluation and vendor management, Inspection, testing and quality assurance, Erection, commissioning and performance testing

Project Management: Project planning, scheduling and monitoring (PERT/CPM/MS Project/Primavera basics), Cost estimation, budgeting and project control, Resource planning and contractor management, Procurement procedures and contract management, Risk management and mitigation strategies, Preparation of project reports and documentation

Energy Efficiency & Utility Systems: Energy efficient operation of cement plant equipment, Waste Heat Recovery (WHR) systems, Fans, pumps, compressors and utility optimisation, Reduction of specific power and heat consumption, Energy conservation opportunities in cement plants

Mechanical Equipment & Maintenance: Mechanical systems used in cement plants, Preventive, predictive and breakdown maintenance practices, Lubrication systems and condition monitoring, Alignment, balancing and vibration analysis, Troubleshooting of mills, kilns, coolers, fans, conveyors and pumps, Shutdown and turnaround maintenance planning

Fluid Mechanics and Thermal Sciences

Fluid Mechanics: Fluid properties; fluid statics, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings; basics of compressible fluid flow.

Heat Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan-Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis.