Syllabus for the post of JUNIOR TECHNICAL ASSISTANT (Chemical Engineering)
(WRITTEN TEST & SKILL TEST)

HEAT TRANSFER: Fundamentals of Heat Transfer, Steady State Heat Transfer by conduction through various geometric configuration, Heat Transfer by Convection and Measurement, Heat Transfer by Phase Change, Thermal Radiation and measurement, Heat Exchangers, Evaporation, Unsteady state heat transfer, Equipment set-up and maintenance.

FLUID FLOW OPERATION: Fluid Statics, Fluid dynamics, Behaviour of different types of fluids, Transportation of fluids, Fluidization, Fluidised and Packed bed flow, Flow and Level measurement, Drag coefficients and measurements, fluid friction measurement, Pumps, NPSH, Cavitation, Boundary Layer theory, Types of flow & Reynolds Apparatus, Equipment set-up and maintenance.

MASS TRANSFER: Introduction, Molecular Diffusion of Solids and Fluids, Prediction of Diffusion Coefficient Interphase Mass Transfer, Gas Absorption, Packed Bed Absorption, Liquid-Liquid Extraction, Leaching and Solid-Liquid Extraction, Batch and Sieve Plate Distillation, Humidification and Cooling Tower, Drying and Dryers and Adsorption, Equipment set-up and maintenance.

INSTRUMENTATION AND CONTROL: Introduction to Instrumentation, Temperature Measuring Devices, Measurement of Pressure & Vacuum, Measurement of Head & Level, Process Recording Instruments, Distributed Control Systems, Interacting & Non-Interacting Systems, Single and Two-Tank Systems, Equipment set-up and maintenance.

THERMODYNAMICS: Introduction and First law of thermodynamics, Second law of thermodynamics, Introduction to refrigeration and liquefaction, Vapour-Liquid equilibrium of pure and substance and mixtures.

REACTION ENGINEERING: Introduction to reaction engineering, Kinetics of homogeneous reaction, Interpretation of ideal and non-ideal reactor data, Introduction to reactors in series, PBR and Semi-batch reactor, RTD, Equipment set-up and maintenance.

ENGINEERING MEASUREMENTS: Introduction to Physical Quantities and Units, Linear Measurements, Precision Measurements, Measurement of Area, Measurement of Electrical Energy, Measurement of frictional coefficient, Measurement of volumetric flow rate & Mass flow rate, Measurement of pH, Measurement of hardness of water, Measurement of Specific Gravity, Measurement of Viscosity.

PROCESS CALCULATIONS: Introduction, Basic Chemical Calculations, Material Balance with and without chemical reaction, Energy Balance, Combustion, ideal gas law.

ENGINEERING MATERIALS: Corrosion, Coatings and Polymer Materials.

MECHANICAL OPERATION: Introduction and concepts of Mechanical Operations, particulate solids, Screen Analysis, Size Reduction, Sedimentation, Filtration, Agitation and Mixing, Equipment set-up and maintenance.

INDUSTRIAL SAFTY AND ENVIRONMENTAL ENGINEERING: General Introduction & Concept of Safety, Chemical & Fire Hazards & their Control, Other hazards & occupational diseases, Personal Protective Devices, Introduction to pollution, Air Pollution, Water pollution, Solid waste of disposal.

PLANT UTILITIES AND ENERGY ENGINEERING: Introduction, Conventional fuels, Non-conventional sources of energy, Water & Steam, Air & Refrigeration, Equipment set-up and maintenance.

COMPUTER AWARENESS: Applications of computers in Chemical Instrumentation and Process Control, Basic knowledge of Computer Applications, viz. MS Word, MS Excel, Power Point etc. Internet, MS-DOS, LINUX, Windows.

COMMUNICATION SKILLS: English grammar, vocabulary, oral and written communication.

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