

Diploma in Civil Engineering–Syllabus

Topic 1: Construction Materials

Overview of Construction Materials, Natural Construction Materials, Artificial Construction Materials, Special Construction Materials and Processed Construction Materials, Advanced Construction Materials, Advanced Concreting Methods and Equipments, Advanced Technology in Constructions, Hoisting and Conveying Equipment, Miscellaneous Machineries and Equipments

Topic 2: Basic Surveying

Overview and Classification of Survey, Chain Surveying, Compass Traverse Survey, Levelling and Contouring, Measurement of Area and Volume, Plane Table Surveying, Theodolite Surveying, Tacheometric surveying and Curve setting, Advanced surveying equipments, Remote sensing, GPS and GIS.

Topic 3: Mechanics of Material

Moment of Inertia, Simple Stresses and Strains, Shear Force and Bending Moment, Bending and Shear Stresses in beams and Columns.

Topic 4: Building Construction

Overview of Building Components, Construction of Substructure, Construction of Superstructure, Building Communication and Ventilation and Building Finishes, Conventions and Symbols, Planning of Building, Drawing of Load Bearing Structure, Drawing of Framed Structure, Overview of Building Services, Modes of vertical communication, Fire Safety, Plumbing Services, Lighting, Ventilation and Acoustics

Topic 5: Concrete Technology

Cement, Aggregates and Water, Different grades of concrete, Concrete Mix Design and Testing of Concrete, Quality Control of Concrete and Chemical Admixture, Special Concrete and Extreme Weather concreting.

Topic 6: Geotechnical Engineering

Overview of Geology and Geotechnical Engineering, Physical and Index Properties of Soil, Permeability and Shear Strength of Soil, Bearing Capacity of Soil, Compaction and stabilization of soil

Topic 7: Hydraulics

Pressure measurement and Hydrostatic pressure, Fluid Flow Parameters, Flow through pipes, Flow through Open Channel, Hydraulic Pumps, Introduction to Hydrology, Crop water

requirement and Reservoir Planning, Dams and Spillways, Minor and Micro Irrigation, Diversion Head Works & Canals.

Topic 8: Theory of structures

Direct and Bending Stresses in vertical members, Slope and Deflection, Fixed and Continuous Beam, Moment distribution method, Simple trusses, Design of Steel Tension and Compression Members, Design of Steel beams (Limit State Method), Design of Reinforced Concrete Beams by Limit State Method, Shear, Bond and Development length in Design of RCC member, Design of axially loaded RCC Column. Basics of maintenance, Causes and detection of damages, Materials for maintenance and repairs, Maintenance and repair methods for masonry Construction, Maintenance and repair methods for RCC Construction, Design of connections in steel structures, Steel Beams, Design of RC flanged beam, Design of slab, Design of RCC Column and Footing design: Uni-axial bending

Topic 9: Transportation Engineering

Overview of Highway Engineering, Geometric Design of Highway, Construction of Road Pavements, Basics of Railway Engineering, Track geometrics & Construction and Maintenance.

Topic 10: Construction Management

Construction industry and management, Site Layout, Planning and scheduling, Construction Contracts and Specifications, Safety in Construction

Topic 11: Estimating and Costing

Fundamentals of Estimating and Costing, Approximate Estimates, Detailed Estimate, Estimate for Civil Engineering Works, Rate Analysis.

Topic 12: Traffic Engineering

Fundamentals of Traffic Engineering, Traffic Studies, Road Signs and Traffic Markings, Traffic Signals and Traffic Islands, Road Accident Studies and Arboriculture. Basics of pavement Design, Fundamentals of pavement design, Design overview of Flexible and Concrete pavement, Pavement evaluation and Pavement Maintenance.

Topic 12: Green Building and Energy Conservation

Introduction to Green Building and Design Features, Energy Audit and Environmental Impact Assessment (EIA), Energy and Energy conservation, Green Building and Rating System

Diploma in Mechanical Engineering–Syllabus

Topic 1: MECHANICAL ENGINEERING

Introduction to Thermodynamics, Heat transfer & Thermal Power Plant, Steam Turbines, Materials and Manufacturing Processes, Machine Tools and Machining Processes, Process Planning and Process Engineering, Production Forecasting, Break-Even Analysis, Assembly Line Balancing, Material Management

Topic 2: MATERIAL SCIENCE & ENGINEERING

Crystal structures and Bonds, Phase diagrams, Ferrous metals and its Alloys, Non-ferrous metals and its Alloys, Failure analysis & Testing of Materials, Corrosion & Surface Engineering

Topic 3: FLUID MECHANICS & HYDRAULIC MACHINERY

Properties of fluid, Fluid Flow, Impact of jets, Hydraulic Turbines, Centrifugal Pumps.

Topic 4: MANUFACTURING ENGINEERING

Cutting Fluids & Lubricants, Broaching Machines, Welding, Gear Making, Grinding and finishing processes.

Topic 5: THERMAL ENGINEERING

Sources of Energy, Internal Combustion Engines, : I.C. Engine Systems, Performance of I.C. Engines, Air Compressors, Gas Turbines, Properties of Steam, Steam Generators, Steam Nozzles, Steam Turbines

Topic 6: MEASUREMENTS & METROLOGY

Introduction to measurements, Transducers and Strain gauges, Applied mechanical measurement, Limits, Fits & Tolerances, Gear Measurement and Testing, Machine tool testing

Topic 7: STRENGTH OF MATERIALS

Simple Stresses and Strains, Shear Force & Bending Moment Diagrams, Theory of Simple Bending and Deflection of Beams, Torsion in Shafts and Springs, Thin Cylindrical Shells

Topic 8: ADVANCED MANUFACTURING PROCESSES

Jigs & Fixtures, Jig Boring, Modern Machining Processes, CNC Milling Machines, Special Purpose Machines

Topic 9: THEORY OF MACHINES & MECHANISMS

Cutting Fluids & Lubricants, Broaching Machines, Welding, Gear Making, Grinding and finishing processes.

Topic 10: Design of Machine Elements

Introduction to Design, Design of simple machine parts, Design of Shafts, Keys, Couplings and Spur Gears, Design of Power Screws, Design of springs, Design of Fasteners

Topic 11: TOOL ENGINEERING

Metal Cutting, Machinability, Types of dies and construction, Die Design Fundamentals, Forming Dies, Pressure Die casting dies; metal extrusion dies; injection molding dies; forging dies; plastic extrusion dies

Topic 12: COMPUTER INTEGRATED MANUFACTURING/ CAD/ CAM

Computer Integrated Manufacturing (CIM), Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Flexible manufacturing system (FMS), Computer aided production scheduling; computer aided inspection planning; computer aided inventory planning, Fundamentals of CAD/CAM, Surface Modeling, NC Control Production Systems.

Topic 13: INDUSTRIAL ROBOTICS & AUTOMATION/ MECHATRONICS

Fundamentals of Robotics, Robotic Drive System and Controller, Sensors, Robot kinematics and Robot Programming, Automation. Introduction to Mechatronics.

Topic 13: HEAT TRANSFER/ REFRIGERATION AND AIR-CONDITIONING

Conduction, Fins, Convection, Radiation, Heat exchangers, Introduction to Refrigeration, Refrigeration systems, Refrigeration Equipments, Refrigerants and lubricants, Refrigerant flow controls, Air conditioning

Topic 14: POWER PLANT ENGINEERING

Introduction to Power plant, Economics of power plant, Hydro power plant, Diesel and Gas turbine plant, Environmental impact of Power plant, Nuclear power plant, Material Handling System, Hoisting Machinery & Equipments, Conveying Machinery

Diploma in HR Examination Syllabus

Topic-I: Principles of Management – Introduction to Management, Planning & Decision Making, Organising & Staffing, Directing & Communication, Motivation & Leadership

Topic-II: BUSINESS ENVIRONMENT– – Concepts of Vision, Mission & Strategy Statements– Types of Environment:– Internal to the Enterprise– Value System, Management Structure and Nature, Human Resource, Company Image and Brand Value, External environment to the Enterprise, Forms of Business Organization, Global business environment, Business Process Management (BPM), Knowledge Process management (KPO) –E-Business– M-Commerce- Business foundation skills-Business Concept Development-Creative thinking-Critical thinking-Crisis management – Start up initiative Incubation- Government initiatives.

Topic-III: BUSINESS DECISION THEORIES– —Demand analysis: Meaning of demand— Law of demand— Classification of demand—Demand function—Measure of demand— Methods of measurement of demand. Supply analysis: Law of supply—Determinants of supply—Supply function— Elasticity of supply—Equilibrium, GDP—Methods of measurement of GDP—NDP— NNP-- GNP—considerations for measuring GNP—Income method--Expenditure method, Market structure—Monopoly—Duopoly—Oligopoly and Perfect competition, Consumer Behaviour, Cost Analysis: Fixed cost—Average fixed cost— Variable cost—Average variable cost—Total cost.

Topic-IV: MANAGEMENT INFORMATION SYSTEM – Introduction to MIS, Concepts of information - Nature of information - Definition and Types of management information, Value and cost of information - Types of information systems - Operations support system - Transaction Processing Systems - Decision support System - Process Control Systems - Executive support system - Formal and Informal information system - Knowledge Work Systems- Expert system Artificial intelligence, Planning information system - Developing information system - System Analysis and design - Implementing Information System acquisition - Managing and Controlling information system resources - Information resources management, ERP Concepts, Evolution of ERP, ERP packages, ERP Evaluation, ERP implementation.

Topic-V: Personnel Management: Functions, Structure of Personnel Department, Line and Staff, Job Analysis, Manpower Planning, Recruitment and Selection, Placement and Induction, Wage and Salary Administration, Job evaluation, Methods of Wage payment linking wages with productivity, Grievance handling and Disciplinary action.

Topic-VI: HRD Concepts: Evolution, Functions, Performance appraisal, Training and Development, Quality of worklife, Career planning, Quality circles, Training Programmes for workers. Management Development Programmes and Evaluation of training.

Topic-VII: Organisational Behaviour Concepts: Evolution. Role, Group dynamics, Motivation, Leadership. Job satisfaction, Morale, Patigue and Monotony Organisational change and Development, Organisational effectiveness.

Topic–VIII: Industrial Relations: Approaches. Industrial Relations System, Industrial disputes: Causes, Effects, Trends. Methods and Machinery for the settlement of Industrial disputes, Workers participation in Management. Code of discipline, Tripartite bodies, ILO, Industrial relations and the new economic reforms.

Topic-IX: Social Work & Human Growth: Human Growth & Development, Social Policy & Planning, Social Development, Counselling.

BHEL Examination Pattern – for General Section (Common Sections) For Supervisor Trainees (STs)

- i) Questions on Test of Reasoning - 20 Questions
Venn Diagrams
Similar Pairs/ Analogies
Data Interpretation
Passage – True/False statements/ analogies
Logical Reasoning
Basic Maths/ Aptitude
Integers/ Percentages/ Prime Numbers etc

- ii) Questions on General Knowledge - 10 Questions
Self-Explanatory – as per current trends, history, geography, political, sports etc

- iii) Questions on General English - 20 Questions
04 Questions on closest meaning words/ Synonyms/ Antonyms
04 Questions on Reading Comprehension/Small Passages
04 Questions on sentence re-arrangement
04 Questions on sentence completion/ preposition use
04 Questions on misspelling/ wrong usage of word