

ANNEXURE - VI

M.E./M.Tech. Admissions (2009-2010) SYLLABUS FOR M.E. (CIVIL) ENTRANCE TEST

1. STRUCTURAL ENGINEERING

- Strength of Materials: Simple Stress and Strains, elastic constants, shear forces and bending moment diagrams for beams, principal stresses and Mohr's stress circle, bending and shear stresses, deflections, torsion, thin and thick cylinders and fixed beams, shear centre, trusses, Betti-Maxwell theorem, unsymmetrical bending.
- Theory of Structures: Direct and bending stresses, Columns, Strain energy, Moving loads and influence lines, Arches, Suspension bridges – static and kinematic indeterminacy, Moment distribution, Slope deflection and Kani's methods applied to continuous beams and portal frames, column analogy, matrix methods.
- Concrete Structures: Materials and stresses, stress blocks limit state and working stress methods of design of Beams, Slabs, Columns and Footings. Retaining walls, water tanks, Slab and T-Beam bridges, design for shear and torsion, yield line theory.
- Steel Structures: Riveted and welded joints and connections, simple and compound columns, column bases, roof trusses, plate and gantry girders, plate girder and lattice girder railway bridges and bearings. Plastic analysis and design of beams and frames.
- Prestressed concrete: Basic concepts, material losses, system of prestressing analysis and design of beams.

2. GEOTECHNICAL ENGINEERING

- Soil Mechanics: Physical properties of soils, Classification and Identification, Permeability, Capillarity, Seepage, Compaction, Consolidation, Shear strength, Earth pressure, Slope stability.
- Foundation Engineering: Stress distribution in soils, Bearing capacity, Settlement analysis, Pile foundations, Cofferdams, Caissons, Dewatering, Bracing for excavations, Site investigations, Newmark charts, machine foundations.
- Engineering Geology: Mineralogy, Structural Geology Groundwater Earthquake Engineering, Tunnels, Dams and Reservoirs, rock mechanics, Geological hazards..

3. HYDRO MECHANICS AND WATER POWER ENGINEERING

- Fluid Mechanics: Basic concepts, Fluid STATICS, KYNEMATICS AND DYNAMICS, Measurement of flow, Compressible flow, Flow Through pipes, Open channel flow, Similarity concepts, Hydraulic machines-Turbines and pumps.
- Hydrology: Rainfall, Runoff, Floods, Groundwater, hydrographs, flood control and mitigation.
- Irrigation: Diversion Head Works, Canals, Corp water requirement, Soil agronomy, Water management, wears, cross drainage works, canal falls.
- Dam Engineering: Storage works, Dams, Surplus works, Energy dissipation, Earth dam.
- Water Power: Development, Power House, Components.

4. OTHER TOPICS:

Elements of Surveying: Plane table, compass, Leveling and theodolite survey, Building materials and technology, Elements of estimation transportation and environmental engineering, CPM and PERT, remote sensing and GIS, contracts and tenders.

MODEL question paper for M.E.(Civil) Entrance Test

Note:

- The Question Paper consists of 120 multiple choice questions to be answered in 120 minutes.
- OMR Answer Sheets will be supplied for answering the test.

Model Questions:

- Poisson's ratio for mild steel is about
(a) 0.2 (b) 0.3 (c) 0.4 (d) 0.5
- Maximum bending moment in a simply supported beam of span 6m and carrying a UDL of 4 kN/m over its left half span is equal to
(a) 10 kN m (b) 12 kN m (c) 8 kN m (d) None of these

M.E./M.Tech. Admissions (2009-2010)

SYLLABUS FOR M.E. (MECH.) ENTRANCE TEST

Engineering Mechanics: Free body diagrams and equilibrium, trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion, including impulse and momentum (linear and angular) and energy formulations; impact.

Strength of Materials: Stress and strain, stress-strain relationship and elastic constants, Mohr's circle for plane stress and plane strain, thin cylinders, shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns, strain energy methods, thermal stresses.

Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of slider-crank mechanism; gear trains, fly wheels.

Vibrations: Free and forced vibration of single degree of freedom systems; effect of damping, vibration isolation, resonance, critical speeds of shafts.

Design: Design for static and dynamic loading, failure theories, fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints, shafts, spur gears, rolling and sliding contact bearings, brakes and clutches.

FLUID MECHANICS AND THERMAL SCIENCES

Fluid Mechanics: Fluid properties, fluid statics, manometry, buoyancy; control – volume analysis of mass momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; viscous flow of incompressible fluids; boundary layer; elementary turbulent flow; flow through pipes, head losses in pipes, bends.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept, electrical analogy, unsteady heat conduction, fins; dimensionless parameters in free and forced convective heat transfer, various correlations for heat transfer inflow over flat plates and through pipes; thermal boundary layer; effect of turbulence; radiative heat transfer, black and grey surfaces, shape factors, networks analysis, heat exchanger performance, LMTD and NTU methods.

Thermodynamics: Zeroth, First and Second laws of thermodynamics; thermodynamic system and processes; Carnot cycle, Irreversibility and availability, behaviour of ideal and real gases, properties of pure substances, calculation of work and heat in ideal processes; analysis of thermodynamic cycles related to energy conversion.

Applications: Power Engineering; Steam tables, Ranking, Brayton cycles with regeneration and reheat.

I.C. Engines: air-standard Otto, Diesel cycles, Refrigeration and air-conditioning; Vapour refrigeration cycle, heat pumps, gas refrigeration, Reverse Brayton cycle, moist air psychrometric chart, basic psychrometric processes. Turbo machinery, Pelton-wheel, Francis and Kaplan turbines – impulse and reaction principles, velocity diagrams.

MANUFACTURING AND INDUSTRIAL ENGINEERING

Engineering Materials: Structure and properties of engineering materials, heat treatment, stress strain diagrams for engineering materials.

Metal Casting: Design of patterns, moulds and cores; Solidification and cooling, riser and gating design, design considerations.

Forming: Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of power metallurgy.

Joining: Physics of welding, brazing and soldering; adhesive bonding design considerations in welding.

Machining and Machine Tool Operations: Mechanics of machining, single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining, principles of non-traditional machining processes; principles of work holding, principles of design of jigs and fixtures.

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools. Production Planning and Control: Forecasting models, aggregate production planning, scheduling, materials requirement planning.

Inventory Control: Deterministic and probabilistic models; safety stock inventory control systems.

Operations Research: Linear programming, simplex and duplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

MODEL question paper for M.E.(Mech.) Entrance Test

- Note:**
1. The Entrance test paper consists of 120 multiple choice questions to be answered in 120 minutes.
 2. OMR Answer sheets will be supplied for answering the test.

Model Paper:

- Ex:
1. High carbon steel is used for the manufactures of
 - a) Solid drawntube
 - b) Angle iron
 - c) Boiler plates
 - d) Hammers

M.E./M.Tech. Admissions (2009-2010)
SYLLABUS FOR M.E. (ECE) ENTRANCE TEST

(A) BASIC ENGINEERING MATHEMATICS

1. Differential and integral calculus Partial and total differentials. Composite functions.
2. Systems of linear equations. Matrices and determinants, rank, Cramer's rule. Eigenvalue and Eigen vectors.
3. Differential equations. Homogeneous and non-homogeneous power series.
4. Theory of complex variables. Cauchy-Riemann equations Cauchy's residue theorem. Singular points, Evaluation of residues.
5. Vector products. Gradient curve.

(B) NETWORK ANALYSIS

Topological description of a network, KVL, KCL, Mesh and nodal analysis. First order and second order circuits, RL, RC and RLC circuits. Forced and Natural response of network, Step, Impulse and sinusoidal inputs. Transient and steady state response, Laplace transforms method of solution, Network theorems, Implications of linearity, Signal analysis, Two port networks.

(C) ELECTRONIC DEVICES AND CIRCUITS

Theory of semiconductors, P-n junction, BJT, JEET, MOSFET characteristics, Basic amplifier configurations, Biasing of BJT and JEET, Difference Amplifier, R-C coupled amplifier, Frequency response, Feedback in amplifiers, Power amplifiers, Power rectification.

(D) PULSE AND DIGITAL CIRCUITS

Linear wave shaping, Non-linear wave shaping, Sweep circuits, Multivibrators, Logic gates, Boolean Algebra, Arithmetic circuits, TTL, MOS, CMOS, Flip-Flops, Counters, Shift Registers.

(E) FEEDBACK CONTROL SYSTEMS

Types of systems, Steady state errors, System modelling, Transfer Functions, Stability, Frequency response Techniques, Root Locus Diagrams, Compensation, Control System components, Signal flow graphs and block diagrams.

(F) ELECTROMAGNETIC THEORY

Electro statics: Gauss law, potential function, divergence theorem, Coulomb's law, Poisson's equation, Laplace equation, capacitance.

Static Magnetic field: Magnetic flux, Flux density, Ampere's Law, Biot Savart's Law, Stokes theorem, MMF, Vector potential.

Maxwell's Equations: Time varying fields, Ampere's work law in differential form. Maxwell's equations in differential and Integral forms, Boundary conditions, Energy theorem. Poynting theorem.

Uniform Plane Waves: Wave equation, Solution to wave equation, Reflection, Refraction, Skin effect.

MODEL question paper for M.E.(E.C.E) Entrance Test

Note: The entrance test paper consists of 120 multiple choice questions to be answered in 120 minutes. OMR Answer sheets will be supplied for answering the test.

Example:

1. Simplified form of $AB + \bar{A}BC + \bar{A}B\bar{C}$ is

- a) $A\bar{B}$ b) ABC c) B d) $\bar{A}BC$

2. Linearity in networks implies

- a) Reciprocity b) Casualty c) Superposition d) Time invariance

M.E./M.Tech. Admissions (2009-2010)
Syllabus for M.E. (EE) entrance test

Electric Circuits and Fields: Network graph, KCL, KVL, node and mesh analysis, transient response of dc and ac networks, sinusoidal steady-state analysis, resonance, basic filter concepts; ideal current and voltage sources, Thevenin's, Norton's and Superposition and Maximum Power Transfer theorems, two-port networks, three phase circuits; Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere's and Biot-Savart's laws; inductance; dielectrics; capacitance.

Signals and Systems: Representation of continuous and discrete-time signals; shifting and scaling operations; linear; time-invariant and causal systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.

Electrical Machine: Single phase transformer-equivalent circuit, phasor diagram, tests, regulation and efficiency; three phase transformers-connections, parallel operation; auto-transformer; energy conversion principles; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors – principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines – performance, regulation and parallel operation of generators, motor starting characteristics and applications; servo and stepper motors.

Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference, distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control power factor correction; economic operation; symmetrical components fault analysis, principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS concepts.

Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Nyquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; state space model; state transition matrix, controllability and observability.

Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurements of voltage, current, power, energy and power factor; instrument transformers; digital voltmeters and multi-meters; phase, time and frequency measurement; Q-meters; oscilloscopes; potentiometric recorders; error analysis.

Analog and Digital Electronics: Characteristics of diodes, BJT, FET; amplifiers – biasing, equivalent circuit and frequency response oscillators and feedback amplifiers; operational amplifiers – characteristics and applications; simple active filters; VCOs and timers; combinational and sequential logic circuits, multiplexer; Schmitt trigger, multi-vibrators, sample and hold circuits; A/D and D/A converters; 8-bit microprocessor basics, architecture, programming and interfacing.

Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, CTOs, MOSFETs and IGBTs – static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge converters – fully controlled and half controlled; principles of choppers and inverters; basis concepts of adjustable speed dc and ac drives.

MODEL question paper for M.E. (E.E.) Entrance Test

Note: The entrance test paper consists of 120 multiple choice questions to be answered in 120 minutes. omr answer sheets will be supplied for answering the test.

Example:

1. Linearity in networks implies

- a) Reciprocity b) Casualty c) Superposition d) Time invariance

M.Tech. Admissions (2009-2010)
Syllabus for M.Tech. (cse) entrance test

ENGINEERING MATHEMATICS: Mathematical Logic: Propositional Logic, First order Logic;

Probability: Conditional probability, Mean, Median, Mode and Standard Deviation; Random Variables; Distributions; Uniform, normal, exponential, Poisson, Binomial.

Set Theory & Algebra: Sets; Relations; Functions; Groups; Partial orders: Lattice; Boolean Algebra.

Combinatorics; Permutations; combinations; counting; Summation; generating functions; recurrence relations; asymptotics.

Graph theory: Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

Linear Algebra: Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors.

Numerical Methods: LU decomposition for systems of linear equations; numerical solutions of non-linear algebraic equations by Secant, Bisection and Newton-Raphson Methods; Numerical integration by trapezoidal and Simpson's rules.

Calculus: Limit, Continuity & differentiability, mean value Theorems, Theorems of integral calculus, evaluation of definite & improper integrals, partial derivatives, Total derivatives, maxima & minima.

COMPUTER SCIENCE AND ENGINEERING

Theory of computation: Regular languages and finite automata, context free languages and push-down automata, Recursively enumerable sets and Turing machines, undecidability NP-completeness.

Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point)

Computer Organization and Architecture: Machine instructions and addressing modes ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage.

Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, worst and average case analysis; Design; Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; hashing, Sorting, Searching.

Compiler Design: Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target Code generation, Basics of code optimization.

Operating System: processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and Security.

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Computer Networks: ISO/OSI Stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, routing algorithms, congestion control, TCP/UDP and sockets, IP (v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); basic concepts of hubs, switches, gateways, and routers.

Note: It is recommended to set the question paper having 30% of the questions from Engineering Mathematics and 70 % of questions from the Computer Science and Engineering part of the syllabus.

MODEL question paper for M.Tech. (C.S.E) Entrance Test

Note: The entrance test paper consists of 120 multiple choice questions to be answered in 120 minutes on OMR answer sheet.

1. If a set A has n elements, then the number of objective functions from A to A are
a. n b. n^2 c. 2^n d. n!
2. In two Phase locking, how many number of different locks are used
a. 2 b.3 c.4 d.5