

## ADMISSION TO M.E./M.Tech. PROGRAMME

**Mode of Program:** Regular

**Duration of Program:** January, 2019 to December, 2020 (4 Semesters)

The normal duration of programme leading to the M.E./M.Tech. degree shall be two years (four semesters) for regular students, which includes course work of twelve subjects, seminar, minor project and Dissertation. The maximum duration for regular programmes is six semesters.

### **Mode of Selection:**

Vacant Seats for departments Computer Science and Engineering, Electronics and Communication Engineering, Civil Engineering and Mechanical Engineering shall be done by conducting offline entrance test.

For Other Departments, vacant seats shall be filled on the basis of merit prepared by giving 30% weightage to 12<sup>th</sup> marks and 70% weightage to B.E./B.Tech. marks (upto end of pre-final year).

**Eligibility:** Overall minimum 60% (55% for SC/ST/Industry sponsored) in qualifying exam (B.E./B.Tech.) shall be required to be eligible for admission.

### **GENERAL INFORMATION REGARDING M.E./M.TECH. ENTRANCE TEST INCLUDING ENTRANCE TEST SYLLABUS**

**Duration of Test:** 120 minutes (90 Questions)

**Maximum Marks:** 90

**Minimum of 30% (25% for SC/ST) marks are required to qualify the test. There will be no negative marking in the test.**

#### **Components of Test**

1. Engineering Mathematics	(Common for all)	15 Questions	} <b>90 Questions</b>
2. General Aptitude (GA)	(Common for all)	15 Questions	
3. Subject Knowledge		60 Questions	

#### **SYLLABUS FOR ENGINEERING MATHEMATICS (Common for all)**

**Linear algebra:** Algebra of matrices; rank of matrix; System of linear equations; Eigen values and Eigen vectors.

**Calculus:** Functions of single variable; Limit, continuity and differentiability; Mean value theorems; Local maxima and minima; Evaluation of definite and indefinite integrals, application of definite integral to area; Partial derivatives; Total derivative; double and triple integrals; Gradient, Divergence and Curl, Vector identities, Directional derivatives; Line, surface and volume integrals; Gauss, Stoke's and Green 's theorem.

**Ordinary Differential Equations (ODE):** First order (linear and nonlinear) equations; higher order of linear Differential equations with constant coefficients; Euler – Cauchy equations.

**Probability and statistics:** mean, median, mode and standard deviation Definitions of probability, conditional probability, Bayes theorem; random variables, Binomial, Poisson and Normal distributions; Correlation and regression analysis.

**Numerical Methods:** Numerical solutions of linear and nonlinear algebraic equations; Integration by trapezoidal and Simpson's rule; numerical solution of first order differential equation by using Euler's method and fourth order Runge – Kutta method.

### **SYLLABUS FOR GENERAL APTITUDE (GA) (Common for all)**

**Verbal Ability:** English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

**Numerical Ability:** Numerical computation, numerical estimation, numerical reasoning and data interpretation.

### **SYLLABUS FOR SUBJECT KNOWLEDGE**

#### **ME – CAD/CAM ENGINEERING/THERMAL ENGINEERING/PRODUCTION ENGINEERING**

**Design:** Mechanics, Solid Mechanics, Machine Design, Theory of Machines, Mechanical vibrations, Machine Drawing, Computer Aided Design, Computer Aided Manufacturing, Robotics, Industrial Automation

**Thermal Engineering:** Thermodynamics, Thermodynamic Cycles (Carnot, Otto, Diesel, Rankine, Brayton) IC Engines and Gas Turbines, Turbo Machines, Fluid Mechanics and Machinery, Refrigeration and Air Conditioning, Heat and Mass Transfer, Power Plant Engineering, Non-conventional Sources of Energy, Combustion Stoichiometry

**Production and Industrial Engineering:** Manufacturing Processes/Technologies, Machining Science, Industrial Engineering, Production Management, Inspection and Quality Control, Measurement Techniques, Material Science and Metallurgy.

**Subject Knowledge component of Entrance Test for admission to ME – CAD/CAM Engineering/Thermal Engineering/Production Engineering shall consist of 60 question. Questions will be equally divided (20 each) from the three paragraphs on Design, Thermal and Production Engineering.**

#### **M.E. – STRUCTURAL ENGINEERING/INFRASTRUCTURE ENGINEERING**

**Structural Engineering:** Bending moment and shear force diagrams. Analysis of pin jointed and rigid plane frames. Influence lines. Concrete Technology: Concept of quality control. Concrete making materials. Properties of fresh and hardened concrete. Methods of concrete mix design. Reinforced Concrete Design: Limit state design methods for flexure, shear, bond and torsion. Design of basic elements using IS: 456-2000. Design of Steel Structures: Design of tension and compression members. Design of beams and columns (including bases and foundations as per IS: 800-2007). Welded and riveted joints. Earthquake resistant design of structures

**Geotechnical Engineering:** Soil classification, engineering properties of soil, permeability and seepage, effective stress principle: consolidation, compaction, shear strength. Sub-surface investigation, earth pressure theories, foundation design requirements, bearing capacity, shallow and deep foundations, load capacity of piles in sands and clays.

**Highway & Transportation Engineering:** Highway planning, Geometric design of Highways, Testing and specifications of paving materials, Design of flexible and rigid road pavements as per IRC guidelines, Geometric design of runway & taxiways, Pavement markings & lighting, FAA method of runway & taxiway pavement design, Marshall method of mix designing, Geometric & structural design of Permanent way as per Indian Railways guidelines.

**Water Resources and Hydraulics:** Hydrostatics, applications of Bernoulli equation, laminar and turbulent flow in pipes, critical flow and gradually varied flow in channels, hydraulic jump, dimensional analysis and hydraulic modelling. Hydrologic cycle, rainfall, evaporation infiltration, unit hydrographs, flood estimation, Irrigation methods, Duty, delta, estimation of evapo-transpiration, crop water requirements, design of lined and unlined canals.

**Environmental Engineering:** Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, effluent discharge standards.

**Surveying & Construction Management:** Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Levelling and trigonometric levelling; Traversing and triangulation survey. Types of construction projects, Tendering and construction contracts, Rate analysis and standard specifications, Cost estimation of building & road projects, Project planning and network analysis - PERT and CPM.

**Subject Knowledge component of Entrance Test for admission to M.E. (Structural Engineering & Infrastructure Engineering) shall consist of 60 question. There will be 24 questions from Structural Engineering, 8 questions from Geotechnical Engineering, 8 questions from Highway & Transportation Engineering, 8 questions from Water resource & Hydraulic Engineering and 12 questions from Environmental Engineering, Surveying & Construction Management.**

#### **M.E. – ELECTRONICS & COMMUNICATION ENGINEERING and M.Tech. – VLSI DESIGN**

**Communication Systems:** Fourier analysis of signals amplitude, phase and power spectrum, Autocorrelation and cross-correlation and their Fourier transforms. Signal transmission through linear time-invariant (LTI) system, impulse response and frequency response, group delay and phase delay. Analog modulation systems-amplitude and angle modulation and demodulation systems, spectral, analysis of operations, super heterodyne receivers, elements of hardware realizations of analog communication systems. Basic sampling theorem. Pulse code modulation (PCM), differential pulse code modulation (DPCM), delta modulation (DM), amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK). Multiplexing time-division and frequency division, Additive Gaussian noise characterization using correlation. Probability density function (PDF), power spectral density (PSD). Signal to noise ratio (SNR) calculation for amplitude modulation (AM) and frequency (FM) for low noise conditions.

**Electromagnetism Antennas:** Elements of vector calculus: gradient, divergence and curl; Gauss' and Stokes' theorems, Maxwell's equations: differential and integral forms. Wave equation. Pointing vector Plane waves: propagation through various media; reflection; phase and group velocity; Skin depth Transmission lines: Characteristics impedance; impedance transformation, Smith Chart, Impedance matching pulse excitation. Modes in rectangular waveguides; Boundary conditions; Cut-off frequencies; Dispersion relations. Dipole antennas; antenna arrays; radiation pattern; reciprocity theorem; antenna gain.

**Analog and Digital Circuits:** Characteristics and equivalent circuits (large and small signal) of diodes, BJTs, JFETs and MOSFETs Simple diode circuits: clipping, clamping, rectifier Biasing and bias stability of transistor and FET amplifiers. Amplifiers: single and multi-stage, differential, operational; feedback and power. Amplifiers; frequency response of amplifiers. Simple op-amp circuits. Filters, Sinusoidal oscillators: criterion for oscillation; single-transistor and op-amp configurations. Function generators & wave-shaping circuits Power supplies, Boolean algebra; minimization of Boolean functions; logic gates, Digital IC families (DTL, TTL, ECL, MOS, CMOS). Combinational circuits; arithmetic circuits, code converters, multiplexers and decoders.

Sequential circuits; latches and flip-flops, counters and shift registers. Comparators, timer, multi-vibrators. Sample and hold circuits, ADCs and DACs. Semiconductor memories.

**Networks:** Network graphs; matrices associated with graphs, incidence, fundamental cut set and fundamental circuit matrices. Solution methods: nodal and mesh analysis. Network theorems: superposition, Thevenin and Norton's Maximum Power Transfer, Wye-Delta Transformation Steady state sinusoidal analysis using phasors. Fourier series. Linear constant coefficient differential and difference equations; time domain analysis of simple RLC circuits. Laplace and Z transforms; frequency domain analysis of RLC circuits. Convolution 2 port network parameters driving point and transfer functions. State equations for networks.

**Fundamentals of Computer Programming and Data Structures:** Basics of Computers; Operators, Datatypes, Expression, Control Flow statement, Functions, Arrays, Strings, pointers, structures, and unions. Data types, structures, stacks, queues, and linked lists. Sorting and Searching, B-trees, B+ trees and hashing.

**Microprocessors and Computer Architecture:** Evolution, microcomputer architecture; Intel 8085: architecture, addressing mode, Instruction set, programming technique, Interrupt Structure; Intel 8086: architecture, concept of segmented memory, addressing modes, Instruction set, programming techniques, Interrupt Structure; Interfacing devices i.e. 8255, 8279, 8257, 8253, 8259 etc. memory and I/O interfacing, read/write timing diagrams. Basic computer organization and Design, memory organization, I/O organization, I/O Devices, Data transfer techniques, Register transfer Language Microprogrammed control, CPU, Concept and CISC and RISC architecture.

**Subject Knowledge component of Entrance Test for admission to M.E. – Electronics & Communication Engineering and M.Tech. – VLSI Design shall consist of 60 question. There will be 16 questions from Communication Systems, 8 questions from Electromagnetism Antennas, 16 questions from Analog and Digital Circuits, 12 questions from Networks, 4 questions from Fundamentals of Computer Programming and Data Structures, and 4 questions from Microprocessors and Computer Architecture.**

### **M.E. – COMPUTER SCIENCE & ENGINEERING and SOFTWARE ENGINEERING**

**Digital Logic:** Logic functions, minimization, design and synthesis of combinational and sequential circuits; Number Representation and Computer Arithmetic;

**Computer Organization:** Machine instructions and addressing modes, ALU and data-paths, hardwired and micro-programmed control, memory interface, I/O interfaces, serial communication interface, instruction pipelining, cache, main and secondary storage.

**Programming Methodology:** C programming, program control, functions, recursion, scope, binding, parameter passing, pointers, array handling, structures and unions, file handling, elementary concepts of Object Oriented, Functional and Logic Programming;

**Data Structures:** Notion of abstract datatypes, stacks, queues, linked lists, trees, heap, graphs;

**Algorithms for Problem Solving:** Tree and graph traversals, connected components spanning trees, shortest paths, hashing, sorting, searching; design techniques;

**Compiler Design:** Lexical analysis, parsing, syntax directed translation, runtime environment, code generation, linking;

**Operating Systems:** Classical concepts (concurrency, synchronization, deadlock), processes, threads and inter-process communication, CPU scheduling, memory management, file systems, I/O systems, protection and security;

**Database Systems:** Relational model, ER diagram, relational algebra, database design, normalization, SQL, file structures, transactions management and concurrency control;

**Computer Networks:** ISO/OSI stack, sliding window protocol, LAN technologies (Ethernet, Token ring), TCP/UDP, IP, Basic concepts of switches, gateways and routers.

**Theory of Computation:** Regular languages and finite automata, context free languages and pushdown automata, Turing machines.

**Subject Knowledge component of Entrance Test for admission to M.E. – Computer Science & Engineering and Software Engineering shall consist of 60 question. These 60 questions will be evenly distributed among the complete syllabus of subject knowledge.**