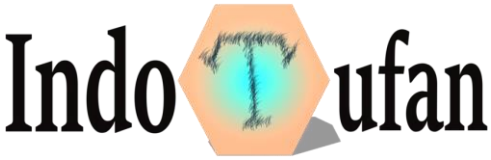

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Mechanical Engineering

Starting Time: 7 PM for Minor, 5 PM for Major

Syllabus and Schedule - All India Online Gate Test Series – 2018

	Test Date	Syllabus	No. of Question	Marks	Duration
1	Mar 5, 2017	**EB-Engineering Mechanics**: Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions	30	120	90
2	Mar 12, 2017	**EB-Mechanics of Materials-I**: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams;	30	120	90
3	Mar 19, 2017	**EB-Mechanics of Materials-II**: bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.	30	120	90
4	Mar 26, 2017	**EM- Linear Algebra**: Matrix algebra, systems of linear equations, eigenvalues and eigenvectors. **Numerical Methods**: Numerical solutions of linear and non-linear algebraic equations; integration by	30	120	90

		trapezoidal and Simpson's rules; single and multi-step methods for differential equations.			
5	Apr 2, 2017	**EB-Theory Of Machines and Vibrations**: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope. Vibration: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.	30	120	90
6	Apr 9, 2017	**EB-Machine 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, gears, rolling and sliding contact bearings, brakes and clutches, springs.	30	120	90
7	Apr 16, 2017	**EB-Fluid Mechanics-I:** Fluid properties; fluid statics, manometry, buoyancy, 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;	30	120	90
8	Apr 23, 2017	**EM-Calculus**: Functions of single variable, limit, continuity and differentiability. Mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima, Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume	30	120	90

		integrals, applications of Gauss, Stokes and Green's theorems.			
9	Jun 4, 2017	**EB-Fluid Mechanics-II and Turbo-Machinery:** dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings. Turbo-machinery: Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines.	30	120	90
10	Jun 18, 2017	**EB-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.	30	120	90
11	Jul 2, 2017	**EB-Thermodynamics:** Thermodynamic systems and processes; properties of pure substances, behavior of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.	30	120	90
12	Jul 16, 2017	**EM-Differential equations**: First order equations (linear and nonlinear); higher order linear differential	30	120	90

		equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations. Complex variables: Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.			
13	Aug 6, 2017	**EB- 10 Thermodynamics-Applications Power Engineering**: Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and dual cycles. **Refrigeration and air-conditioning**: Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes	30	120	90
14	Aug 20, 2017	**EB-Manufacturing Science-I Engineering Materials**: Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials. Casting, Forming and Joining Processes: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. 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 powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.	30	120	90
15	Sep 3,2017	**EB-Manufacturing Science-II Machining and Machine Tool Operations**: Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and	30	120	90

		materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, 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.			
16	Sep 17, 2017	**EB-Industrial Engineering Production Planning and Control**: Forecasting models, aggregate production planning, scheduling, materials requirement planning. Inventory Control: Deterministic models; safety stock inventory control systems. Operations Research: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.	30	120	90
18	Oct 1,2017	**EM-Probability and Statistics**: Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.	30	120	90
19	Oct 15,2017	FULL SYLLABUS	60	240	180
20	Nov 5,2017	FULL SYLLABUS	60	240	180