

Mechanical Engineering (ME)

Detailed subject and topic catalogue for Quick Revision, Topic-wise Tests, Combined Practice and 10 Full-Length Mocks.

Source: official GATE 2027 ME syllabus, IIT Madras. Topic descriptions below are concise paraphrases organized for a practice-test database; always cross-check the official PDF.

01 Engineering Mathematics

Linear Algebra

Matrix algebra; linear equations; eigenvalues and eigenvectors

Calculus and Vector Calculus

Limits, continuity, derivatives, multiple integrals, Taylor and Fourier series, maxima and minima, vector identities, Gauss/Stokes/Green theorems

Differential Equations

First and higher order ODEs, Euler-Cauchy, initial/boundary values, Laplace transforms, heat/wave/Laplace equations

Complex Variables

Analytic functions, Cauchy-Riemann, contour integrals, Taylor and Laurent series

Probability and Statistics

Conditional probability, descriptive statistics, random variables, binomial/Poisson/normal distributions

Numerical Methods

Roots of equations, trapezoidal and Simpson integration, ODE solvers

02 Applied Mechanics and Design

Engineering Mechanics

Equilibrium, free-body diagrams, friction, trusses, virtual work, rigid-body motion, momentum and energy

Mechanics of Materials

Stress/strain, Mohr circle, beams, shafts, columns, pressure vessels, strain gauges, material properties

Theory of Machines

Kinematics and dynamics of mechanisms, cams, gears, governors, flywheels, balancing, gyroscopes

Vibrations and Control

Free/forced vibration, damping, isolation, resonance, critical speed, PID and transfer function

Machine Design

Failure theories, fatigue, bolted/welded joints, shafts, gears, bearings, springs, brakes and clutches

03 Fluid Mechanics and Thermal Sciences

Fluid Mechanics

Fluid statics, conservation equations, Bernoulli, dimensional analysis, boundary layers, pipe flow, compressible flow, nozzles

Heat Transfer

Conduction, fins, transient response, convection, boiling, condensation, heat exchangers, radiation

Thermodynamics

Laws, pure substances, gases, entropy, cycles, availability, thermodynamic relations

Thermal Applications

Power cycles, IC engines, combustion, refrigeration, psychrometrics, turbines, compressors and pumps

04 Materials, Manufacturing and Industrial Engineering

Engineering Materials

Crystal structure, phase diagrams, heat treatment, metals, polymers, ceramics, composites

Casting, Forming and Joining

Moulds, casting defects, forming loads, powder metallurgy, welding, brazing, NDT

Machining and Machine Tools

Tool geometry, cutting mechanics, wear, economics, abrasive and nontraditional machining, fixtures

Additive Manufacturing

Process types, materials, advantages, limitations and applications

Metrology and Inspection

Fits and tolerances, measurements, interferometry, CMM, surface finish

CAD/CAM and Automation

NC/CNC, programming, actuators, PLC

Production Planning and Control

Forecasting, scheduling, MRP, lean, Six Sigma, inventory and quality

Operations Research

Linear programming, simplex, transportation, assignment, network flows, queuing, PERT/CPM

Shared module: General Aptitude (GA)

Verbal aptitude, quantitative aptitude, analytical aptitude and spatial aptitude. GA is common to all GATE papers; use the official GA syllabus for the complete detail.

Official source: https://gate2027.iitm.ac.in/static/doc/GATE2027_Syllabus/ME_GATE2027_Syllabus.pdf

Database recommendation: branch_code > section > topic > subtopic > question type > difficulty > marks > revision note.