

# Electronics and Communication Engineering (EC)

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

Source: official GATE 2027 EC 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

Vector spaces, basis, matrix rank, eigenvalues, systems

### Calculus and Differential Equations

Integrals, derivatives, Taylor series, ODE/PDE

### Vector and Complex Analysis

Gradient, divergence, curl, Green/Gauss/Stokes, analytic functions, residues

### Probability and Statistics

Distributions, joint/conditional probability, correlation and regression

## 02 Networks, Signals and Systems

### Circuit Analysis

Node/mesh, network theorems, AC phasors, 2-port networks

### LTI Systems

Convolution, causality, stability, poles/zeros, delay

### Continuous-Time Signals

Fourier series/transform, sampling and reconstruction

### Discrete-Time Signals

DTFT, DFT, Z transform, FIR/IIR filter design

## 03 Electronic Devices

### Semiconductors

Energy bands, intrinsic/extrinsic materials, carrier transport

### Devices

PN/Zener diodes, BJT, MOS capacitor, MOSFET, LEDs, photodiodes, solar cells

## 04 Analog Circuits

### Diode Circuits

Clipping, clamping, rectification

### Amplifiers

BJT/MOSFET biasing, small signal, current mirrors, differential amplifiers

### Op-Amps

Amplifiers, filters, integrators, oscillators, Miller compensation, phase margin

## 05 Digital Circuits

### Number Systems and Logic

Integer/floating point, Boolean algebra, K-maps, CMOS gates

### Combinational and Sequential

Arithmetic circuits, MUX, decoders, flip-flops, FSM, timing

### Converters and Memories

ADC/DAC, ROM, SRAM, DRAM

### Computer Organization

Instructions, addressing, ALU, datapath, pipelining

## 06 Control Systems

### Feedback and Modelling

Transfer functions, block diagrams, state space

### Analysis and Design

Time/frequency response, Routh, Nyquist, Bode, root locus, PID

## 07 Communications

### Random Processes

Autocorrelation, PSD, white noise

### Analog Communications

AM/FM, demodulation, superheterodyne

### Information Theory

Entropy, coding, mutual information, capacity

### Digital Communications

PCM/DPCM, ASK/PSK/FSK/QAM, detection, BER, Hamming, CRC

## 08 Electromagnetics

### Maxwell Equations

Differential/integral forms, boundary conditions, Poynting vector

### Wave Propagation

Polarization, reflection/refraction, skin depth

### Transmission and Antennas

Transmission lines, Smith chart, waveguides, optical fibres, dipole/monopole/arrays

## 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/EC\\_GATE2027\\_Syllabus.pdf](https://gate2027.iitm.ac.in/static/doc/GATE2027_Syllabus/EC_GATE2027_Syllabus.pdf)

Database recommendation: branch\_code > section > topic > subtopic > question type > difficulty > marks > revision note.