

# GATE Physics (PH) — Weightage-Based Syllabus

A smart, exam-targeted reading of the official GATE Physics syllabus, re-ordered by historical weightage from **975 authentic PYQs** across **2012–2026**.

Use this PDF alongside the official GATE PH syllabus brochure published by the organising IIT. All topic lists below come from the official syllabus; the weightage and priority tags are derived from PhysicsByAaryan's PYQ database.

## Subject-wise weightage at a glance

#	Subject	Questions	Weightage	Priority
1	General Aptitude	150	15.4%	<b>VERY HIGH</b>
2	Quantum Mechanics	122	12.5%	<b>VERY HIGH</b>
3	Solid State Physics	99	10.2%	<b>VERY HIGH</b>
4	Electromagnetism	97	9.9%	<b>HIGH</b>
5	Classical Mechanics	96	9.8%	<b>HIGH</b>
6	Mathematical Physics	87	8.9%	<b>HIGH</b>
7	Nuclear and Particle Physics	85	8.7%	<b>HIGH</b>
8	Atomic and Molecular Physics	68	7.0%	<b>HIGH</b>
9	Electronics	63	6.5%	<b>MEDIUM</b>
10	Statistical Mechanics	59	6.1%	<b>MEDIUM</b>
11	Thermodynamics	32	3.3%	<b>LOW</b>
12	Optics	17	1.7%	<b>LOW</b>

**Reading order recommendation:** Tackle **VERY HIGH** and **HIGH** priority subjects first — they consistently account for  $\geq 60\%$  of the GATE PH paper. Keep **LOW** priority subjects (Optics, Thermodynamics) for final revision rounds.

## Quantum Mechanics

**VERY HIGH** · 12.5% of GATE PH paper · 122 questions in 2012–2026

### Official syllabus topics

- Postulates of quantum mechanics; uncertainty principle; Schrödinger equation; one, two and three dimensional potential problems; particle in a box, harmonic oscillator, hydrogen atom
- Linear vectors and operators in Hilbert space; angular momentum and spin; addition of angular momenta
- Time-independent perturbation theory; variational method; WKB approximation
- Time-dependent perturbation theory and Fermi's golden rule; identical particles, Pauli's exclusion principle, spin-statistics connection

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Basics Quantum Mechanics	34	27.9%
2	Spin and Total Angular momentum	22	18.0%
3	Orbital angular momentum and hydrogen atom	18	14.8%
4	Perturbation Theory	16	13.1%
5	Potential Well	12	9.8%
6	Quantum Harmonic Oscillator	12	9.8%
7	Scattering Theory	4	3.3%
8	Quantum Statistical Mechanics	3	2.5%
9	Variational Principle	1	0.8%

## Solid State Physics

**VERY HIGH** · 10.2% of GATE PH paper · 99 questions in 2012–2026

### Official syllabus topics

- Elements of crystallography; diffraction methods for structure determination; bonding in solids; elastic properties; lattice vibrations and thermal properties of solids
- Free electron theory; band theory of solids: nearly free electron and tight binding models; metals, semiconductors and insulators
- Transport properties; Hall effect and thermoelectric power; electron motion in magnetic fields; cyclotron resonance
- Dielectric and magnetic properties of solids; ferroelectrics, paramagnetism, diamagnetism, ferromagnetism, anti-ferromagnetism and ferrimagnetism; superconductivity: type-I and type-II superconductors, Meissner effect, London equation, BCS pairing mechanism

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Lattice vibration	16	16.2%
2	Semiconductor Physics	13	13.1%
3	Crystallography	13	13.1%
4	Superconductivity	12	12.1%
5	Tight binding model	11	11.1%
6	Free electron model	10	10.1%
7	Magnetic properties of solids	10	10.1%
8	Xray diffraction	7	7.1%
9	Hall Effect	6	6.1%
10	Dielectric Properties of solid	1	1.0%

## Electromagnetic Theory

**HIGH** · 9.9% of GATE PH paper · 97 questions in 2012–2026

### Official syllabus topics

- Solutions of electrostatic and magnetostatic problems including boundary value problems; method of images; separation of variables
- Dielectrics and conductors; Maxwell's equations; scalar and vector potentials; Coulomb and Lorentz gauges
- Electromagnetic waves in free space, non-conducting and conducting media; reflection and transmission at interfaces; energy density and energy flux
- Radiation from a moving charge

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Electrostatics	20	20.6%
2	EM Waves	19	19.6%
3	Magnetism	16	16.5%
4	Electric field in matter	11	11.3%
5	Electrodynamics	9	9.3%
6	Relativistic EMT	8	8.2%
7	Magnetism in matter	4	4.1%
8	Image Problem	3	3.1%
9	Plasma	3	3.1%
10	Potential formulation	2	2.1%
11	Radiations	2	2.1%

## Classical Mechanics

**HIGH** · 9.8% of GATE PH paper · 96 questions in 2012–2026

### Official syllabus topics

- Lagrangian and Hamiltonian formalisms; equations of motion, conservation laws, cyclic coordinates, Poisson brackets
- Central force motion, Kepler problem, scattering in central potential
- Small oscillations, normal modes
- Special theory of relativity: Lorentz transformations, relativistic kinematics, mass-energy equivalence

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Lagrangian and Hamiltonian	29	30.2%
2	Special theory of relativity	17	17.7%
3	Small Oscillations	12	12.5%
4	Canonical Transformation and Poisson bracket	11	11.5%
5	Central Forces	9	9.4%
6	Rotation Motion	7	7.3%
7	Phase diagram	4	4.2%
8	Basic Mechanics	4	4.2%
9	Coriolis Force	2	2.1%
10	Pseudo Forces	1	1.0%

## Mathematical Physics

**HIGH** · 8.9% of GATE PH paper · 87 questions in 2012–2026

### Official syllabus topics

• Vector calculus: linear vector space, matrices, vector calculus
• Linear differential equations; elements of complex analysis: Cauchy-Riemann conditions, Cauchy's theorem, singularities, residue theorem
• Laplace, Fourier and Hilbert transforms
• First and second order ordinary differential equations, special functions (Hermite, Bessel, Laguerre and Legendre)
• Partial differential equations (Laplace, wave and heat equations)
• Elements of probability theory, error analysis

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Complex Analysis	20	23.0%
2	Matrices	16	18.4%
3	Vector Analysis	14	16.1%
4	Fourier and Laplace transform	11	12.6%
5	Tensors	10	11.5%
6	Differential Equations	9	10.3%
7	Gamma, Beta and Delta function	3	3.4%
8	Special functions	3	3.4%
9	Probability	1	1.1%

## Nuclear & Particle Physics

**HIGH** · 8.7% of GATE PH paper · 85 questions in 2012–2026

### Official syllabus topics

- Nuclear radii and charge distributions, nuclear binding energy, electric and magnetic moments; nuclear models, liquid drop model, semi-empirical mass formula, Fermi gas model of nucleus, nuclear shell model
- Nuclear force and two nucleon problem; alpha decay, beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion
- Particle accelerators and detectors; elementary particles; photons, baryons, mesons and leptons; quark model; conservation laws, isospin symmetry, charge conjugation, parity and time-reversal invariance

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Particle Physics	28	32.9%
2	Radioactivity	21	24.7%
3	Shell Model	11	12.9%
4	Nuclear Force, deuteron problem and scattering	10	11.8%
5	Particle detector and accelerator	6	7.1%
6	Nuclear properties	3	3.5%
7	Collective Model	3	3.5%
8	Liquid Drop Model	3	3.5%

## Atomic & Molecular Physics

**HIGH** · 7.0% of GATE PH paper · 68 questions in 2012–2026

### Official syllabus topics

- Spectra of one- and many-electron atoms; LS and jj coupling; hyperfine structure
- Zeeman and Stark effects; electric dipole transitions and selection rules
- Rotational and vibrational spectra of diatomic molecules; electronic transitions; Franck-Condon principle; Raman effect
- EPR, NMR, ESR, X-ray spectra; lasers: Einstein coefficients, population inversion, two- and three-level systems

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Effects in atomic physics	29	42.6%
2	Molecular Physics	17	25.0%
3	Vector Model	6	8.8%
4	Lasers	5	7.4%
5	Model of atom	5	7.4%
6	ESR/EPR/NMR	4	5.9%
7	Xray spectra	2	2.9%

## Electronics

**MEDIUM** · 6.5% of GATE PH paper · 63 questions in 2012–2026

### Official syllabus topics

- Semiconductors in equilibrium: electron and hole statistics in intrinsic and extrinsic semiconductors; metal-semiconductor junctions; PN diodes, bipolar junction transistors, field effect transistors
- Negative and positive feedback circuits; oscillators, operational amplifiers, active filters; basics of digital logic circuits, combinational and sequential circuits; flip-flops; timers, counters, registers, A/D and D/A conversion

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	OPAMP	17	27.0%
2	Logic Gates	16	25.4%
3	Transistors	9	14.3%
4	Diodes	7	11.1%
5	AD/DA conversion	4	6.3%
6	fet	3	4.8%
7	Flip flops	3	4.8%
8	Filters	2	3.2%
9	Basic Electronics	2	3.2%

## Thermodynamics & Statistical Physics

**MEDIUM** · 6.1% of GATE PH paper · 59 questions in 2012–2026

### Official syllabus topics

- Laws of thermodynamics; work and heat; thermodynamic potentials and Maxwell relations; chemical potential, phase equilibria
- Phase space, micro and macrostates; microcanonical, canonical and grand canonical ensembles and partition functions
- Free energy and connection with thermodynamic quantities; classical and quantum statistics; ideal Bose and Fermi gases; Planck's distribution law

### Topic-wise weightage (within this subject)

#	Topic	Qs	Share
1	Quantum Statistical Mechanics	19	32.2%
2	Canonical ensemble	18	30.5%
3	Microstates	13	22.0%
4	Microcanonical ensemble	9	15.3%

General Aptitude (GA) — 15% of the paper (10 questions). Common to all GATE papers: verbal aptitude, quantitative aptitude, analytical aptitude and spatial aptitude. Do not skip — it is the easiest section to score on with regular practice.