UPPSC GIC Lecturer (Male/Female) Examination - 2025 Physics

Prepared by
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December 2025

Complete Exam Pattern and Detailed Syllabus

1   Post Details and Salary

Detail	Information
Post Name	Lecturer (Male/Female) Government Inter College Examination-2025
Nature of Post	Group 'C' non-gazetted
Pay Level	Level-8
Essential Qualification	• Post Graduation degree in Physics from a University/Deemed University/Institution established by law in India. • Degree of Graduation in Education (B.Ed.) in a course recognized by NCTE.

2   Examination Pattern (Preliminary & Main)

The selection process involves two stages: a **Preliminary Examination** (Objective Type) and a **Main (Written) Examination** (Conventional/Descriptive Type).
Selection is based on the total marks obtained in the written examination (Main).

2.1   Preliminary Examination (Screening Test)

Detail	Description
Paper Type	Objective and Multiple-Choice (One Paper)
Total Questions	120 Questions (80 Optional Subject + 40 General Studies)
Total Marks	300 Marks
Time Duration	2 Hours
Negative Marking	Yes. One-third (0.33) of the marks assigned to the question will be deducted for every wrong answer.
Qualifying Standard	Minimum efficiency standard is 35% for SC/ST candidates and 40% for candidates of other categories. Those who secure less will be disqualified.
Admission to Main	Candidates declared successful will be admitted to the Main examination (approximately fifteen times the number of vacancies).

Note: The syllabus for the Optional Subject (Physics) in the Preliminary Examination is the same as the syllabus prescribed for the Main Examination.

2.2   Main (Written) Examination (Traditional Type)

The Main Examination consists of two mandatory papers:

Paper 1: General Hindi and Essay (   )

- Type: Conventional (Traditional)
- Time: 2 Hours
- Total Marks: 100 Marks (50 Marks for General Hindi, 50 Marks for Hindi Essay)
- Syllabus for General Hindi includes comprehension, vocabulary, grammar, synonyms, antonyms, etc.
- Syllabus for Hindi Essay requires one essay (max. 1000 words) from areas like Literature/Culture, National/International Issues, Science & Environment, etc.

Paper 2: Optional Subject – Physics
- Type: Conventional (Traditional/Descriptive)
- Time: 3 Hours
- Total Marks: 300 Marks

Structure of Physics Paper:

Section Total Marks	Question Type	Number of Questions	Word Limit (Approx.)	M
Section A 125	General Answer ( )	5	250 words	
Section B 75	Short Answer ( )	5	150 words	
Section C 100	Very Short Answer ( )	10	50 words	

3 Detailed Syllabus for Physics

The syllabus for the Optional Subject (Physics) is divided into seven main sections:

3.1 (I) MECHANICS

- **Basic Concepts:** Physical world and measurement, Kinematics, Laws of motion, Work energy and power, Gravitation.
- **Vector Mechanics:** Scalar and vector products, vector identities, background of vector calculus, concept of line, surface and volume integrals, physical meaning of gradient, divergence and curl, Gauss and Stoke's theorems.
- **Rigid Body & Central Force:** Centre of mass, rotating frame of reference, Coriolis force, motion of rigid bodies, moment of inertia, theorem of parallel and perpendicular axes, moment of inertia of sphere, ring, cylinder and disc. Angular momentum, torque, central force, Kepler's Law, motion of satellite (including geostationary satellite).
- **Relativity:** Galilean transformation, special theory of relativity, Michelson-Morley experiment, Lorentz transformation equations, variation of mass and length with velocity, time dilation, addition of velocities and mass-energy equivalence relation.
- **Fluid Mechanics & Elasticity:** Stream line and turbulent motions, Reynold's number, Stoke's law, Poiseuille's formula, flow of liquid through narrow tube. Bernoulli's formula with applications, surface tension, Stress-strain relationship, Hooke's Law, moduli of elasticity and interrelation between them, Poisson's ratio, elastic energy.

3.2 (II) THERMAL PHYSICS

- **Thermodynamics:** Concept of temperature and the zeroth law, first law of thermodynamics and internal energy, isothermal and adiabatic changes, second law of thermodynamics, Entropy, Carnot cycle and Carnot engine, absolute scale of temperature. Maxwell's thermodynamical relations. The Clausius-Clapeyron equation, porous plug experiment and Joule Thomson effect.
- **Kinetic Theory of Gases:** Behaviour of ideal gas and molecular theory of gases. Maxwell distribution law of velocities, calculation of mean velocity, root mean square velocity and the most probable velocity. Degrees of freedom, Law of equipartition of energy, specific heats of gases, mean free path, transport phenomena.
- **Radiation:** Black body radiation, Stefan's law, Newton's law of cooling, Wien's law, Rayleigh Jeans law, Planck's law, solar constant.
- **Cryogenics:** Production of low temperatures by adiabatic demagnetization.

3.3 (III) WAVES AND OSCILLATIONS

- Oscillations: Oscillation, simple harmonic motion, stationary and progressive waves, damped harmonic-motion, forced oscillations and resonance, sharpness of resonance.
- Wave Phenomena: Wave equation, Plane and spherical waves, superposition of waves. Fourier analysis of periodic waves – square and triangular waves, phase and group velocities, Beats.

3.4 (IV) OPTICS: LASERS

- Geometrical Optics: Cardinal points of a coaxial system, simple problems on combination of thin lenses, eyepiece – Ramsden and Huygens eyepieces.
- Interference & Diffraction: Huygen's principle, conditions for sustained interference, Young double slit experiment, division of amplitude and wavefront, Fresnel biprism, Newton's rings, Michelson-interferometer. Diffraction by straight edge, single, double and multiple slits. Rayleigh's criterion, resolving power of optical instruments.
- Polarization: Production and detection of polarized light (linear, circular and elliptical). Brewster's law, Huygen's theory of double refraction, optical rotation, polarimeters.
- Lasers: Temporal and spatial coherence, stimulated emission, basic ideas about laser emission, Ruby and He-Ne lasers.

3.5 (V) ELECTRICITY AND MAGNETISM

- Electrostatics & Circuits: Gauss law and its applications, electric potential, Kirchhoff's laws and their applications, Wheatstone's bridge.
- Magnetostatics: Biot-Savart law, Ampere's circuital law, and their applications. Magnetic induction and field strength, magnetic field on the axis of circular coil.
- Electromagnetism (EM) & AC Circuits: Electromagnetic induction, Faraday's and Lenz's law, self and mutual inductances. Alternating current, L.C.R. circuits, series and parallel resonance circuits, quality factor.
- EM Waves & Magnetism: Maxwell's equations and electromagnetic waves, transverse nature of electromagnetic waves, Poynting vector. Dia-, para-, ferro-, antiferro- and ferri-magnetism (qualitative approach only), hysteresis.

3.6 (VI) MODERN PHYSICS

- Atomic Structure & Spectra: Bohr's theory of hydrogen atom, electron spin, Pauli's exclusion principle, optical and X-ray spectra. Spatial quantization and Stern-Gerlach experiment, vector model of the atom, spectral terms, fine structure of spectral lines, J-J and L-S coupling, Zeeman effect, Raman effect.
- Quantum Mechanics: Photoelectric effect, Compton effect, de Broglie waves, wave-particle duality, Uncertainty principle. Postulates of quantum mechanics, Schrödinger wave equation and its applications to (i) particle in a box (ii) motion across a step potential (iii) one dimensional harmonic oscillator, and eigen values.
- Solid State Theory: Einstein's and Debye theory of specific heat of solids. Band theory of solids, energy band, Kronig-Penny model in one dimension, energy gap, distinction between metals, semiconductors and insulators, variation of Fermi level with temperature and effective mass.
- Nuclear Physics: Radio activity, alpha, beta and gamma radiations, elementary theory of alpha decay, nuclear binding energy, Semi empirical mass formula, nuclear fission and fusion and nuclear reactors. Elementary particles, particle accelerator, cyclotron, linear accelerator. Elementary ideas of super conductivity.

3.7   (VII) ELECTRONICS

- Semiconductors and Devices: Intrinsic and extrinsic semiconductors, PN junction, Zener diode and their characteristics, unipolar and bipolar transistors, solar cells.
- Applications: Use of diode and transistor for rectification, amplification, oscillation, modulation and detection, r.f. waves.
- Digital Electronics: Logic gates and their truth tables, some applications.

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