UPPSC Polytechnic Lecturer Physics Syllabus (Paper-I&II)

Paper-I (Syllabus)

First Question Paper – Pattern

विषय	प्रश्नों की संख्या	अंक	कुल अंक	समय
सामान्य हिन्दी	25 (प्रत्येक प्रश्न 03 अंक)	75		
मुख्य विषय (Physics)	100 (प्रत्येक प्रश्न 03 अंक)	300	375	2.30 (ढाई) घंटे

सामान्य हिन्दी

(व्याख्याता / कार्यशाला अधीक्षक पद हेतु)

(इसका स्तर हाईस्कूल का होगा)

1 – हिन्दी – वर्णमाला – स्वर एवं व्यंजन
2 – पर्यायवाची शब्द
3 – विलोम शब्द
4 – अनेकार्थक शब्दों के लिए एक शब्द / वाक्यांश के लिए एक शब्द
5 – अनेकार्थक शब्द
6 – उपसर्ग एवं प्रत्यय
7 – अशुद्धि – शोधन – वर्तनी – शुद्धि, वाक्य – शुद्धि
8 – तत्सम – तद्भव शब्द
9 – शब्द – युग्म, अनेकार्थी (शब्दार्थ)
10 – मुहावरे एवं लोकोक्तियां
11 – सन्धि, समास
12 – विरामचिह्न
13 – अलंकार
14 – हिन्दी – व्याकरण – संज्ञा, सर्वनाम, विशेषण, क्रिया, अव्यय, लिंग, वचन |

Physics – PAPER–I Syllabus

1. Mathematical Physics

Dimensional analysis. Vector algebra and vector calculus, concept of Tensor, Linear ordinary differential equations of first & second order, special functions (Legendre, Hermite, Bessel, Laguerre functions). Fourier series, Fourier and Laplace transforms. Partial differential equations (Laplace, wave and heat equations in two and three dimensions). Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

2. Classical Mechanics and Properties of Matters

Newton's laws of motion, Dynamic of System of particle and rigid body, Center of mass and Center of Gravity, conservation law's of Energy, momentum and angular momentum, central force and its characteristics, Keplar's laws of planetary motion, Reduction of Two body Central Force Problems, Planate and Satellite, Orbital and escape velocity, communication satellite. Virtual and Actual Displacement, D'Alembert's Principle, Generalized co-ordinates, Lagrangian equations, Hamiltonian functions and equations, cyclic co-ordinates, Poisson Brackets and canonical transformations, Hamilton-Jacobi Theory, Inertial and non-inertial frame of references, Events, Galilean transformations, Galilean invariance and variance, special theory of Relativity, Lorentz transformations, Relativity of simultaneity and colocality, Length contraction, Time Dilation, Velocity addition theorem, Non-relativistic and relativistic particles, Relativistic Dynamics, Mass-energy equivalence, Doppler effect in light. Elastic behavior of loaded wire, Elastic constants, Torsion of Cylinder, Bending of beam, Cantilever, surface tension, surface energy, angle of contact, capillarity, Excess pressure, Ideal fluid, hydro dynamical equations based on conservation of mass, Momentum and energy, Viscous force (Newton's law, Poiseuille law, Stokes law).

3. Thermodynamics and Statistical Physics

Four Laws of thermodynamics and their consequences Carnot cycle, Heat engine, Refrigerator. Thermodynamic potentials, Maxwell's relations, Joule's effect and Joule's Thomson effect, Transport Phenomenon of gases, Kinetic theory of matters, conduction, convection, Black Body Radiation Kirchhoff's laws, Planck's distribution law and deduction of Stefan's law, Wien's law and Rayleigh-Jeans law, Phase space (μ and λ), Macrostate and microstate, Micro-canonical, Gibb's-canonical, Grand-canonical ensembles and Partition functions, Classical and Quantum statistical mechanics, Maxwell speed distribution. Ideal Bose and Fermi gases, Bose Einstein condensation, Thermodynamic and statistical Entropy and theorems, Gibb's paradox and its resolution. First and second order phase transition.

4. Optics and Acoustics

Cardinal points, Huygens and Ramsden eyepiece, Defect of visions, Human eye and camera, Telescope and microscope, Theories of light, concept and conditions of interference, Young's double slits, Biprism, Colour in thin films, Newton's ring, Michelson interferometer, Fabry-Perot interferometer, Fresnel and Fraunhoffer's Diffraction, Zone Plate, Single slit and multiple slits diffraction, plane Grating, Resolving Power of Grating and optical instruments, Limit and criteria of resolution. Unpolarised and polarised light, Plane of vibration and plane polarization,

Polarization by Reflection, Refraction, Double refraction, Dichroism, Law of Malus, Nicol Prism, Retardation Plates (Half and Quarter), Babinet compensator, Optical rotation, Polarimeters, Coherence (Temporal and Spatial), Induced emission, Spontaneous emission, Induced absorption, Einstein's A & B co-efficients, components of Laser, Types of pumping, Ruby lasers, He-Ne lasers, Semi-conductor lasers, Holography and Photography, Medical application of lasers, Undamped, Damped, Forced and Resonance Vibrations, Lissajous figures, Velocity of Sound, Plane progressive and stationary waves, Vibration of Stretched strings and organ Pipes, Reflectivity and Transmittivity at boundary, Phase velocity and Group velocity.

Paper-II (Syllabus)

Second Question Paper – Pattern

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GS Paper

(for the post of Lecturer/Workshop Superintendent)

1. History of India.
2. Geography of India.
3. Indian Polity and Constitution.
4. Current events of National and International significance.

1. History of India: Emphasis should be on general understanding of political, economic and social aspects of Indian History.
2. Geography of India: Candidates will be expected to have knowledge of the Physical and Human aspects of the Geography of India in general terms.
3. Indian Polity and Constitution: Candidates are expected to have a basic knowledge and preliminary understanding about Indian Political system as well as Indian Constitution.

Physics – PAPER–II Syllabus

5. Electromagnetism

Electric Flux, Gauss law in electrostatics and its applications, Electric Field and Potential Due to Dielectric sphere and Electric Dipole, Laplace and Poisson equations, Gauss law in

magnetostatics, Behavior of dipole in uniform and non-uniform fields, effect of currents, Biot-Savart law and its applications, Ampere's circuital law and its applications, Lorentz force, cyclotron (limit and modification), Galvanometer, Ammeter, Voltmeter, Magnetic Flux, Laws of electro-magnetic induction, static and dynamic Induced emf, Self and Mutual induction and inductance, Laws of Electrostatics, Laws of magnetostatics, laws of electromagnetism, equation of continuity and modification of Ampere's circuital law, Conduction and displacement current, Maxwell's equations in free space and Dielectrics, Electromagnetic waves, Poynting vector, Dispersion relation in Plasma, Transmission line and Waveguide.

6. Quantum Mechanics

Wave particle duality, Matter waves, Uncertainty Principle, Photoelectric and Compton effect, Davisson–Germer experiment, Wavepacket, Schrodinger equation (Time dependent and Time independent), Physical Significance of wave function, Normalisation, Orthogonality, Orthonormality, Eigen value equation, Eigen value, Eigen function, Expectation value, Ehrenfest Theorem, Dirac function and Kronecker delta, Particle in a box, Potential step, Potential barrier, Harmonic oscillator, Rigid Rotator.

7. Atomic, Molecular, Nuclear and Particle Physics

Hydrogen Atom, Spherical harmonics, Commutation and Pauli spin matrices, Operators, Exchange degeneracy. Bohr's and Sommerfeld Atomic Models, Hydrogen like atoms, effect of nuclear motion, Optical spectra and X-Ray spectra, Duane-Hunt's law, Moseley law, Vector atom model, Sodium D1 and D2 lines, Bohr Magneton, Larmor frequency, Stern–Gerlach experiment, Selection rules, Spectral terms, L-S coupling, J-J coupling, Lande g-factor, Zeeman effect (Normal and anomalous), Paschen-Back effect, Stark effect, Electronic, Rotational, Vibrational molecular Spectra, Raman effect, phosphorescence effect, Laws of Radioactivity, Earth and Carbon dating, Mass defect, Packing fraction, Binding energy, Binding energy curve, Nuclear fission and fusion, Nuclear Reactor, Nuclear reaction, Q-values, Chain reaction (Controlled and un-controlled), Thermo nuclear reactions, Hydrogen bomb, Semi-empirical mass formula, Liquid drop model, Shell model, Collective model, Nuclear forces, Fundamental particles, four fundamental interactions, classification of elementary particles on the basis of Spin, Mass and Interaction, Quantum numbers (Charge, Spin, Parity, Isospin, Strangeness) of elementary particles, Quark model, Baryons, Leptons, Mesons, Conservation laws.

8. Electronics and Condensed Matter

Intrinsic and extrinsic semiconductors, P–N Junction & Zener Diode and their characteristics, Rectifier and filters, Bipolar and Unipolar transistors, Input and Output characteristic curves, Hybrid Parameters, Gains (Resistance, Current, Voltage, Power), Voltage and Power Amplifiers, Feedback Amplifiers, Operational Amplifiers and applications, Oscillators, Modulators, Detectors, Supersonics, Ultrasonic (Production, Detection and Applications), Multimeters, CRO, Opto-electronic devices (LED, Photo detectors, Photo transistors, Solar cells). Analog and Digital signals, Logic Gates (NOT, AND, OR, NAND, NOR, XOR, XNOR), Logic symbols, Truth Tables, Venn diagram, Boolean functions, K-Map, Adder and Subtractor, Boolean Theorems,

A/D, D/A, Resistors, Counters, Comparators, Flip-flops, Microprocessors, Bravais Lattices, Reciprocal Lattices, Electron Diffraction, Bonding of Solids, Liquid Crystals, Free Electron and Band theory of Solids, Electron motion in Periodic Potential, Effective mass of free electrons and holes, Specific heat of Solid (Classical and Quantum theories), Hall effect and Thermo-electric Power, Super conductivity (Type-I and Type-II), Super conductors, Josephson Junction, BCS theory, Cooper pairs, Super fluidity, Dia, Para, Ferro, Antiferro, Ferrimagnetism.