

Syllabus for NePhO (Pre-selection Test)

This syllabus is mostly based on the Secondary Education Curriculum-2076 of grade 11 and a few from grade 12. Problems will mainly focus on testing creativity and understanding of physics rather than testing mathematical skills or speed of working. Additionally, the processing and analysis of scientific data will focus on testing common experimental techniques.

1. Mechanics:

Kinematics; Dynamics; Work, energy and power; Circular motion; Gravitation; Elasticity; Rotational dynamics; Periodic motion.

2. Heat and thermodynamics:

Heat and temperature; Quantity of heat; Ideal gas; First and second law of thermodynamics.

3. Optics:

Reflection at curved mirrors; Refraction: at plane surfaces, through prisms; Dispersion.

4. Electricity and Magnetism:

Electric charges; Electric field; Potential; Capacitor; DC circuits; Electrical circuits; Thermoelectric effects.

5. Modern Physics:

Nuclear physics; Solids; Recent trends in physics; Electrons; Photons; Quantization of energy.

6. Experimental uncertainty & Data analysis:

Identification of dominant error sources, and reasonable estimation of the magnitudes of the experimental uncertainties of direct measurements; Standard deviation; Converting any equation to a straight line; Plotting graphs containing data points with error bars; Fitting a straight line to the data points; Finding slopes and intercepts of the line.

Syllabus for NePhO (Final Selection Test)

This syllabus is mostly based on the Secondary Education Curriculum-2076 of grade 12, and a few advanced topics are also covered. Problems will mainly focus on testing creativity and understanding of physics rather than testing mathematical skills or speed of working. Additionally, experimental techniques for measuring physical quantities will focus on testing experimental skills.

1. Wave and Optics:

Mechanical waves; Acoustic phenomena; Nature and propagation of Light; Interference; Diffraction; Polarization.

2. Electricity and Magnetism:

Magnetic field; Magnetic properties of materials; Electromagnetic induction; Alternating currents.

3. Modern Physics:

Semiconductor devices; Radioactivity and nuclear reaction; Recent trends in physics.

Quantum Physics: Particles as waves; Uncertainty principle.

Statistical physics: Planck's law; Wien's displacement law; the Stefan-Boltzmann law.

4. Experimental uncertainty & Data analysis:

Identification of dominant error sources, and reasonable estimation of the magnitudes of the experimental uncertainties of direct measurements; Distinguishing between random and systematic errors; Finding absolute and relative uncertainties of a quantity determined as a function of measured quantities using any reasonable method (such as linear approximation, addition by modulus or Pythagorean addition). Standard deviation; Transformation of a dependence to a linear form by appropriate choice of variables and fitting a straight line to experimental points. Finding the linear regression parameters (gradient, intercept and uncertainty estimate). Selecting optimal scales for graphs and plotting data points with error bars.