Nepal Engineering College
Syllabus for nec Entrance Test 2026

Subject Weightage and Rules of *nec* Entrance Test

1. The Syllabus and Weightage of Subjects in the *nec* Entrance Test will be as follows:

SN	Subject	Weightage
1	Mathematics	40%
2	Physics	30%
3	Chemistry	20%
4	English	10%

2. The duration of entrance test is two hours.
3. *nec* Entrance Test will be OMR paper-based multiple-choice questions.
4. There is not negative marking for the wrong answers.
5. Use of programmable devices is prohibited.
6. If you are applying for Bachelor of Architecture, you must take and additional 45-minute aptitude test.

A. Syllabus of Mathematics [40%]:

1) Set, Logic and functions
- i) Set, real number system, intervals, absolute value, logic, connectives, laws of logic
- ii) Function, types of functions – injective, subjective, objective, algebraic, trigonometric, exponential and logarithmic; Inverse of function, composite functions

2) Algebra
- i) Matrices and determinants, types and properties, inverse of a matrix
- ii) Complex numbers and polynomial equations
- iii) Sequence and series, permutations and combination
- iv) Binomial theorem, exponential and logarithmic series

3) Trigonometry
- i) Trigonometric equations and general values
- ii) Inverse trigonometric functions, principal values
- iii) Properties of triangles, in-center, ortho-centers and circum-center, solution of triangles

4) Coordinate geometry
- i) Straight lines, pair of lines
- ii) Circles, equations of circle in different forms, tangents and normal
- iii) Conic section: parabola, ellipse, and hyperbola, standard equations and simple properties
- iv) Coordinates in space, plane and its equation

5) Calculus
- i) Limit and continuity of functions, indeterminate forms, L'Hospital rule
- ii) Derivatives, rules of derivatives, geometrical and physical meanings, higher order derivatives, applications of derivatives: tangents and normal, rate of change, maxima and minima
- iii) Integration, linear properties, rules of integration, standard integrals, definite integral, applications of definite integral: area under a curve and area between two curves

iv) Differential equations, order and degree, differential equation of first order and first degree: variable separation method, homogeneous, linear and exact differential equations, integrating factor

6) Vectors and their products

i) Vectors in plane and space, algebra of vectors, linear combination of vectors, linearly dependent and independent set of vectors
ii) Product of two vectors, scalar and vector product of two vectors, scalar triple product

7) Statistics and probability

i) Measures of location and measures of dispersion
ii) Correlation and regression
iii) Basic terms in probability, conditional and compound probability, additive and multiplicative rules, Bayes' theorem, binomial distribution

B. Syllabus of Physics [30%]:

1) Mechanics

i) Physical quantities, vector, and kinematics: Dimensions, resolution and polygon laws of vector, vector algebra, equations of motions, projectile motion, relative motion
ii) Newton's laws of motion and friction: conservation of linear momentum, applications of Newton's laws in equilibrium and non – equilibrium, laws of solid friction and verification
iii) Work, energy and power: work- energy theorem, kinetic and potential energy, conservation of energy, conservative and nonconservative forces, elastic and inelastic collisions
iv) Circular motion, gravitation and SHM: centripetal force, conical pendulum, banking of track, gravitational potential, variation of g, motion of satellite, rocket launch technology, energy in SHM, spring- mass system, simple pendulum, damped and forced oscillation, resonance
v) Rotational dynamics: Moment of inertia, radius of gyrations, rotational KE, centre of gravity and centre of mass, Torque, conservation of angular momentum
vi) Elasticity: Hook's law, Young's modulus, bulk modulus, modulus of rigidity, Poissons' ratio, elastic energy

2) Heat and thermodynamics:

i) Temperature and quantity of heat: Thermal equilibrium, specific heat, latent heat, method of mixture, measurement of specific heat and latent heat, Newton's law of cooling, triple point.
ii) Thermal expansion: expansion of solid and liquid, measurement and applications of expansions.
iii) Transfer of heat: conduction, convections, radiation, thermal conductivity, black body radiation, Stefan- Boltzmann law
iv) Thermal properties of Matter: molecular properties of matter, Kinetic theory of gases, heat capacities of gases and solids
v) Laws of thermodynamics: first law, heat and work, relation of specific heat of gas, thermodynamic process, second law, heat engine, carnot cycle, otto cycle, diesel cycle, refrigeration, entropy

3) Geometric and physical optics:

i) Reflection: plane and curved mirror, mirror formula
ii) Refraction: plane surface, critical angle, total internal reflection, lateral shift, prism, minimum deviation, lenses, lens formula, lens maker's formula, combination of lenses in contact, optical fibre
iii) Dispersion: spectrum, dispersive power, chromatic aberration, achromatism, spherical aberration, scattering of light

iv) Nature and propagation of light: Huygen's principle, velocity of light
v) Interference: coherent sources, young's double slit experiment
vi) Diffraction: fraunhoffer;s diffraction, diffraction grating, resolving power
vii) Polarization: Brewster's law. Transverse nature of light, polaroid

4) Waves and sound:

i) Wave motion: travelling and stationary wave
ii) Mechanical wave: velocity of sound wave in solid, gas and liquid, effect of temperature, pressure, humidity
iii) Waves in pipes and strings: closed and open popes, resonance, resonance tube. String, laws of vibration of fixed string
iv) Acoustic phenomena: pressure amplitude, intensity level, quality and pitch, ultrasonic and infrasonic, Doppler's effect

5) Electricity and magnetism

i) Electrostatics: coulomb's law, electric field and Gauss's law, potential and potential gradient, capacitors, combination of capacitors, type of capacitors, effect of dielectrics, energy stored of capacitors, polarization and displacement
ii) DC circuits: Ohm's law, resistivity and conductivity, work and power, Galvanometer and ohm meter, internal resistance, Joule's law, Kirchhoff's law and applications
iii) Thermoelectric effect: Seebeck effect, thermocouples, peltier effect, thermopile, Thomson effect
iv) Magnetic effect: force on a conductor and charge, torque, Hall's effect, Biot- Savart's law, Ampere's law, force between parallel conductors
v) Magnetic properties of matter: Earth magnetism, magnetic materials, permeability, susceptibility, hysteresis
vi) Magnetic induction: faraday's law, induced emf, AC generators, self and mutual induction, energy stored by inductor, transformer.
vii) Alternating current: RMS value, phasor diagram of capacitance, inductance and resistance, quality factor, power factor

6) Modern physics

i) Electrons: Millikan's experiment, cathode rays, specific charge
ii) Photons and quantization of energy: photoelectric effect, Planck's constant, Bohr's theory, spectral series, de Broglie's theory, Uncertainty principle, X – ray and Bragg's law, LASER
iii) Solids and semiconductor devices: intrinsic and extrinsic semiconductors, PN junction, rectification, zener diode, transistors , logic gates
iv) Radioactivity and nuclear reaction: atomic mass, Isotopes, nuclear density, Einstein's mass energy relation, mass defect, fission, fusion, law of radioactive disintigration, carbon dating, health hazard
v) Recent trends in physics: i) Particle physics: particle and antiparticle, quarks, Leptons, Baryons, Mesons, Higgs Boson. ii) Universe: Big bang, and Hubble's law, Dark matter, Gravitational wave, black hole. iii) Seismology: pressure wave, surface wave, internal wave. iv) Telecommunication: Radio, TV and Mobile, GPS and Remote sensing. V) Environment: Energy crisis, environmental pollution, ozone layer. vi) New technology and materials: Nano-technology, superconductor and perfect conductor

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C. Syllabus of Chemistry [20%]:

1) Physical chemistry

i) Chemical arithmetic: Dalton's atomic theory and Laws of stoichiometry, atomic mass and molecular mass, empirical molecular formula and limiting reactants, Avogadro are Hypothesis and its applications and equivalent masses
ii) States of matter: gaseous state, liquid and solid states
iii) Atomic structure and periodic classification of elements
iv) Oxidation, reduction, and equilibrium
v) Volume analysis
vi) Ionic equilibrium, acid, base and salt
vii) Electrochemistry
viii) Energetic of chemical reaction, chemical kinetics, chemical bonding and shape of molecules

2) Inorganic chemistry

i) Non- metal: hydrogen, oxygen, ozone, water, nitrogen and its compounds, Halogen, carbon, phosphorus, sulphur, noble gas and environment pollution
ii) Metals: metallurgical principle, alkali metal, alkaline earth metals, coinage metals, copper, silver, gold
iii) Extraction of metal: zinc and mercury, Iron compound

3) Organic chemistry

i) Introduction: fundamental principles, purification of organic compounds, nomenclature of organic compounds, structure isomerism and idea of reaction mechanism
ii) Hydrocarbons: alkanes, alkenes and alkynes, aromatic hydrocarbons
iii) Haloalkanes and Haloarenes
iv) Alcohols, phenols and ethers
v) Aldehydes, ketons, carboxylic acid and derivatives, aliphatic and aromatic
vi) Nitro compounds and amines: aromatic and aliphatic

4. Syllabus of English [10%]:

1) Vocabulary

i) Synonyms and antonyms
ii) Homonyms, homophones
iii) Word building, suffixes and prefixes
iv) Meaning of words in context
v) Idioms and phrases

2) Grammar

i) Articles and possessives
ii) Pronouns, prepositions, adjectives, adverbs
iii) Tenses, modals, conditions
iv) Subject verb agreement
v) Tag questions
vi) Sentence types and transformations
vii) Voice
viii) Direct and indirect narration

3) Reading comprehension:

i) Contents/idea
ii) Reading between the lines
iii) Contextual clues
iv) Reconstruction (rewording)

4) Writing:

i) Punctuation
ii) Cohesive devices
iii) Coherence
iv) Discourse makers

5) Sounds of English:

i) Phonemes
ii) Phonemics symbols
iii) Word stress
iv) Intonation