Syllabus for english TOLC-I

Logic and reading comprehension section

The logic and reading comprehension questions seek to test in particular the candidate's aptitude rather than the skills acquired in secondary school. Therefore, they do not require a specific preparation.

Mathematics, arithmetic and algebra section

Properties and operations on numbers (integers, rationals, real numbers). Absolute value. Powers and square roots. Logarithms and exponentials. Symbolic mathematics. Polynomials (operations, factorisations). First and second degree algebraic equations and inequalities or reducible. Systems of first degree equations. Fractional rational equations and inequalities and with radicals. Geometry, segments and angles; measurements and properties. Lines and planes. Significant loci. Properties of the main plane geometric figures (triangles, circles, regular polygons, etc.) and their perimeters and areas. Properties of the main solid geometric figures (spheres, cones, cylinders, prisms, parallelepipeds, pyramids, etc.) and their volumes and areas.

- **Analytic geometry and numeric functions**
  cartesian coordinates. The concept of function. Equations of lines and of simple loci (circles, ellipses, parabolas, etc.). Graphs and properties of elementary functions (powers, logarithms, exponentials, etc.). Calculations with logarithms. Equations and inequalities with logarithms or exponentials

- **Trigonometry**
  graphs and properties of sine, cosine and tangent. The main trigonometric formulas (addition, subtraction, duplication, bisection). Trigonometric equations and inequalities. Relations between the elements of a triangle

- **Statistics**
  basic elementary notions of statistics is required (permutation, combination, mean, variance and frequency). Basic notions to read frequency diagrams and histograms.

Sciences section

- **Mechanics**
  the understanding and knowledge of the following topics and concepts is required: scalar and vector quantity, measurement of physical volumes and measurement unit system; definitions of the fundamental physical volumes (displacement, velocity, acceleration, mass, momentum, force, weight, work

and power); Newton's first law, Newton's law of universal gravitation and Newton's third law, fluid mechanics

- **Optics**
  principles of geometric optics; reflection, refraction; refractive index; prisms; mirrors and concave and convex lenses; elementary knowledge of lens systems and instruments

- **Thermodynamics**
  the understanding and knowledge of the following concepts is required: temperature, heat, specific heat, expansion, ideal gas law. Also required elementary knowledge of the laws of thermodynamics

- **Electromagnetism**
  elementary knowledge of electrostatics (Coulomb's law, electrostatic field and condensers) and magnetostatics (electric intensity, Ohm's law, magnetostatic field) is required. Also required, elementary knowledge of electromagnetic radiations and their propagation

- **Chemistry and material structure**
  qualitative knowledge of atomic and molecular structure is required. In particular the elementary understanding of atom constituents and the periodic table. Also required is the knowledge of the difference between ionic and molecular compounds and their physical characteristics, in particular of the more common compounds existing in nature, such as water and the atmospheric constituents

- **Chemistry symbols**
  knowledge of chemistry symbols is required as well as the meaning of chemical formula and equations

- **Stoichiometry**
  knowledge of the concept of mole and its applications is requested, as well as the capability to carry out simple stoichiometric calculations

- **Organic chemistry**
  knowledge of the structure of the more simple carbon compounds is required

- **Solutions**
  knowledge of the definition of acid base systems and pH is requested

- **Oxidation-reduction**
  knowledge of the concepts of oxidation and reduction as well as elementary knowledge of the combustion reaction is requested.