*Science (Physics and Chemistry).* (Marks, 2,000.)

The questions set will be such as may be answered by candidates who have acquired their knowledge by an experimental treatment of the subjects.

*Physics.*

*Heat.*—Construction and use of thermometers. Expansion of solids, liquids, and gases. Specific heat. Phenomena of change of state; vapour-pressure, latent heat. Simple phenomena of conduction, convection and radiation of heat. Heat as a form of energy.

*Light.*—Rectilinear propagation. Reflection and refraction; formation of images by plane and spherical mirrors, and by concave and convex lenses. Telescope and microscope. The dispersion of light by a prism.

*Magnetism.*—Simple phenomena of magnetism; induction. Lines of force in a magnetic field; terrestrial magnetism. Elementary quantitative notions of strength of pole, magnetic force due to a pole, strength of field.

*Static Electricity.*—Electrification; induction. The electroscope; electrophorus. Elementary notions of potential and capacity. Distribution of charge on conductors.

*Current Electricity.*—Meaning of the units volt, ampere, and ohm. The simple voltaic cell; Daniell cell; Leclanché cell; accumulator. Ohm's law with simple applications; arrangement of cells in series and parallel. Magnetic field due to a current; astatic galvanometer, tangent galvanometer, moving coil galvanometer. Laws of electrolysis; electro-chemical equivalent. Fundamental experiments of electro-magnetic induction.

*Practical Work.*—Simple experiments on the subject-matter of the preceding syllabus; for example: Verification of Boyle's law. Testing the standard points of thermometers. Determination of specific and latent heat by the method of mixtures. Determination of melting and boiling points. Verification of the laws of reflection and refraction. Determination of the positions of images formed by plane and spherical mirrors and by convex lenses. Mapping lines of force in magnetic fields. Comparison of intensities of magnetic fields by the method of oscillations. Comparison of electric currents by the tangent galvanometer and by ammeters. Comparison of potential differences by high-resistance galvanometers and by voltmeters. Comparison of resistances by substitution and by the sliding bridge.

*Chemistry.*

Classification of matter into single substances and mixtures, elements and compounds. Quantitative laws of chemical combination; outlines of the explanation of these laws by the atomic theory. Avogadro's law. General methods of determining chemical equivalents. The chemistry of water and of its constituent elements; water as a solvent; natural waters. The atmosphere; combustion; oxidation, the various classes of oxides. Acids, bases and salts. Chlorine and hydrogen-chloride; nitrogen, ammonia and nitric acid; sulphur, sulphur-dioxide and sulphuric acid. Carbon; the oxides of carbon; carbonates. The hydrocarbons, marsh-gas and acetylene; flame. The metals: General methods of preparation of the metals and their commoner salts. (Questions will not be set on metallurgy or on technical processes of manufacture.)

*Practical Work.*—Simple exercises, which may include weighing and the measurement of volume of liquids and gases, will be set on the subjects of the preceding syllabus; for example: Estimation of soluble matter in a mixture; determination of change of weight in a simple reaction; measurement of the gas evolved during solution of a metal. Observation of the behaviour of substances under the influence of heat and in simple chemical reactions. Preparation of the gases enumerated above; preparation of salts from metals and oxides by general methods. Volumetric determination of acids and alkalis. (Importance will be attached to accurate observation and to clear description of the work done. Where necessary, sufficient instructions will be given to enable candidates to apply their general knowledge of practical chemistry to the problem set.)

*Freehand Drawing.* (Marks, 400.)

The examination will be exacting, in order to ensure that indifferent draughtsmanship receives no credit. From the marks originally allotted, 40 per cent. of the maximum (*i.e.*, 160 marks) will be deducted. The remaining marks will be subsequently increased by two-thirds.

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COMMISSIONS IN THE REGULAR ARMY.

*Candidates from the Special Reserve, Militia, Territorial Force, Universities, and Colonial Military Forces.*

FOR the examination in military subjects of candidates for commissions in the Regular Army from the Special Reserve, Militia, Territorial Force, Colonial Forces, and universities, to be held in October, 1912, and for subsequent examinations, the following will be the syllabus:—

1. Military history and strategy— Marks.

(*a.*) One general paper dealing with the strategy and general conduct of a selected campaign, which will be notified in Army Orders annually in July .. .. 500

(A knowledge of the details of battles and of the movements of small units is not required, except in cases in which these immediately affect the general conduct of the campaign.)