

(d) Magnetism and Electricity : Production of charge, inverse square law, induction and distribution, electrostatic field, lines of force, potential capacity, condensers, dielectric capacity, electrostatic machines. Magnetic pole, inverse square law, magnetic moment, magnetic field, and lines of force, induction, permeability, terrestrial magnetism. Magnetic force due to currents, galvanometers, Ohm's law, E.M.F., thermal effect of a current; voltaic cells, and electrolysis; interaction of magnets and currents; mutual action of currents, induction coil, thermo-electricity—Simple technical applications illustrating principles, electric waves and radiation.

Questions will be set to test the candidates' knowledge of principles rather than of details. Special importance will be attached to fundamental laws, their simpler applications, and their experimental bases.

A candidate in Physical Science will be required to forward to the Department a certificate on the prescribed form that he has carried out satisfactorily a course of practical work in the subject occupying at least sixty hours.

(13) (a) *Chemistry* (three-hour paper).—Candidates will be expected to show that they have an experimental as well as a theoretical knowledge of the matters set forth in the subjoined syllabus : The three states of matters; indestructibility of matter, physical changes compared with chemical changes. Difference between mechanical mixtures and chemical compounds. Phenomena of chemical action; conditions that promote or check or otherwise modify chemical action. The metric system. Elements and compounds. Modes of chemical action; direct union, displacement, mutual exchange, decomposition. Effects of pressure and temperature on gases; Boyle's and Charles's laws. Estimation of the weight of an element in a given weight of one of its compounds, of the weight of one element required to displace another from a given compound, and of the weight of known volumes of gases. Laws of combination of elements in definite proportions by weight; laws of gaseous combination of elements and compounds; equivalent weights; atoms and molecules, their relative weights; the atomic theory; Avogadro's law; meaning and use of symbols, formulæ, and equations; valency; graphic formulæ; calculations of quantities by volume and by weight; volumetric estimation of acids and alkalies. Production and properties of oxygen, hydrogen, and nitrogen; nitrogen cycle; fixation of nitrogen. Air, its properties, the exact determination of its composition; the constituents of the atmosphere; estimation of the amounts of aqueous vapour and of carbon dioxide. Water, its properties; solution and crystallization; hard and soft water; determination of the composition of water by volume and by weight; production and properties of ozone and of peroxide of hydrogen. The production properties and uses of chlorine, hydrochloric acid, ammonia, oxides of nitrogen, nitric acid. Definition and general properties of oxides, acids, alkalies, and bases; the basicity of acids and the classification of salts. The physical and chemical properties of the various forms of carbon, sulphur, and phosphorus; the production of the two latter on the large scale; the production and properties of the oxides of the three elements just named; carbon cycle; the production and properties of sulphuretted hydrogen, of bisulphide of carbon, of sulphurous and sulphuric acids (manufacture not required), of phosphoretted hydrogen, and of meta-, pyro-, and ortho-phosphoric acids; superphosphate. Experimental determination of the composition of hydrochloric acid, ammonia, carbon dioxide, sulphuretted hydrogen. The halogens, their physical and chemical properties compared; the production of iodine on the large scale; the combinations of the halogens with hydrogen. General properties of metals and non-metals. The chief methods of isolating and the physical and chemical properties and uses of sodium, potassium, ammonium, silver, calcium, zinc, magnesium, copper, mercury, aluminium, tin, lead, manganese chromium and iron; the properties and uses of their more important compounds. The production and properties of the following carbon compounds, with special reference to processes of substitution, oxidation, and reduction; the meaning of constitutional formulæ, and the evidence on which they are constructed, and the characters of homologous series; the homologous paraffins treated as a series; ethylene, acetylene, methyl, and ethyl alcohols, ether, acetaldehyde, acetone, formic acid, acetic acid, and their relations to one another. Petroleum and its products. Elementary knowledge of sugar, starch, cellulose. Oils and fats, soap.

A candidate in Chemistry will be required to forward to the Department a certificate on the prescribed form that he has carried out satisfactorily a course of practical work in the subject occupying at least sixty hours.

Or,

(b) Domestic Science (three-hour paper) : Two of the following sections—
(i) Household chemistry : Study of sugars, starches, fibres, fats and oils,