

## (28) APPLIED MECHANICS.

Elementary graphic statics. Funicular polygon, plane reciprocal figures. Frame and force diagrams for simple plane trusses with pin-joints and no redundant members.

Stress, strain, and elasticity. Young's modulus, modulus of rigidity, and modulus of cubic compressibility. Shear and bending, shear and bending moment diagrams in simple cases. Moment of resistance of beams of simple sections. Ties and struts.

Elementary dynamics of machines. Force and velocity diagrams. Efficiency. Fly-wheel and angular accelerations. Simple wheel trains, belts, and belt gearing; the slider-crank chain and its simpler applications.

Flow of water in pipes. Hydraulic gradient. Pelton wheel.

It is expected that the treatment will be graphical wherever graphic methods are appropriate, but other methods will be accepted.

A certificate from the Principal of the school of the candidate's having taken satisfactorily a course of experimental work in applied mechanics in a laboratory approved for the purpose by the Director on the recommendation of an Inspector of Secondary or of Technical Schools will be required.

Such laboratory work shall include simple experiments on the extension of wires and springs, the bending of rods, the efficiency of machines, the funicular polygon, the fly-wheel, friction of plane dry and lubricated surfaces, the acceleration of gravity, and the flow of water in tubes under various heads.

## (30) PHYSIOLOGY AND HYGIENE.

The laws of personal health.

Hygiene of the home, the effect of environment, site, aspect, building material, sanitation, water-supply, methods of heating, lighting, and ventilation.

A general knowledge of the external and internal structure of a mammal, such as can be gained by the study of simple dissections of the rabbit.

General physiology of man; the structure and function of the chief organs (alimentary canal, liver, lungs, heart, kidney, larynx, and eye); the processes of digestion, excretion, nutrition, respiration, and circulation; and elementary knowledge of the arrangement and activities of the nervous system and of the functions of the brain and the spinal cord; a general knowledge of the principal muscles and joints and of the bones of the trunk. The application of physiology to first aid and ambulance work; the treatment of fractures, bruises, sprains, cuts and wounds, burns and scalds. Artificial respiration.

The candidate will be required to be familiar with the chief steps to be taken in dissecting, say, a rabbit, and he may be required to identify and describe parts of an animal body from specimens or photographs.

The candidate will be required to forward before the date of the examination a certificate in the prescribed form that he has carried out satisfactorily a course of practical work based on the above syllabus.

## (31) GENERAL BIOLOGY.

The form and functions of roots, stems, and leaves of a green herbaceous plant. The structure of a typical flower and the functions of its various parts. The structure of a typical seed, germination and the establishment of the seedling. The general habit and manner of growth of trees as compared with that of herbaceous plants; a knowledge of the appearance and habits of the commoner native and imported trees.

Elementary knowledge of protoplasm; the cell as a unit of living tissue; an elementary knowledge of typical plant and animal cells—*e.g.*, amoeba, and a unicellular plant type, *e.g.*, Sphaerelia. Differences between plants and animals. Air in relation to life; respiration of plants and animals. Metabolism, including nutrition and excretion, digestion and distribution of the results of digestion in plants and animals. Cold and warm blooded animals. Water and the living organism. The importance of light to plants and animals. The adaptation of plants and animals to their environment and to seasonal changes as exemplified in New Zealand.

The chief external characters and mode of life of earthworm, snail, blowfly, beetle, butterfly (or moth), and frog. Growth and metamorphosis as illustrated by the frog and butterfly (or moth). The dissection of a frog or mammal with a view to studying the skeleton, the alimentary tract, the respiratory system, and the circulatory system.

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F. D. THOMSON,  
Clerk of the Executive Council.