



Preliminary Scientific M. B. Examination.

1891.

CHEMISTRY.

Examiner—RAI KANAILAL DE, BAHADUR, F. C. S., C. I. E.

The figures in the margin indicate full marks.

1. How much water is required in a refrigerator for condensing the vapour of a gallon of water in the process of distillation? State the temperature of the water when introduced into, and removed from, the refrigerator and mention the data on which the calculation is based. 50
2. What are the differences between Mechanical or frictional electricity, Voltaic electricity, Galvanism, and Magnetism? 30
3. How is peroxide of hydrogen obtained, and what are its properties and composition? 20
4. Trace the steps by which Ammonia is obtained from Coal. How may the gas be collected in jars for examination? 30
5. How would you separate gold and platinum from a solution containing the two metals? 30
6. Describe and give the methods for preparing the following:—the hydride, chloride, and alcohol of the methyl series. The hydride, iodide, and carbonate of the ethyl series. 50
7. Urea, when in solution in water, changes into ammoniac carbonate. Write the reaction. 30
8. Explain the meaning of the terms Isomerism, Polymers, Metamers and Dissociation. 30
9. Write the composition in symbols of Nicotine, Quinine, Cinchonine, Morphia, Codeine, Benzoic acid, Carboic acid, Hippuric acid, Uric acid. 30

Written, 300 ; Oral, 100 ; Practical, 200.

BOTANY.

Examiner—DR. D. PRAIN, M. A.

The figures in the margin indicate full marks.

1. Describe fully the inflorescence in the natural order *Palmeæ*. 30
2. Explain and describe the process of respiration in plants. 40
3. Describe the ovule ; state what changes ensue when it is fertilized, and trace these during the period between fertilization and the production of ripe seed. 60



4. State the characters that distinguish the group *Corollifloræ*, and define the natural order *Compositæ*. 50
5. Enumerate the useful products afforded by the natural order *Gramineæ*, mentioning in each case the part used, and the purpose for which it is employed. 30
6. State and explain the factors that regulate the movement of fluids through vegetable tissues. 60
7. Describe the structure of the flower in the natural order *Malvaceæ*. 30

Written, 300 ; Vivâ voce, 300.

COMPARATIVE ANATOMY AND COMPARATIVE PHYSIOLOGY.

Examiner—MR. J. WOOD-MASON.

The figures in the margin indicate full marks.

1. Describe the digestive and respiratory systems of *Amphioxus* illustrating your answer by a transverse section through the hinder part of the pharynx. 50
2. Explain the difference between a *branchial* and a *systemic* heart, giving instances illustrated by diagrams showing the course of the blood in each case. 50
3. Draw diagrams illustrative of the gemmation and of the formation of stocks in *any two* of the following Alcyonimorph Cœlentera: *Corallium*, *Tubipora*, *Alcyonium*, *Gorgonium*; clearly distinguishing the gastro-vascular spaces from the skeletal structures, etc., by different kinds of shading or by different colours. 50
4. Describe the ontogeny of any Brachyurous Crustacean, illustrating your description by diagrams of the different stages. What inferences do you draw from the ontogeny as to the ancestry of the Brachyura? 50
5. Describe the structure and development of the skeleton of the hind-limb in a bird, (*e. g.*, the Common Pigeon). 50
6. What are epiphyses? How would you distinguish an epiphysis from the apparently similar structures met with in the hind-limb of a developing bird? 50
7. Draw a diagram illustrative of the *external* morphology of any species of Leech: indicating the eyes by larger black dots, the segmental sense-organs by smaller black dots, the nephridial openings by smaller circles and the mouth and anus by larger circles, and numbering the annuli with arabic numerals on the left side and the somites with roman numerals on the right side of your drawing. 50
8. State all you know about the structure and position of the poison-apparatus in the following animals: Scorpions, Spiders, Honey-bees, Snakes, Centipedes. 50

Written, 400 ; Oral, 200.