

ADDITIONS TO THE LIBRARY, MARCH 1936

A. Books.

1. Tropical Planting and Gardening. 4th Edition—Revised. *Macmillan, H. F.* (1935).
2. Manual of the Grasses of the United States. *Hitchcock, A. S.* (1935).
3. Bee-keeping. *Flower, A. B.* (1934).
4. Poverty and Kindred Economic Problems in India—3rd Edn. *Findlay & Shirras.* (1935).
5. The Indian Peasant and His Environment. *Ganguli, N.* (1935).
6. Economics of the Farm Business—English Edition. *Brinkmann, T.* (1935).
7. Economics with Applications to Agriculture. *Dummier, E. F. & Hefflebower, R. B.* (1934).
8. Principles and Practice of Field Experimentation. *Wishart, I. & Sanders, H. G.* (1935).
9. Facilities for Scientific Research in Indian Universities. *Inter. Uni. Board Pub.* (1929).
10. Technical Teaching in Theory and Practice. *Creasy, C. H.* (1935).

B. Annual Reports and Publications.

1. Reports of Subordinate Officers of the Department of Agriculture, Madras for 1934-35.
2. Madras Agricultural Station Reports 1934-35.
3. Report on the Operations of the Department of Agriculture, Punjab for the year ending 30th June, 1935.
4. Season and Crop Report of the United Provinces of Agra and Oudh for the Year 1934-35.
5. Report on the Season and Crops of the North-west Frontier Province for the year 1934-35.
6. Annual Administration Report of the Department of Agriculture H. E. H. the Nizam's Government for the Year 1341 Fasli (7th June 1931 to 5th June 1932).
7. Annual Report of the Department of Agriculture Gwalior Government for the Year 1933-34.
8. Indian Lac Research Institute Annual Report for the Year 1st April 1934 to 31st March 1935.
9. Administration Report of the Madras Co-operative Societies for the Year 1934-35.
10. Report of the Department of Industries, Madras for the Year Ending 31st March 1935.
11. Statistical Abstract for British India from 1923-24 to 1932-33.
12. Agricultural Statistics of India 1933-34, Vol. 1.
13. Empire Cotton Growing Corporation Progress Reports from Experiment Stations Season 1934-35.
14. Sierra Leone Annual Report of the Department of Agriculture for the Year 1934.
15. Colony of Mauritius Annual Report of the Department of Agriculture for 1934.
16. Progress Report of the Dominion Apiarist (Canada) for the Years 1931, 1932 and 1933.
17. Report of the Minister of Agriculture, South Australia for the year ended 30th June, 1935.
18. Formosa, Japan Report of the Government Sugar Experiment Station, Tainan, No. II, October 1935.
19. Forty-eighth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College.
20. Ohio Agricultural Experiment Station Fifty-third Annual Report 1933-34.
21. Fifty-seventh Report of the Connecticut Agricultural Experiment Station New Haven for the year 1933.
22. The Pennsylvania Agricultural Experiment Station 48th Annual Report for the Fiscal Year Ended June 30, 1935.
23. Annual Report of the Director 1933-1934 Agricultural Experiment Station University of Wisconsin.

C. Special Publications.

24. Electricity in Agriculture.
25. Electric Power for Agricultural Uses. *Madras Govt. Elec. Dept. Pub.*
26. Report of Proceedings of the Inter-state Locust Conference, Pretoria, 30th July to 3rd August, 1934.
27. New England Farm Marketing Conference 1934 proceedings.
28. Comparative Advantages of Jute and Cotton Baggings for American Cotton Bales. *U. S. Agri. Dep. Bur. of Agri. Econ. Pre. Report, 1933.*
29. Development of Standards for Grades of Cottonseed. *U. S. Agri. Dep. Bur. of Agri. Econ. Dvn. of Cotton Mark. Pub. 1935.*
30. Cotton Production in Mexico. *U. S. Agri. Dep. Bur. Agri. Eco. For. Agr. Ser. Pub. 1935.*
31. A Summary of the Important Results Arrived at or Indicated by the Agricultural Stations in the United Provinces During the Year 1934-35. *United Provinces of Agra & Oudh Pub. 1936.*

D. Bulletins, Memoirs, Etc.

32. Technological Reports on Standard Indian Cottons, 1935. *Indian Cent. Cot. Com. Tech. Bul. Ser. A, No. 28.* 33. Hints for the Cultivation of Roses. 34. Vegetable Growing in the Plains of the United Provinces. *U. P. of Agra & Oudh Agri. Dep. Bull. Nos. 69, 70.* 35. Report on the Development of Sugarcane Cultivation in the Nizamsagar Canal Area. *Hyderabad Deccan Agri. Dept. Bull. 9.* 36. Humus Manufacture from Cane Trash. *Inst. of Plant Ind. Indore Bull. 3.* 37. The Coconut Industry of the Philippine Islands. *S. S. & F. M. S. Agri. Dep. Gen. Ser. No. 23.* 38. An Inquiry into the Design, Operation and Efficiency of Pasteurising plants. *Hanna Dairy Res. Inst. Bull. 6.* 39. Studies on *Gibberella Fujikuroi* Var. Subglutinans. The Hitherto Undescribed Ascigerous Stage of *Fusarium Moniliforme* Var. Subglutinans and on Its Pathogenicity on Maize in New South Wales. *N. S. Wales Sci. Bull. 49.* 40. Allotments: Their Acquisition and Cultivation. *England Min. of Agri. & Fish. Bull. 90.* 41. Survey of the Distribution and Prevalence of Cotton Insects in China During the Year 1934. *Nanking National Agri. Res. Bull. Spe. Pub. 12.* 42. The Composition and Constitution of the Colloids of Certain of the Great Groups of Soils. *U. S. Agri. Dep. Tech. Bull. 484.* 43. Coffee Cultural Practices in the Kona District of Hawaii. 44. Factors Affecting the Chemical Composition of Pasture Grasses. *Hawaii Agri. Exp. Stn. Bull. Nos. 75, 76.* 45. Estimating Live Weights of Dairy Cattle. 46. Estimating Condition in Dairy Cattle. 47. Insect Pests of the Household. 48. Actinomycosis in Cattle. *Missouri Agri. Exp. Stn. Bull. Nos. 354, 355, 356, 357.* 49. A Field and Laboratory Test on Plant Material for Diagnosing Phosphorus Deficiencies. *Indian Agri. Exp. Stn. Bull. 355.* 50. Precooling Investigations with Deciduous Fruits. *California A. E. S. Bull. 590.* 51. Sugar, Acidity, and Juice Color Determinations in Grapes. 52. The Efficiency of Soil and Fertilizer Phosphorus as Affected by Soil Reaction. *Ohio Agri. Exp. Stn. Bull. Nos. 550, 553.* 53. The Composition, Quantity, and Physiological Significance of Gases in Tree Stems. 54. Proper Spacing and Depth of Tile Drains Determined by the Physical Properties of the Soil. 55. Correlated Inheritance in Oats of Reaction to Diseases and Other Characters. 56. The Relationship Between Certain Morphological Characters and Lodging in Corn. 57. Weeding Methods and Rations for Fattening Lambs. 58. Suggestions to Purchasers of Farms. 59. Comparative Values of Farm Crops Grown at the Central and Branch Stations in Yield Trials. 60. Dry Skimmilk—How to Use it. 61. Factors Causing Variation in Earnings Among Dairy Farmers in Southeastern Minnesota. *Minnesota Agri. Exp. Stn. Tech. Bull. Nos. 99, 101, 102, 103, 306, 309, 312, 313, 314.* 62. Effect of Temperature on Pollen Germination and Tube Growth in the Tomato. 63. Quantitative Determination of Lactic Acid in Dairy Products. 64. A Summary of Linkage Studies in Maize. *Cornell Agri. Exp. Stn. Mem. 175, 179, 180.* 65. Investigations in Pruning Mature Apple Trees. 66. A Critical Study of the Methods for Measuring Oxidation-reduction Potentials of Soils, with Special reference to Orchard Soils. 67. An Economic Study of Grape Farms in Eastern United States. Part II. Harvesting and Marketing. 68. Soil, Field-crop, Pasture, and Vegetable Crop Management for Erie County, N. Y. 69. Soils in Relation to Fruit Growing in New York. Part VIII. Tree Behavior on Important Soil Profiles in the Medina-Lyndonville-Carlton Area, Orleans County. *Cornell Agri. Exp. Stn. Bull. Nos. 624, 625, 628, 630, 633.*

E. Circulars, Leaflets Etc.

70. Potash Fertilizers. *England Min. of Agri. & Fish. Ad. Leaf. 22.* 71. A Study of Persistence in Certain Introduced Pasture Grasses. *Com. Aust. C. S. & I. R. Pamph. 59.* 72. The Farmers' Own Credit System. *Washington Land Grant Col. Assn. Cir. A. 4.* 73. Vernalization Experiments with Forage Crops. *U. S. Agri. Dep. Cir. 377.* 74. Growing and Handling Sweet Potatoes in California. *California Agri. Ext. Ser. Cir. 55.* 75. Selecting Dairy Cattle. *Illinois A. E. S. Cir. 422.* 76. Tractor Repair and Maintenance. 77. Tomato Diseases and Insect Pests. *Illinois A. Ext. Ser. Cir. Nos. 425, 428.* 78. Canning Fruits and Vegetables at Home. *Louisiana Agri. Ext. Ser. Cir. 153.*

UNIVERSITY OF MADRAS

B. Sc. (Agriculture) Degree Examination, 1936.

FIRST EXAMINATION

1. AGRICULTURE

(Thursday, 2nd April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Six questions to be answered. Questions 2 and 5 are compulsory.

1. Explain how, with reference to rainfall in the different seasons of the year, the Coimbatore farmer regulates his tillage operations. (9 marks.)

*2. What do you understand by the term 'weather chart'? From a general knowledge of the weather conditions, prepare a sample chart for the normal weather that prevails in the Madras Presidency in the middle of the month of July. (12 marks)

3. Classify the soils, indicating the proportion of the mechanical constituents in each soil. To what classes of soil does the decomposition of 'igneous' and 'metamorphic' rocks give rise? (9 marks.)

4. Define 'soil temperature.' Explain its variations in regard to colour, depth, moisture, and class of soils. (9 marks.)

*5. Explain by means of sketches how you would lay out land for ploughing. Calculate the labour and cost of preparing a ten-acre piece of land into a fine seed bed. (12 marks.)

6. Describe an iron plough of up-to-date make suitable for Indian conditions, and explain how the various parts function. (9 marks.)

7. Distinguish between a cultivator and a harrow. Give examples. (9 marks.)

8. Write short notes on:—stratosphere, dewpoint, isobars, snowline, soil profile, suction of a plough, ridge roller, mechanical seed drill, early and late soils. (9 marks.)

2. BOTANY

(Saturday, 4th April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Answer six questions. Questions 2 and 3 are compulsory.

1. What are the general principles of classification of plants? (9 marks.)

*2. What are the distinguishing characteristics of the families *Leguminosae* and *Gramineae*? Mention two plants of economic importance in each. (12 marks.)

*3. Mention the functions of the stem and root, and describe the structure of each with sketches. What is the role of the various tissues? (12 marks.)

4. Write short notes on :— seed, protoplasm, primary and secondary tissues, irritability in plants. (9 marks.)

5. Sketch a typical living plant-cell and name its constituents. What are the two types of cell division? (9 marks.)

6. Draw a typical stoma and describe the role of the stomata in plants. (9 marks.)

7. What are the essential elements of plant food? What is the source of nitrogen to ordinary green plants and to leguminous plants? (9 marks.)

8. How is the energy in the plant obtained and how is it expended? (9 marks.)

3. CHEMISTRY

(Monday, 6th April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Answer six questions. Questions 2 and 6 are compulsory.

1. Give a short account of the determination of the molecular weight of an organic substance soluble in water. (9 marks.)
- *2. What is meant when it is stated that the paraffins belong to a homologous series? Describe the chief properties of the paraffins. (12 marks.)
3. How is methyl alcohol prepared in commerce? What are its chief properties? How is it used? (9 marks.)
4. Describe how you would prepare ethyl ether in the laboratory. Mention some of its important properties. (9 marks.)
5. What are the chemical reactions involved in the manufacture of soap? What is the difference between saponification and hydrolysis? (9 marks.)
- *6. Describe the manufacture of sucrose. How would you distinguish it from other sugars? (12 marks.)
7. What are the proteins? Give some of their important properties. (9 marks.)
8. Write short notes on:—(a) stereo-isomerism, (b) unsaturation, (c) compound radical, (d) amino-acids. (9 marks.)

4. ZOOLOGY

(Tuesday, 7th April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Answer six questions. Questions 1 and 7 are compulsory.

- *1. Write briefly what you know of the main principles of the 'doctrine of organic evolution', and adduce evidence to support the same with reference to animals. (12 marks.)
2. Prepare diagrams to show clearly the general external organisation of—the slipper animalcule, sea-anemone, carb, a fly, and a turtle. (9 marks.)
3. Explain clearly the different modes of reproduction found in the animal kingdom, and describe briefly the essential features of each, with examples. (9 marks.)
4. Explain the following terms used in relation to animals, and give one or two examples to illustrate their meaning:—arboreal, radial symmetry, pathogenic, viviparous, predatory, mimicry, nocturnal, phosphorescent. (9 marks.)
5. Describe the arrangement for performing the excretory function in the bodies of the following animals:—amoeba, flat-worm, earth-worm, prawn, cockroach, rabbit. (9 marks.)
6. What are the important criteria generally adopted in zoological classification? Explain those which are employed in the classification of insects, and subdivide this group into its chief orders. State briefly in what other ways you can classify this group. (9 marks.)
- *7. Write a short essay to illustrate the following statement: 'In the animal kingdom numerous forms have structural peculiarities suited to their special habits.' Give examples. (12 marks.)
8. Write short notes on—pseudopodia, amphioxus, karyokinesis, hermaphroditism, peripatus, coral, seaurchin, aquatic mammals. (9 marks.)

SECOND EXAMINATION

1. AGRICULTURAL ZOOLOGY

(Tuesday, 7th April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Answer six questions. Questions 1 and 2 are compulsory.

*1. Owing to the wide range of differentiation, wings provide one of the most useful characters for the purpose of classification of insects. Elaborate this statement with suitable examples. (12 marks.)

*2. Prepare a crop pest calendar for the Central Farm, Coimbatore, to give the local farmer an idea of the important insect pests of crops he may have to tackle during the year. (12 marks.)

3. Explain clearly the nature of the damage caused by the following categories of animals, giving examples of their food hosts:—weevils, fruit flies, capsidae, sphingidae, thysanoptera. (9 marks.)

4. Write what you know of—Soorai disease, fumigation, lac, larva, and tropisms. (9 marks.)

5. Classify the following into their respective families or groups and state the economic importance, if any, of each:—ants, biting lice, ladybirds, flea, mealywing, silver-fish, spittle insect, skipper pollu insect crickets. (9 marks.)

6. Discuss the role of the Arachnida as pests. (9 marks.)

7. Write a short essay on the important insect pests of sugar-cane in South India, with suggestions for their control. (9 marks.)

8. Write short notes on—crabs, shot-hole borers, mealworms, tachinidae, pebrine, trap-nests, strepsiptera, warbles. (9 marks.)

2. ANIMAL HYGIENE

(Wednesday, 8th April. 7 A. M. to 10 A. M.)

Maximum : 60 marks.

Answer six questions. Questions 2 and 5 are compulsory.

1. Give a full description of the liver of the ox with the aid of diagrams, and enumerate its functions. (9 marks.)

*2. Name the ferments concerned in the digestion of protein, and explain the changes it may undergo in the animal body before and after it is assimilated. (12 marks.)

3. A milch cow is suspected to be suffering from anthrax. How would you confirm your diagnosis? If confirmed, what prophylactic measures would you adopt in dealing with the outbreak? (9 marks.)

4. Define the following terms:—expectorant, intestinal astringent, febrifuge, diuretic. Quote *two* examples of each stating their respective doses for the ox. (9 marks.)

*5. Describe tuberculosis as regards aetiology, animals susceptible, mode of infection, symptoms, and method of diagnosis. (12 marks.)

6. Write notes on the diagnosis and treatment of—(a) fractures, (b) sprains, (c) mange. (d) hoven. (9 marks.)

7. How would you determine the nearing of parturition in a cow? What measures would you recommend to enable an easy parturition and to avoid complications after calving? (9 marks.)

8. What do you understand by 'filterable virus'? Mention *not less than four* diseases caused by such virus, and write a full account of any *one* of them that is transmissible to human beings. (9 marks.)

3. AGRICULTURAL ENGINEERING

(Monday, 6th April. 7 A. M. to 10 A. M.)

Maximum: 60 marks.

Answer six questions. Questions 1 and 5 are compulsory.

- *1. Give a dimensioned sketch of a Madras terrace roof for a span of 12 feet, and estimate the quantities of material required for 100 square feet of roofing. (12 marks.)
2. Write short notes on—cast iron, chilled iron, malleable iron, steel, concrete, reinforced concrete. (9 marks.)
3. A group of ryots in Kurnool district desires to instal a power-driven ground nut decorticating factory with two decorticators. Would you recommend a steam engine, a gas engine, a crude-oil engine, or a kerosene-oil engine for the motive power? Give reasons for your answer, and compare the running cost of a suitable steam engine with that of a crude-oil engine of similar power. (9 marks.)
4. Find the number of cubic feet of solid stone in a heap having a rectangular base 60 feet by 18 feet standing on level ground, slope of the sides 45 degrees, flat-topped, height 3 feet, the voids being 30 per cent. (9 marks.)
- *5. Explain the functions of the following:—governor, fly-wheel, carburettor, countershaft. Can an engine be worked without a fly-wheel? Give reasons for your answer. (12 marks.)
6. Sketch and briefly describe any modern tillage implement with which you are familiar, and compare it with its indigenous prototype. (9 marks.)
7. Calculate the horse-power required for lifting water at the rate of 180 gallons per minute from a well 20 feet deep and delivering it at a height of 6 feet above ground-level into a cistern situated at a distance of 50 feet from the well. Three-inch mains are to be used. The loss of head due to friction in the mains is 0.549 feet per yard of pipe. (9 marks.)
8. Explain clearly the object of fitting **each** of the following to a steam engine:—(a) safety valve, (b) non-return feed valve, (c) pressure gauge. (9 marks.)

4. AGRICULTURE--PLANT HUSBANDRY. I

(Thursday, 2nd April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 1 and 4 are compulsory.

- *1. a) Explain the terms 'heavy' and 'light' as applied to soils. Illustrate your answer by reference to soils in the vicinity of the Central Farm.
b) Describe a suitable rotation for a heavy soil, and explain briefly the principles on which it is based. (18 marks.)
2. Garden lands in Coimbatore district tend to become saline. Explain (a) how this tendency can be checked, (b) how salinity can be reduced. Name a few crops suitable for growing on saline soils. (16 marks.)
3. An agent offers a compound fertilizer with a guaranteed analysis of—6 per cent. nitrogen, 18 per cent. soluble phosphates, 6 per cent. insoluble phosphates, and 5 per cent. potash. State the method you would adopt in valuing this fertilizer. Would you consider the above information sufficient for your valuation? (16 marks.)
- *4. Field No. 20 on the Central Fram is intended for Cambodia cotton. Describe the preliminary cultivation and manuring you would consider necessary—

the previous crop being cholam harvested in June. Discuss the relative advantages and disadvantages of dibbling Cambodia seed in lines as compared with broadcasting and ploughing in. (18 marks.)

5. Write short notes on—sheep-penning, making composts, utilization of sullage, use of artificial fertilizers. (16 marks.)

6. What are the fundamentals of dry farming? How are these solved by the Indian ryot? State briefly the various operations you would carry out on dry land so as to make the fullest use of rainfall for a cotton crop. (16 marks.)

7. Classify briefly the main soil types of the Madras Presidency. Describe in detail the characteristics of the black cotton soil of the Bellary district. (16 marks.)

8. What is meant by soil erosion? Explain the nature of the damage done on arable lands by such erosion. Describe, with sketches, the methods by which you would prevent soil erosion under the different conditions met with. (16 marks.)

5. AGRICULTURE. PLANT HUSBANDRY II.

(Saturday, 4th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 3 and 7 are compulsory.

1. Compare and contrast the working of the under-noted water-lifts in wells of varying depth:—(a) single mhote, (b) double mhote, (c) circular water-lift, (d) picottah. (16 marks.)

2. What are the factors that would guide you in fixing up the area to be commanded by an irrigation source? (16 marks.)

*3. Work out in detail the cost of lifting water from a well 25 feet deep for irrigating ragi from planting to harvest in Coimbatore district by (a) mhote, (b) Cooper's Persian wheel, (c) oil engine, (d) electric motor. (18 marks.)

4. What are the methods to be adopted for bringing about a general improvement in the rice cultivation in the Madras Presidency? (16 marks.)

5. Discuss the scope for large scale manufacture of sugar in Madras Presidency. What are your recommendations for arranging a regular supply of raw produce in order that the factory may work for the maximum number of days in the year? (16 marks.)

6. Give a short account of the cultivation of **one** of the following crops, pointing out any features demanding special attention:—potato, sweet potato, tobacco, onions, cabbage, tomatoes. (16 marks.)

*7. Explain by means of a chart the methods followed for effecting improvement in the cotton crop. (18 marks.)

8. Write brief notes on—basin irrigation, double transplantation, wrapping of sugar-cane, ageing of tobacco, predatory cultivation, mixed cropping, and the Tinnevely system of growing cumbu after cumbu. (16 marks.)

FINAL EXAMINATION

1. AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

(Wednesday, 15th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 1 and 3 are compulsory.

*1. Work out a scheme for the supply of pure hygienic milk to an urban colony of fifty middle-class families, taking into consideration the full requirements of the population according to modern dietetic standards. (18 marks.)

2. Lay out a farm of 25 acres in one of the red-soil tracts of the southern districts of Madras for growing crops on a commercial basis. The crops are

sugar-cane, Cambodia cotton, rice, groundnuts, vegetables, and fruits. An allotment of 5 acres is to be set apart for fruits. Show by means of a sketch the various allotments for the different crops, and work out the balance sheet.

(16 marks.)

*3. Compare and contrast the economic life of an ordinary black soil farmer of the Ceded districts, who cultivates an area of 50 acres, with that of a garden land ryot of Coimbatore owning 10 acres of garden land.

(18 marks.)

4. What are the various kinds of lease tenure under which lands are given out for farming in the Presidency? What place does 'Metayer system' described in English text-books occupy in these forms of leases? Which would you prefer, ownership of land or leasehold conditions? Give reasons.

(16 marks.)

5. Explain what is meant by 'economic rent'. Discuss in detail what role rent plays in the valuation of agricultural lands.

(16 marks.)

6. Define the terms, 'value' and 'price' of a commodity and their relationship to each other.

(16 marks.)

7. What are your views regarding the establishment of farming colonies as providing a means for the solution of the unemployment problem? Would you work such colonies on a co-operative basis or on an individual basis? Give reasons.

(16 marks.)

8. What are credit and non-credit activities in the co-operative movement? How can the farmer be made to subserve the aims of the latter so far as agricultural production is concerned? Mention the chief obstacles in the way of co-operative production in agriculture.

(16 marks.)

2 AGRICULTURE—ANIMAL HUSBANDRY AND DAIRYING

(Thursday, 16th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 4 and 8 are compulsory.

1. Describe in detail the characteristics of a good Scinde cow. Discuss the advantages of milk records in building up a good dairy herd.

(16 marks.)

2. Write short notes on—pedigree, line-breeding, prepotency, reversion, dual purpose cattle.

(16 marks.)

3. Discuss the improvement of live stock with reference to the Agricultural Department's policy of maintaining good breeding bulls at selected centres in the Coimbatore and Salem Districts.

(16 marks.)

*4. What do you understand by the term 'balanced ration'? Having regard to the cattle foods available on the Central Farm, draw up a suitable ration for a Scinde cow of 900 lb. live-weight (a) giving 20 lb. of milk daily, (b) dry, but eight months in calf. Could you improve on the above ration if other foods were purchased outside? If so, how?

(18 marks.)

5. Describe briefly the various breeds of sheep in the Madras Presidency. Discuss clearly the methods which could be adopted to improve (a) wool bearing, (b) mutton production of any one of the breeds named.

(16 marks.)

6. Describe with sketches the principles of cream separation by mechanical means. Can you adjust the quality and quantity of cream obtained, if so, how? What is double cream?

(16 marks.)

7. What is butter? Describe clearly the various points to be observed in making good butter. What should be the butter out-turn from 150 lb. of milk testing 4.5 per cent. butter fat? Explain how you would obtain a good lactic fermentation in cream intended for butter-making.

(16 marks.)

*8. Explain why it is necessary to sterilize dairy utensils, and describe what you consider the best method of doing so. Explain the difference between pasteurization and sterilization. Describe briefly how the former process is carried out in commercial dairies. What is the effect of pasteurization on whole milk? (18 marks.)

3. AGRICULTURAL BOTANY I.

(Friday, 17th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 2 and 6 are compulsory.

1. Write all you know about the longevity of seeds. Give, with sketches of seeds, a brief account of *two* weeds commonly found growing among garden-land crops. (16 marks.)

*2. What improvements would you suggest in the matter of sugar-cane varieties in the Madras Presidency? Discuss the geographical distribution of sugar-cane in India and the origin of sugar-cane. (18 marks.)

3. Give a detailed account of the formation of sugar, starch, and protein in leaves. What are the conditions necessary for these processes? (16 marks.)

4. Explain the importance of root studies in agricultural crops. (16 marks.)

5. Write notes on—intramolecular respiration, nutrition of insectivorous plants, circumnutation, absorption of water by roots. (16 marks.)

*6. Describe with sketches, the various methods of propagating fruit-trees by stems. State, giving reasons, the precautions you would take for the successful application of these methods. (18 marks.)

7. Explain as fully as you can how water reaches the tops of tall trees. (16 marks.)

8. Give a description of the development of the male and female gametophytes in an angiosperm. (16 marks.)

4. AGRICULTURAL BOTANY II.

(Saturday, 18th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 4 and 7 are compulsory.

1. Give the life-history of an important fungus disease of any of the palms. Describe the symptoms and give the measures to combat the disease. (16 marks.)

2. Taking any rust, describe (a) its effect on the host, (b) its mode of nutrition and reproduction, (c) how it is disseminated. (16 marks.)

3. Describe the origin and evolution of sex in algae. (16 marks.)

*4. Describe with illustrative sketches the structural modifications which have enabled plants to change from aquatic to terrestrial habits. (18 marks.)

5. What are the methods which you recommend for improving the yields of the following crops within the shortest possible time:—(a) orange, (b) paddy, (c) cumbu, (d) plantain? Give reasons in support of your views. (16 marks.)

6. Write short notes on—linkage, sterility, variation, haustoria. (16 marks.)

*7. In a cross between two varieties of the ground-nut F_1 was normal, and in F_2 1,560 normal and 90 albino plants were obtained. Draw conclusions and suggest further observations to confirm your hypothesis. (18 marks.)

8. Write a short account of the chromosome theory of heredity. (16 marks.)

5. AGRICULTURAL CHEMISTRY I.

(Monday, 20th April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Answer six questions. Questions 6 and 8 are compulsory.

1. Discuss the role of phosphorus in plant and animal nutrition and describe a method by which you would determine whether a soil is deficient in this element or not. (16 marks.)
2. What are the important factors that determine the water-holding capacity of a soil? How may the properties of a soil be improved in this respect? (16 marks.)
3. Explain as fully as you can the nature of the transformations that attend the burying in of a green manure into (a) a swamp paddy soil, (b) a dry soil. (16 marks.)
4. What do you mean by the 'base exchange capacity of a soil'? Give, in detail, *one* method of estimating it, illustrating your answer by means of an example. (16 marks.)
5. What are 'city wastes'? Outline a scheme of utilizing them with maximum advantage to the farmer, explaining clearly the principles underlying the method. (16 marks.)
- *6. In a fertilizer sample given to you for analysis the following forms of nitrogen are to be determined:—(a) total nitrogen, (b) water soluble nitrogen, (c) water insoluble nitrogen, (d) nitrate nitrogen, (e) ammonia nitrogen, (f) mineral nitrogen, (g) organic nitrogen. Describe briefly the procedure you would adopt, giving reasons for the various steps that you take. (18 marks.)
7. Define humus. Describe its important characteristics and discuss its role in soil processes. (16 marks.)
- *8. You are using 150 lb. of sulphate of ammonia as a nitrogenous fertilizer and 10 lb. of sulphur (in spray materials) per acre annually in an orchard. Calculate how many lb. of calcium carbonate you must apply to counteract the theoretical acidity which these may cause. (18 marks.)

6. AGRICULTURAL CHEMISTRY II.

(Tuesday, 21st April. 7 A. M. to 10 A. M.)

Maximum: 100 marks.

Only six questions to be answered. Questions 1 and 2 are compulsory.

- *1. (a) What are the factors that you would consider important in making up a ration for milch cattle?
(b) Given cholam straw, paddy straw, maize fodder, and elephant grass as alternative roughages, which would you choose for feeding (i) milch cattle, and (ii) working animals? State reasons for your answer. (18 marks.)
- *2. Describe in detail the changes that proteins undergo in the alimentary tract of the ruminant. (18 marks.)
3. Describe, with experimental details, how you would proceed to estimate the nitrogen content of a sample of groundnut cake. (16 marks.)
4. Write short notes on—(a) crude fibre, (b) digestible coefficient, (c) nutritive ratio, and (d) maintenance ration. (16 marks.)
5. Give a short account of the importance of minerals to young stock. (16 marks.)
6. What is meant by the pasteurization of milk? Mention some of its advantages. (16 marks.)
7. What are the chief constituents of butter fat? (16 marks.)
8. What are the vitamins? Of what importance are they to cattle? (16 marks.)