AGRICULTURE GROUP

COURSE I

Animal Science and Dairying

Standard XI

Paper I

THEORY

Role of livestock in agricultural economy, livestock in relation to resources, study of important breeds of cattle, buffalo, sheep, goat, pig and poultry.

Anatomy and physiology of reproductive organs of male and female, oestrus cycle, fetilization, inplantation, gestation, parturition, role of harmones in reporduction, problems in reproduction - infertility and sterility.

Relative importance of A.I. and efficient ways of its application in livestock and poultry for milk, meat and egg production.

Principles of genetics : heredity, variation, systems of breeding in farm animals and poultry, role of cross-bredding for increasing livestock production in tropics. Study of different schemes, plans and programmes for livestock and poultry improvment.

Signs of health in livestock and poultry, common ailments and diseases of various body systems of livestock and poultry especially of reproductive and digestive systems. Method of diagnosis and control of infectious and viral diseases of cattle and poultry. Routine vaccination and treatment procedures in livestock farms.

PRACTICALS **Periods per week - 6**

i.e. 3 Practicals

1. Handling of livestock and poultry : casting, restraining, etc.
2. Study of important breeds :

Cattle - Khillar, Dangi, Gir, Sindhi, Rathi, Deoni, Haryana, Tharparkar, Hostein Friesian, Jersey, Brown Swiss, Crossbreeds

Buffalo - Murrha, Surti, Mehsana, Pandharpuri

Sheep - Deccani, Bikaneri, Merino, Rambouillet, Mandya, Nellore.

Goat - Surati, Jamnapari, Sangamneri, Malberi, Angora, Saanen, Beatal.

Pig - Deshi, White Yorkshire, Landrace.

Poultry - White leghorn,Rhode Island Red, Black Minorca, Deshi,Hybrids.

3. Judging of dairy animals.
4. Judging of draft animals.
5. Judging of poultry for eggs and meat.
6. Estimation of age and weight.
7. Preparation of animals for market and shows.
8. Marketing of surplus and culled animals, study of norms and methods.
9. Study of reproductive organs of males and females in Cattle, Sheep and Goat. Anatomical nomenclature, identification etc.
10. Study of different methods of detection of heat in farm animals.
11. Technique of A.I., Pregnancy diagnosis demonstration.
12. Recording of pulse,temperature, heartbeat, respiration in Cattle.
13. Signs of health and study symptoms of common aliments in farm animals.
14. Methods of giving medicines to animals - bolus, electuary, drenching, injection, vaccination, passing stomach tube; use of trochar and canula, etc.
15. Study of schedule of vaccination for prevention and protection from diseases of livestock and poultry : R.P., F & M.D., B.Q., H.S. Ranikhet, Foul pox, etc.
16. Study of farm, livestock breeding and health records.
17. Visits to slaughter houses.
18. Visit to A.I. Centre, Study of collection, preservation and transport of semen.

PAPER II

THEORY Periods per week - 2

Texture, Structure and types of soil, water and soil temperature, humus, fertility, saline, alkaline and acidic soils. Manures and fetilizers. Preparatory tillage for fodder crops. Irrigation and water management. Cultivation of important forage crops and preparing cropping scheme for uniform forage production. Preservation of fodder : Hay and silage making.

Anatomy of digestive system and physiology of digestion in ruminants and non-ruminants. Chemical and biological nutritive value of feeds and fodders. Feeding standards. Computation of rations and feed mixtures of farm animals and poultry. Non-conventional feeds and fodders. Legal standards for feed formulations : ISI Specifications.

Care and management of dairy animals and poultry. Raising of calves. Housing of cattle and poultry, Sanitation and control of internal and external parasites.

Study of records and recordkeeping. Economics of production of milk, meat and eggs.

PRACTICALS Periods per week - 6 (3 Practicals)

1. Physical and chemical analysis of soil, water, manures.
2. Study of implements and tillage operations : plowing, harrowing, sowing, planting, interculturing, harvesting, threshing and marketing of fodders and seeds.
3. Growing fodders : Maize, Jowar, Chawali, Iucerne, berseem, Oat, Perenis grasses like Gajraj, Paragrass.
4. Study of fodders trees, bushes and indigenous grasses. Anjan, Koobabul Sewari, Hedge Lucerne, Marvel, Dinanath, Pawana, etc.
5. Study of important concentrates such as Cakes, brans, chuni, fishery byproducts, slaughter house byproducts and industrial wastes.
6. Computation of ration for dairy animals and poultry.
7. Preparation of forage mixture.
8. Preparation of silage and hay.
9. Care and management of pastures.
10. Study of cattle and poultry housing.

11. Cleaning and sanitation of livestock and livestock byres, yards, etc.
12. Preparation of compost and manure.
13. Disposal of dead animals and birds.
14. Gobar gas plant.
15. Incubation and brooding.
16. Rearing of chicks upto productive age.
17. Rearing of calves upto productive age.
18. Record keeping.
19. Visit to various livestock and poultry farms.
20. Visit to feed compounding factories.

STANDARD XII

PAPER I

THEORY **Periods per week - 2**

Anatomy and physiology of udder. Theories of milk secretion and its hormonal control, composition of milk and its variation. Nutritive value of milk, marketing of milk collection, chilling, transportation, processing, cooling, bottling, distribution, storage of surplus milk.

Separation of milk : Processing and storage of cream. Butter making, Ice cream making, Ghee making, acid casein, Chocolate milk, etc.

Indigenous dairy products : Curd, butter, Ghee, Khoa, Chakka, Channa, Panir, Rabadi, Shrikhand, Basundi, etc.

Economics of milk production, legal standards : I.S.I. and Agmark Specification, Adulteration and its detection in milk and milk products.

Study of Government milk schemes.

Role of Co-operation in dairy industry.

Record keeping.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Study of udder - Anatomy, nomenclature, etc.
2. Milking methods and milking of animals.
3. Physical examination of milk.

4. Chemical analysis of milk for Fat, S.N.F., Total Solids, Acidity.
5. Detection of adulterants in milk and milk products.
6. Detection of preservative in milk and milk products.
7. Cream separation, Butter making, Ghee making, Icecream making.
8. Preparation of indigenous milk products.
9. Judging of milk, cream, butter, ghee and other indigenous products.
10. Record keeping : Study of records.
11. Visit to co-operative milk societies, visit to Govt. milk schemes, dairies, etc.

PAPER II

THEORY **Periods per week - 2**

Role and importance of animal products in human nutrition. Importance of sanitation in production of clean and safe milk. Diseases of udder mastitis, detection of sub-clinical mastitis and its control.

Bacteria and their role in preservation and spoilage of milk and milk products; egg and egg products, meat and meat products, fish and fish products.

Grades and standards for milk, egg, mutton and wool.

Milk and metals, layout for milk processing plant, role of water, steam and electricity in processing of milk and milk products.

Preparation of animal products :

Marketing of milk and milk products, egg and egg products, meat and meat products, fish and fish products.

Grading of wool, eggs, meat and fish.

Study of Record keeping.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Physical examination of udder and test for detection of mastitis in cows.
2. Cleaning of byres, poultry houses and other animal houses.
3. Study and care of milk separator, butter making equipments, Icecream making machines, boiler, refrigerator, etc.
4. Study of bacteria - Handling and use of microscope.

5. Preparation staining and examination of milk slides.
6. Shearing of wool, grading of wool.
7. Physical examination and bacteriological examination of fish and fish products, Demonstration.
8. Physical examination and bacteriological examination of meat and meat products, Demonstration.
9. Cleaning and sterilization of utensils.
10. Study of detergents and their use.
11. Grading of eggs for breeding and marketing.
12. Preservation of surplus meat, eggs, pork, etc. Chilling, deep-freezing etc.
13. Visit to poultry dressing plant.
14. Visit to Bacon factory and slaughter houses.
15. Visit to Baby food factories, bakeries etc.
16. Record keeping.

Reference Books

Subject : Animal Science and Dairy Science

PAPERS I and II

Unit	Name of the book with author and publisher	Corresponding Chapter	Pages	Other information
1.	G.C. Banerjee A text-book of Animal Husbandry Oxford and IBH Publishing Co. Calcutta, Bombay, New Delhi	Chapter I Chapter III Chapter II Chapter IV Chapter VI Chapter VII	1 - 14 55 - 57, 69 - 108 23-29 117 - 121, 130 - 137 141 - 143, 167 - 171 184 - 209, 233 - 279 284 - 337, 363 - 433 437 - 442	
2.	जनावरांचे रोग आणि त्यावर उपाय डॉ. जी.एस. पाटणकर केशव भिकाजी ढवळे गिरगाव, मुंबई. आ. २री		14 - 65	

Unit	Name of the book with author and publisher	Corresponding Chapter	Pages	Other information
3.	Dairy Cattle feeding and Management 5th edition, Publisher - Wiley Estern Pvt. Ltd., New Delhi.	Chapter 3 to 32	15 to 420	
4.	पशु विज्ञान, डॉ. य.त्र्यं. गद्रे विद्या ग्रंथ प्रकाशन, ३३१, शंकर नगर, नागपूर १०.	Chapter I Chapter II Chapter III	1 - 49 63 - 80 1 - 12, 1 - 16, 1 - 20	
5.	वराह पालन -- do --		1 - 12	
6.	पशु प्रजनन -- do --		1 - 16	
7.	पशु संगोपन -- do --		1 - 16	
8.	पशु प्रथमोपचार -- do --		1 - 16	
9.	पशु आहार -- do --		1 - 16	
10.	दुग्ध व्यवसाय -- do --		1 - 16	
11.	पशु सामान्य रोग -- do --		3 - 12	
12.	कुक्कुट पालन -- do --		2 - 24	
13.	कोंबड्यांचे रोग -- do --		3 - 16	
14.	संसर्गजन्य रोग -- do --		2 - 16	
15.	पशु शरीरशास्त्र -- do --		2 - 16	
16.	अधिक दूध अधिक नफा डॉ. प्रभाकर जामखेडकर		9 - 157	
17.	दुग्ध व्यवसाय, डॉ. जी. व्ही. दाणी उद्यम प्रकाशन, नागपूर		All books	
18.	Milk Products of India by Shrinivasan and Anantkrishnan, I.C.A.R. New Delhi		All books	
19.	Live Stock and Poultry Production (Revised edition) By Harbansingh and EARL N. Moore Prentice-hall of India Pvt. Ltd., New Delhi	Chapter 1 to 13 Chapter 16 to 20 Chapter 22 to 25 Chapter 27 to 38	1 to 195 249 to 326 347 to 412 519 to 570	

Course II

CROP SCIENCE

1. Objectives

i. To create interest and to impart knowledge and confidence in the students about the course.

ii. After the completion of the course, students should be able to pursue

i. his vocation of farming with enough confidence or

ii. to select some aspects of the education received and make livelihood by way of village-based advisory and custom-service.

PRINCIPLES OF CROP HUSBANDRY

Standard XI

PAPER I

THEORY **Periods per week - 2**

I Crop Morphology and Physiology

i. Kinds of roots, stems, leaves, flowers and fruits and their functions.

ii. Physiological functions like growth, development, absorption of water and nutrients, carbon-assimilation, respiration, dormancy, maturity, critical growth phases.

iii. Effect of climatic elements like temperature, precipitation, humidity, sunshine, wind-velocity etc. on germination, growth, development and yield of field crops.

II Soil Agronomy

i. Basic soil information : Composition, texture, structure, soil depth, importance of soil water and aeration, soil profile, broad classification of soil organic matter.

ii. Crop Nutrients, manures and fertilizers :

a. Essential nutrients for plant growth, availability, functions, their deficiency and excess, symptoms on crop growth, soil fertility meaning, improving soil fertility, soil fertility evaluation.

b. Composition, preparation, handling, application and benefits of bulky organic manures like farm yard manure, compost, green manures oil cakes and other farm wastes.

c. Straight and mixed fertilizers, nutrient ratio and analysis of composite fertilizers, N.P.K. fertilizers, their characteristics, availability, method of application to crops, residual effects and storage.

iii. Soil - water - plant relationship; soil water supply and losses, its expression, soil moisture constants available soil moisture, its evaluation, consumptive use of water, Drainage - its benefits and associated problems, saline and alkali soils and their methods of reclamation.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Classification of field crops, main morphological features, morphological description of cereals, pulses, fibres, oilseeds and commercial crops.*
2. Study of representative soil profiles and their description.
3. Preparing of compost and F.Y.M.
4. Growing and burial of green manure crops.
5. Study of symptoms of deficiency and excess of major nutrients in sand and soil culture on representative crops.
6. Identification of manures and fertilizers; preparing fertilizer mixtures of given ratio and analysis, working out quantity of fertilizers.
7. Field determination of bulk density, field capacity, wilting point and available soil moisture, measurement of evaporation, transpiration and irrigation water.
8. Study of excess water (in predesigned plots as well as under field condition) on various growth stages of crops and soil types.
9. Effect of salinity on crop growths in pre-designed plots and their reclamation.
10. Study of common meteorological equipments.

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* Classification of roots, stems, leaves, flowers, fruits and seeds of important field crops.

PAPER II

THEORY **Periods per week - 2**

I Crop Agronomy

i. Seed and its environment - qualities of good seed, seed-testing, seed treatment, seed bed requirement, seeding depth.

ii. Seeding time, spacing, population density, seed rate, factors affecting.

iii. Tillage - Primary and secondary tillage, seed bed preparation, soil tilth, various kinds of tillage implements and their operations.

iv. Weed control : weeds, habit of growth, losses caused, physical, mechanical, chemical and biological weed control in crops, common weeds.

v. Irrigation - when to irrigate, how much to irrigate and methods of irrigation.

vi. Soil Conservation - erosion, losses caused, physical engineering and agronomic practices.

vii. Cropping systems, crop rotation and crop mixture principles, objects, merits and demerits, cropping intensity, multiple cropping.

viii. Harvesting, storage and marketing - principles, criteria and methods, crop quality.

ix. Principles of crop improvement - selection, selfing hybridization, hybrid seed production of sorghum, millets and cotton.

II Crop protection

1. Pest control : Principles and methods of pest control, study of important pesticides, attractants, repellants, deoderants; Acaricides and rodenticides, pesticide hazards, antidotes storage and handling, plant protection equipments. Nature, damage and control of important pests of field crops and stored grains.

2. Important Diseases of field crops : symptoms, identification and control methods, Important fungicides and their application, seed treatment with fungicides; Bacterial innoculents, their application, effectiveness and precaution.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Determination of purity, viability and germination percentage of seed in the laboratory.
2. Test weight of seeds of important crops and varieties; optimum spacing and working out theoretical seed rates; comparison with actual seed rates in relation of optimum plant population.
3. Identification of important seeds, their collection and preparing seed herbarium.
4. Use of 5 chemical herbicides (contact and selective), preparing solution of given concentration, application and observing their effects on crop and weeds.
5. Study and use of equipments required for land grading, levelling and preparing irrigation layouts, irrigation water distribution and flow control.
6. Handling, operation and study of various tillage implements.
7. Harvesting, threshing and winnowing techniques.
8. Collection of important crop pests and crop disease herbarium.
9. Preparing pesticide and fungicide solutions of required concentrations and their applications.
10. Handling plant protection equipments.
11. Seed treatment with fungicides and bacterial innoculents.

Standard XII

CROP PRODUCTION TECHNOLOGY

PAPER I

THEORY **Periods per week - 2**

I Production Agronomy - I

1. Soil Classes on the basis of soil profile, slope, depth, soil, fertility, erodibility, land capability classes and units.
2. Classification of crops in respect of fertility needs, production potential, tillage needs, water needs and conservation values.
3. Fitting crops to soils and climate, soil productivity index, rotation index, etc. cropping scheme, calender of operations and requirement of labour units for different operations.

II Crop Production - I (Kharif crops)

Study of the following crops with reference to distribution and production, soil and climatic requirements, seed rates, seeding time and plant population, weed control nutritional and fertilizer requirements, water and irrigation needs, crop rotation and mixtures, important pests and diseases, harvesting, varieties, yields, quality aspects, production potentials, yield parameters and measures to improve the same.

Kharif crops

1.	Cereal	:	Paddy, sorghum, bajra, maize and hillmillets.
2.	Pulses	:	Red gram, green gram, black gram, horse gram, cowpea, kidney bean, soyabean, dolichos.
3.	Fibre Crops	:	Cotton, Sunhemp, deccan hemp, jute.
4.	Oilseed	:	Groundnut, sesame, castor, niger and sunflower.
5.	Fodder Crops	:	Jowar, maize, cowpea, cluster beans and important grasses.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Preparing land capability classes, contour reading and preparing soil and water conservation plans.
2. Intensive handling of tillage implements, seed bed preparation, sowing, weeding, applying fertilizers and manures, irrigation, plant protection measures, harvesting, threshing and winnowing of important crops.
3. Establishment of crop cafetaria on 0.5 ha. and recording observations on germination, growth, flowering maturity, yield contributing characters area.
4. A group of 5 students shall be given an area of 1/2 ha. during the seasons. Under guidance of teacher, they will plan cropping and carry out all operations in that area. The inputs shall be supplied by the school. Each student will prepare a report of work done by him. Receipts of the produce shall be given to the students after deduction of costs of inputs.

5. Crop Improvement Techniques and hybrid seed production of kharif crops, students will be trained adequately for crop improvement techniques like pure selection, mass selection and crossing.

A plot for hybrid seed production of cotton shall be established and students shall be associated with this hybrid seed production programme.

PAPER II

THEORY **Periods per week - 2**

I Production Agronomy - II

1. Soil tests and quick tissue tests - meaning, interpretation and application.
2. Planning for irrigation, assessment of quality and quantity of water, suitability of soil for irrigation, suitability of water for irrigation, preparing plan for management of water.
3. Working out farm production plans and farm layouts.

II Crop Production - II (Rabi crops)

Study of the following crops with reference to distribution and production, soil and climatic requirement, seed rates, seeding time and plant population, weed control nutritional and fertilizer requirements, water and irrigation needs, crop rotation and mixtures, important pests and diseases, harvesting, varieties, yields, quality aspects, production potentials, yield parameters and measures to improve the same.

1.	Cereals	:	Wheat, Sorghum.
2.	Pulses	:	Gram, Peas, Lentil.
3.	Commercial Crops	:	Sugarcane, Potato, Onion, Tobacco, Chilli, Turmeric, Ginger.
4.	Fodder Crops	:	Lucerne, Berseem, Oats.
5.	Oilseeds	:	Sunflower, Linseed, Mustard.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Handling of soil testing kits and determination of soil carbon, P.K., pH and electrical conductivity. Interpretation of quick soil test data and recommendation of feritlizer doses.

2. Preparing irrigation plans, times and quantity of water required, irrigation layout, conveyance system, methods of irrigation, cropping systems for irrigation.

3. Production plans - working, preparing calendar of operation, draft powers and labour planning, cost of production, requirement of inputs for holdings of different sizes.

4. Establishment of crop cafetaria on 0.5 ha. and recording observations on germination, growth, flowering maturity, yield contributing characters area.

5. A group of 5 students shall be given an area of 0.5 ha. during the seasons. Under gudiance of teacher, they will plan cropping and carry out all operations in that area. The inputs shall be supplied by the school. Each student will prepare a report of work done by him. Receipts of the produce shall be given to the students after deduction of costs of inputs.

6. Crop improvement Techniques and hybrid seed production of kharif crops, students will be trained adequately for crop improvement techniques like pure selection, mass selection and crossing.

   A plot for hybrid seed production of Rabi sorghum shall be established and students shall be associated with this hybrid seed production programme.

Reference Books

Subject : Crop Science Std. XI - PAPER I

PRINCIPLES OF CROP HUSBANDRY

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
I. **Crop Morphology & Physiology**		PART I		
1. Kinds of roots	Botany for Degree Students A.C.Datta Oxford University Press, Bombay	Chapter 1 Chapter 2 Chapter 3 Chapter 6	1 to 10 10 to 26 26 to 50 68 to 94	Principles of Agronomy By Lorentz C. Pearson Affiliated East-West Press Pvt. Ltd., New Delhi
2.Physiological functions	- do -	Chapter 10	120 to 128	
3. Effects of climate	Principles of Crop Husbandry in India By A.K.Yegna Narayan Aiyer The Bangalore Printing and Publishing Co. Ltd., Bangalore	PART II Chapter 4 Chapter 5 Chapter 12 Chapter 1	 276 to 280 280 to 284 342 to 352 1 to 27	
II. **Soil Agronomy**	Introduction to Agronomy and Soil & Water Management By V. G. Vaidya & By K. R. Sahasrabudhe Continental, Poona	Chapter 3 Chapter 4	10 to 29 31 to 50	Soil Management in India By Arakeri, Chalam, Satyanarayan & Donahue
1. Basic Soil				
2. Crop Nutrients : Manures & fertilizers	Manures & Fertilizers By K.S. Yawalkar & Others	Chapter I Chapter II	1 to 15 25 to 72	Hand Book of Agriculture and Hand Book of

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
a), b) & c)	Agriculture-Horticultural Publishing House, Nagpur	Chapter III Chapter IV Chapter V Chapter VI	73 to 77 78 to 81 110 to 111 133 to 134	Manures & Fertilizers I.C.A.R. Publication, New Delhi
3. Soil-water-plant relationship	Introduction to Agronomy and Soil & Water Management By V. G. Vaidya & By K. R. Sahasabudhe	Chapter VI Chapter X Chapter XV	90 to 103 163 to 169 190 to 193 320 to 334	Soil Management in India by Araketi et al Asia Publishing House, Bombay

Std. XI - PAPER II

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
I. **Crop Agronomy**	Crop Production and field Experimentation	Chapter III	22 to 46	Principles of Agronomy By Lorentz C. Pearson
1. & 2. Seed and its environment	By V. G. Vaidya, K. R. Sahasrabudhe & V. S. Khuspe Continental Prakashan, Poona 30			
3. Tillage	Introduction to Agronomy and Soil & Water Management By V. G. Vaidya, By K. R. Sahasrabudhe	Chapter VII	103 to 124	
4. Weed Control	Soil Management in India By Arakeri et al Asia Publishing House, Bombay	Chapter VIII	129 to 145	
5. Irrigation	Introduction to Agronomy and Soil & Water Management By V. G. Vaidya, By K. R. Sahasrabudhe	Chapter X	163 to 183	
6. Soil conservation	- do -	Chapter VIII	124 to 148	
7. Cropping systems	Crop Production and Field Experimentation	Chapter IV	46 to 60	

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
	By Vaidya, Sahasrabudhe & Khuspe			
8. Harvesting, storage	Principles of Crop Husbandry in India By A. K. Yegna Narayan Aiyer Bangalore Press, Bangalore	Chapter XXIII	380 to 392	
9. Crop improvement	Crop Production and Field Experimentation By Vaidya, Sahasrabudhe & Khuspe	Chapter I	8 to 10	Principles of Crop Husbandry in India By A. K. Yegna Narayan Aiyer
II. **Crop Protection**				
1. Pest Control	Crop pests & How to fight them Govt. of Maharashtra (Dept. of Agri.) Publication	-		
2. Important diseases of field crops.	Plant diseases By R. S. Singh Oxford Press, Bombay	-		

Std. XII - PAPER I

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
I. **Production Agronomy**				
1. Soil Classes	Introduction to Agronomy and Soil & Water Management By Vaidya & Sahasrabudhe	Chapter III	18 to 30	
2. Classification of	Crop Production and Field Experimentation By Vaidya, Sahasrabudhe & Khuspe	Chapter I	1 to 8	
3. Fitting crops	Introduction to Agronomy and Soil & Water Management By Vaidya & Sahasrabudhe	Chapter II	5 to 9	
II. **Crop Production I (Kharif Crops)**	Crop Production and Field Experimentation	Chapter VIII, IX XI, XII, XIII, XVI		Latest Technical bulletins on different crops.

Std. XII - PAPER II

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
I. Production Agronomy - II				
1. Soil tests & tissue tests	Soil Management in India By Arakeri & others	Chapter 2	26 to 34	
2. Planning for Irrigation	- do -	Chapter 11	207 to 243	
3. Working out Farm Production Plans	Crop Production and Field Experimentation By Vaidya, Sahasrabudhe & Khuspe	Chapter VI	89 to 110	
II. Crop Production II (Rabi Crops)	- do -	Chapter X, XI, XII XIV, XVI and XIII		

Course III

HORTICULTURE

Standard XI

PAPER I

FRUIT GROWING

Periods per week - 2

THEORY

Importance and nutritive value of fruits. Fruit zones of Maharashtra and India. Selection of site, Planning and planning of orchard, Planting methods, Propagation of selected commercial fruit crops, Training and Pruning, Special horticultural practices viz. bending ringing, notching, girdling and bahar treatment. Inter cropping, Fertilizer application and irrigation in fruit crops. Rejuvenation of old orchards.

PRACTICAL Periods per week - 6 (3 practicals)

1. Acquaintance with the orchard of the institution.
2. Garden tools and implements.
3. Systems and layout of Horticultural garden.
4. Layout of small fruit garden.
5. Training and Fruning.
6. Practice in plant propagation methods viz. cutting, layering, budding, grafting and also rejuvenation methods.
7. Selection and planting of grafts, layers, rooted cuttings, budded plants and after care till plant is established.

Standard XII

PAPER I

FRUIT GROWING

Periods per week - 2

THEORY

Commercial cultivation of the following fruit crops (relevant to the area). Considering soil, climate, varieties, root stocks, manuring, irrigation, plant protection measures, harvesting, and marketing of --

Mango, Banana, Citrus (Santra, Mosambi, Kagdi lime), Grape,

Guava, Pomegranate, Papaya, Chikoo, Coconut, Cashewnut, Arecanut, Pineapple, Jackfruit. Cultivation of the minor fruit crops such as Ber, Fig, Tonla, Jaman, Custard apple and Wood apple.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Study of commercial varieties of different fruit crops.
2. Bahar treatment in citrus, guava and pomegranate.
3. Pruning and training of fruit crops.
4. Practice in special horticultural practices viz. ringing, bending, notching and girdling.
5. Application of growth regulators for increasing fruit set and size, fruit thinning and prevention of flower and fruit drop.
6. Manuring and irrigation of fruit trees.
7. Preparation and application of various insecticides and fungicides i.e. Bordeaux paste, Bordeaux mixture, etc.
8. Harvesting, storing, grading and packing of different fruit crops.
9. Demonstration of rejuvenation methods of mango.
10. Conversion of country ber plants into superior types.

Standard XI

PAPER II

VEGETABLE GROWING AND FLORICULTURE

THEORY Periods per week - 2

Nutritive value of vegetables in human diet. Classification of vegetable crops according to season, part used and botanical classification. Types of vegetable and flower garden.

Raising of seedlings of vegetables and flowers. Management of vegetable and flower nursery, transplanting and sowing of vegetables.

Principles of manuring and irrigation of vegetable and flower crops. Inter cropping, companian cropping, relay cropping and rotations in vegetables.

Harvesting, packing and transplanting of various flowers and vegetables.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Identification of most common vegetable and flower seeds, seedlings and plants.
2. Preparation of seed beds for sowing vegetable and flower seeds.
3. After care of vegetables and flower seedlings in nursery.
4. Layouts for planting vegetables.
5. Sowing of seeds and transplanting of seedlings of vegetables and flowers.
6. Manuring and irrigation.
7. Preparation of various fungicide and insecticide solutions and their application.

Standard XII

PAPER II

VEGETABLE GROWING AND FLORICULTURE

THEORY Periods per week - 2

Detailed cultivation of commercially important vegetables such as cole crops, (cabbage, cauliflower, knol-khol)-Solanaceous crops, (tomato, brinjal, chillies and potato) onion, Garlic, bhendi, cucurbitaceous crops, (And Pumpkin, bottle gourd, bitter gourd, Ridge gourd, Sponge gourd, cucumber, watermelon and muskmelon), peas, beans and leafy vegetables.

Detailed cultivation of commercially important floricultural crops such as tuberose, roses, marigold, chrysanthemums, gaiallrdia and Jasminums.

PRACTICAL Periods per week - 6 (3 Practicals)

1. Study of commercially important varieties.
2. Interculture operations such as weeding, earthing up, staking and mulching.
3. Extraction of vegetable seeds of tomato, brinjal, watermelon, muskmelon, chillies, etc.
4. Seed collection of bhendi, gavar, peas, bean, cucurbitaceous vegetables and leafy vegetables.
5. Seed collection of commercially important floricultural crops.
6. Harvesting, grading, packing and marketing of vegetables and flowers.

Reference Books

Subject : Horticulture - Fruit Growing

Std. XI - PAPER I

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other information
1. Importance and Nutritive value of fruits	Fruit Culture in India Complied By Dr.Shamsingh, Dr.S.Krishnamurthi and S.L.Katyal. I.C.A.R. Publication Publisher - Dalip Singh, I.C.A.R. New Delhi	Importance of Fruit Industry	3 to 8	Nil
	Fruit Growing in India By W. B. Hayes Publisher - Kitabistan, Allahabad	Opportunities in Fruit Growing	1 to 11	- do -
2. Fruit zones of Maharashtra and India	Fruit Culture in India Complied By Dr.Shamsingh, Dr.S.Krishnamurthi and S.L.Katyal. I.C.A.R. Publication Publisher - Dalip Singh, I.C.A.R. New Delhi	Climate and Soil	9 to 12	- do -

Std. XI - PAPER II

Unit	Name of the book with author and Publisher	Corresponding Chapter	Pages	Other Information
1. Nutritive value of Vegetables in human diet	Vegetable Production in India By D.V.S. Chauhan, Publisher - Ram Prasad & Sons Agra - 3.	Importance of Vegetables	1 to 9	Nil
2. Classification of Vegetable crops according to Seasons; Part used and botanical classification	1. Vegetable By Dr. B. Chaudhary Publisher-National Book Trust of India, New Delhi	Classification	17 to 23	
	2. Vegetable Production in India By D.V.S. Chauhan,	Importance of Vegetables Types of Vegetable farming	10 to 13	
3. Types of Vegetable and flower garden	1. Vegetable Production in India By D.V.S. Chauhan,	Types of Vegetable	31 to 45	
	2. Vegetable By Dr. B. Chaudhary	Gardens	4 to 16	
	3. Complete gardening in India By K.S.Gopalswamiengar Publisher - G.Kastury Rangan, 177, 5th Road Chamarajpet, Bangalore 18.	The Garden & its parts	164 to 168	

Reference Books

Subject : Horticulture - Fruit Growing

Std. XII - PAPER I

Unit	Name of the book with Author and Publisher	Corresponding Chapter	Pages	Other Information
Commercial cultivation of the following fruit crops considering soil, climate, varieties, rootstocks,manuring, irrigation, plant protection measures and harvesting and marketing of -	1. Fruit Culture in India Compiled By Dr. Shamsingh, Dr.S.Krishnamurthi, and S.L.Katyal. I.C.A.R. Publication Publisher - Dalip Singh, I.C.A.R. New Delhi	Chapter 11 The Mango	85 to 107	Nil
1. Mango	2. Fruit Growing in India By W. B. Hayes Publisher - Kitabistan, Allahabad	Chapter 13 The Mango	154 to 195	
2. Banana	1. Fruit Culture in India Compiled By Dr. Shamsingh, Dr.S.Krishnamurthi, and S.L.Katyal., I.C.A.R. Publication Publisher - Dalip Singh, I.C.A.R. New Delhi	Chapter 12 The Banana	108 to 127	
	2. Fruit Growing in India By W. B. Hayes Publisher - Kitabistan, Allahabad	Chapter 15 The Banana	267 to 285	

Reference Books

Subject : Horticulture : Vegetable Growing and Floriculture

Std. XI - PAPER II

Unit	Name of the book with Author and Publisher	Corresponding Chapter	Pages	Other Information
1. Nutritive value of Vegetables in human diet	Vegetable Production in India By D.V.S. Chauhan, Publisher - Ram Prasad & Sons Agra - 3.	Importance of Vegetables	1 to 9	Nil
2. Classification of Vegetable crops according to Seasons; Part used and botanical classification	1. Vegetable By Dr. B. Chaudhary Publisher-National Book Trust of India, New Delhi	Classification	17 to 23	
	2. Vegetable Production in India By D.V.S. Chauhan,	Importance of Vegetables Types of Vegetable farming	10 to 13	
3. Types of Vegetable and flower garden	1. Vegetable Production in India By D.V.S. Chauhan,	Types of Vegetable Gardens	31 to 45	
	2. Vegetable By Dr. B. Chaudhary	The Garden & its parts	4 to 16 164 to 168	
	3. Complete gardening in India By K.S.Gopalswamiengar Publisher - G.Kastury Rangan, 177, 5th Road Chamarajpet, Bangalore 18.			

Reference Books

Subject : Horticulture : Vegetable Growing

Std. XII - PAPER II

Unit	Name of the book with Author and Publisher	Corresponding Chapter	Pages	Other Information
Cole Crops **Cabbage**	1. Vegetables By Dr. B. Chaudhary Publisher-National Book Trust of India, New Delhi	Chapter VI	72 - 76	Nil
	2. Vegetable Production in India By D.V.S. Chauhan, Publisher - Ram Prasad & Sons,Agra - 3.	Chapter 10	131 - 140	
Cauliflower	1. Vegetables By Dr. B. Chaudhary Publisher-National Book Trust of India, New Delhi	Chapter VI	64 - 71	
	2. Vegetable Production in India By D.V.S. Chauhan, Publisher - Ram Prasad & Sons,Agra - 3.	Chapter 10	117 - 130	
Knolkhol	1. Vegetables By Dr. B. Chaudhary Publisher-National Book Trust of India, New Delhi	Chapter VI	77 - 78	
	2. Vegetable Production in India By D.V.S. Chauhan	Chapter 10	140 - 146	Nil

List of equipments for courses in Agriculture

I Land 10 hectares

For general cultivation as well as for allotting to different batches of 5 students each @ 1/2 ha. during **kharif** and 1/2 ha. during **rabi** (1/3 of the total area should have irrigation facilities).

II Buildings

1.	Class rooms	2 (Each of 8 x 6 m)
2.	Laboratories	1 (16 x 6 m)
3.	Farm Office	1 (3 rooms each of 6 x 4 m)
4.	Store room	1 (20 x 6 m)
5.	Implement shed cum Workshop	1 (20 x 6 m)
6.	Bullock shed	2 (6 x 4 m)
7.	Water tank for animals	1 (3 x 2 m)
8.	Threshing yard	1 (4 x 4 m)
9.	Drying yard	1 (10 x 10 m)

III Tillage Equipments

a) Preparatory Tillage

1.	Plough Kirloskar No.9	1
2.	Plough Kirloskar No.100	1
3.	Plough Vijay	1
4.	Harrows (Blade)	3
5.	Maind (for clod crushing & comparting)	1
6.	Ridger	1
7.	Sara Yantra	1
8.	Leveller	1
9.	Float	1

b) Seeding Implements

1.	Country seed drill (Complete) 45 cm.	1
2.	Country seed drill (Complete) 30 cm.	1
3.	Country seed drill (Complete) 22.5 cm.	1
4.	Ferti seed drill (Bullock drawn)	1
5.	Light harrow for covering of seed (Plankar)	1
6.	Markers (one each of 45.30 and 22.5 cm.)	3

c) Intertillage Implements

1.	Hoes (Blade) 30 cm.	3
2.	Hoes (Blade) 22.5 cm.	3
3.	Slit Blade Hoe 22.5 cm.	3
4.	Hand hees 12 cm.	2
5.	Rotatary hoes with attachments	2
6.	Akola hoe	1

d)	**Threshing and Winowing**	
	1. Power thresher for Jowar, Bajara, Wheat etc. (small)	1
	2. Hand winower	1
e)	**Irrigation Equipments**	
	1. Electric Motor/Oil engine	1
	2. Water meter	1
	3. 'V'notch	1
	4. Standing wave flume	1
f)	**Other Equipments**	
	1. Bullock pairs	2
	2. Bullock carts	2
	3. All types of hand tools	
	4. Duster	2
	5. Sprayer	2
	6. Power sprayer cum duster	1
	7. Seed treating drum	1
	8. Termeric polishing drum	1
IV	'C' class observatory with all common meteorological equipments	
V	**Laboratory equipments**	

Sr.No. (1)	Name of the article (2)	Quantity (3)
1.	Hot Air Oven 18" x 24"	1 No.
2.	Chemical Balance (Cherematic)	1 No.
3.	Physical Balance	2 Nos.
4.	Wt. Boxes - analytical (1 g to 100 g)	3 Nos.
5.	Stop watch	1 No.
6.	Soil Conductivity Bridge	1 No.
7.	Kle Summersion Calorimeter (U.S.A. Make)	1 No.
8.	Dr. Lange Flamephoto Meter (German Make)	1 No.
9.	pH Meter - pH Range (0 to 7 Q. 7 to 14)	1 No.
10.	Hot plates Harsh 1500 Watt	2 Nos.
11.	Distilled water apparatus, cap (set injunction type) 4 lit. per hour	1 No.
12.	International pipette stand	1 No.
13.	Soil Augur screw post hole	2 Nos.
14.	Soil Augur screw	2 Nos.
15.	Rotary Shacking machine	1 No.
16.	Shacking machine horizontal	1 No.
17.	Multiple stabilizer for 4 instruments	1 No.
18.	Brass dishes with seives or perforated dishes	10 Nos.
19.	Evaporating dishes porcelain 7.5 cm.	12 Nos.

(1)	(2)	(3)
20.	Iron tripod stand 8" x 5"	10 Nos.
21.	Polythene wash bottles 500 ml.	5 Nos.
22.	(Wooden) pipette stand - Vertical, horizontal	3 Nos.
23.	Test tube holder 9"	3 Nos.
24.	Wooden pastel and Mortar 180 mm.	1 No.
25.	Porcelain mortar and Pastel 6" dia	1 No.
26.	Beakers corning with beach (different sizes)	24 Nos.
27.	Automatic burette 50 ml.	2 Nos.
28.	Micro burettes 5 ml.	2 Nos.
29.	Dessicator 6" with lid	2 Nos.
30.	Dessicator 8" with lid	2 Nos.
31.	Funnels 2" dia. (different sizes)	12 Nos.
32.	Erlen meyar flask (conical) corning (different sizes)	24 Nos.
33.	Flasks volumetric cap 25 ml.	12 Nos.
34.	Flat bottom flasks 100 ml. cap.	24 Nos.
35.	Kjeldhal flask 800 ml. cap. corning	24 Nos.
36.	Kjeldhal flask 500 ml. cap. corning	12 Nos.
37.	Measuring Cylinder corning different sizes	12 Nos.
38.	Ordinary pipettes with bulb corning (Dif. sizes)	12 Nos.
39.	Automatic pipette (different sizes)	2 Nos.
40.	Pipettes International two way 20 ml.	2 Nos.
41.	Pipette graduated (different sizes)	12 Nos.
42.	Silica crucibles with lid 25 ml.	6 Nos.
43.	Test tubes of different diameters and sizes	24 Nos.
44.	Watch glass 1"	24 Nos.
45.	Soil and water testing kit	2 Nos.
46.	Dumpy level with other accessories	1 Set
47.	Levelling plane table	1 Set
48.	Microscope	1 No.
49.	Core samples with accessories	1 Set
50.	Petridishes	24 Nos.
51.	Soil water and plant Tissue Testing kit	2 Sets

Scheme of Examination
AGRICULTURE GROUP

Course	Paper I				Paper II			
	Theory		Practical		Theory		Practical	
	Marks	Duration	Marks	Duration	Marks	Duration	Marks	Duration
1. Animal Science & Dairying	40	2 Hrs.	60	3 Hrs.	40	2 Hrs.	60	3 Hrs.
2. Farm Mechanics	40	2 Hrs.	60	2 Hrs.	40	2 Hrs.	60	2 Hrs.
3. Crop Science	40	2 Hrs.	60	3 Hrs.	40	2 Hrs.	60	3 Hrs.
4. Horticulture	40	2 Hrs.	60	3 Hrs.	40	2 Hrs.	60	3 Hrs.

NOTE - Each course has a practical examination of 60 marks. 20 marks out of these 60 marks should be assigned to the journal, which is to be produced at the time of Practical Examination.

CATERING AND FOOD TECHNOLOGY GROUP

General Scheme of Vocational Training in Cookery, Bakery & Confectionary and Food Preservation for Stds. XI and XII

XI		XII	
Theory	Practicals*	Theory	Practicals*
1. Cookery			
Paper - I Cookery Food Microbiology Nutrition	**Paper - I** Cookery Food Microbiology	**Paper - I** Cookery Hygiene	**Paper - I** Cookery
Paper - II General Science Equipment Maintenance	**Paper - II** Services	**Paper - II** Costing Inplant Training report	**Paper - II** Visit to different Catering Establishments, Inplant Training.
2. Bakery & Confectionery			
Paper - I Bakery - I Food Microbiology Nutrition	**Paper - I** Bakery - I Food Microbiology	**Paper - I** Bakery - II (Confectionery) Hygiene	**Paper - I** Bakery - II (confectionery)
Paper - II General Science Equipment Maintenance	**Paper - II** Services Visit to different Bakeries	**Paper - II** Costing Inplant Training report	**Paper - II** Visit to different Confectionery units, Inplant Training.
3. Food Preservation			
Paper - I Processing Food Microbiology Nutrition	**Paper - I** Processing Food Microbiology	**Paper - I** Processing Hygiene	**Paper - I** Processing
Paper - II General Science Equipment Maintenance	**Paper - II** Services	**Paper - II** Costing Inplant Training report	**Paper - II** Visit to different Food Processing units, Inplant Training.

* All students will be working in the batches of four.

NOTE : The teaching and the examination scheme for both the stds. (i.e. XI and XII) for all the courses under this group are indicated below :

(1) Teaching Scheme

(periods per week)

Paper - I		**Paper - II**	
Theory -	4 periods	Theory -	4 periods
Practical -	4 periods	Practical -	4 periods

(2) Examination Scheme

Paper - I

Theory : 50 Marks. Duration : 3 Hrs.

Paper - II

This paper is common for all the three courses under this group.

Theory : 50 Marks. Duration : 3 Hrs.

Practical :

(For Papers I & II combined). Marks : 100 (75 + 25)*

Duration : 6 Hrs.

* 75 Marks for actual performance of a student at the practical examination and 25 marks for the Training Report submitted by the student at the time of practical examination which should be assessed by the pair of examiners.