Detailed Course Scheme

Bachelor of Science (Hons.)

Agriculture

Semester- IV

(2022- 26)

DOC202208220007

RNB GLOBAL UNIVERSITY

Educating stars for tomorrow

RNB GLOBAL UNIVERSITY

RNB Global City, Ganganagar Road,
Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System along with Choice Based Credit System as per latest guidelines of University Grants Commission (UGC). Accordingly, each academic year is divided into two semesters, **Odd (July-December) and Even (January-June)**Also, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The Curriculum for B. Sc Agriculture program for (January-June) Even Semester 2024 along with examination pattern is as follows:

Course Scheme

Semester –IV

S.No.	Course Code	Course Name	L	T	P	Credits
1.	20014200	Crop Production Technology –II (*Rabi Crops*)	1	0	0	1
2.	20014300	Crop Production Technology –II (*Rabi Crops*) Lab	0	0	2	1
3.	20014400	Production Technology for ornamental Crops, MAP and Landscaping	1	0	0	1
4.	20014500	Production Technology for Ornamental Crops, MAP and Landscaping Lab	0	0	2	1
5.	20014600	Renewable Energy and Green Technology	1	0	0	1
6.	20014700	Renewable Energy and Green Technology Lab	0	0	2	1
7.	20014800	Problematic Soils and their Management	2	0	0	2
8.	20014900	Production Technology for Fruit and Plantation Crops	1	0	0	1
9.	20015000	Production Technology for Fruit and Plantation Crops Lab	0	0	2	1
10.	20015100	Principles of Seed Technology	1	0	0	1
11.	20015200	Principles of Seed Technology lab	0	0	4	2
12.	20015500	Agricultural Marketing Trade & Prices	2	0	0	2
13.	20015600	Agricultural Marketing Trade & Prices Lab	0	0	2	1
14.	20026400	Introductory Agro-meteorology & Climate Change	1	0	0	1
15.	20026500	Introductory Agro-meteorology & Climate Change Lab	0	0	2	1
16.	20026800	Farming System & Sustainable Agriculture	1	0	0	1

17.	20014000	Agriculture Heritage & HumanValues & Ethics	2	0	0	2
18.	-	Elective-I	2	0	0	2
19.	-	Elective Lab-I	0	0	2	1
20.	20015900	Ability and Skill Enhancement IV	2	0	0	2
21.	99003300	Workshops & Seminars/ Human Values & SocialService/NCC/NSS	-	-	-	1
	Total		**17**	**0**	**18**	**27**

Electives

Elective	Course Code	Course Name
Elective I	20016000	**Agribusiness Management**
	20016100	**Agribusiness Management Lab**
	20016200	Agrochemicals
	20016300	Agrochemicals Lab
	20016400	Commercial Plant Breeding
	20016500	Commercial Plant Breeding Lab
	20016600	Landscaping
	20016700	Landscaping Lab

EVALUATION SCHEME - THEORY

The evaluation of the theory paper of B.Sc. Agriculture program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessment

The distribution of Internal Assessment Marks is as follows:

Type	Details	Marks
Mid Term	Two Mid-term Sessional of 15 marks each (15+15)	30
Marks obtained in various Tests, Assignments, Presentations, Quiz, Tutorials, etc.	Average of marks obtained	15
Attendance	75% + : 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Theory	50

EVALUATION SCHEME - PRACTICAL

The evaluation of the practical paper of B.Sc. Agriculture program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	45
Attendance	75%+: 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- WORKSHOPS & SEMINARS & NCC/NSS

1. NCC/NSS will be completed from Semester I – Semester IV. It will be evaluated internally by the institute. The credit for this will be given at the end of Semester.

2. The students have to join club/clubs with the active participation in different activities of club. The students would be continuously assessed from Semester-I to Semester-IV and credits and marks would be given after the end of Semester.

CURRICULUM

Course Name: Crop Production Technology –II (Rabi Crops)

Course Code: 20014200

Course Outline

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; cereals –wheat and barley, pulses-chickpea, lentil, peas, oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane; medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

Course Name: Crop Production Technology –II (Rabi Crops) Lab

Course Code: 20014300

Course Outline

1. Sowing methods of wheat and sugarcane, identification of weeds in *rabi* season crops.
2. Study of morphological characteristics of *rabi* crops,
3. Study of yield contributing characters of *rabi* season crops, yield and juice quality analysis of sugarcane,
4. Study of important agronomic experiments of *rabi* crops at experimental farms.
5. Study of *rabi* forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

Course Name: Production Technology for Ornamental Crops, MAP and Landscaping

Course Code: 20014400

Course Outline

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping.
Principles of landscaping. Landscape uses of trees, shrubs and climbers. Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions. Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

Course Name: Production Technology for Ornamental Crops, MAP and Landscaping Lab

Course Code: 20014500

Course Outline

1. Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing.
2. Training and pruning of Ornamental plants. Planning and layout of garden.
3. Bed preparation and planting of MAP. Protected structures – care and maintenance.
4. Intercultural operations in flowers and MAP. Harvesting and post harvest handling of cut and loose flowers.
5. Processing of MAP. Visit to commercial flower/MAP unit.

Course Name: Renewable Energy and Green Technology

Course Code: 20014600

Course Outline

Unit I

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource.

Unit II

Introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

Course Name: Renewable Energy and Green Technology Lab

Course Code: 20014700

Course Outline

1. Familiarization with renewable energy gadgets.
2. To study biogas plants,

3. To study gasifier,
4. To study the production process of biodiesel,
5. To study briquetting machine,
6. To study the production process of bio-fuels.
7. Familiarization with different solar energy gadgets.
8. To study solar photovoltaic system: solar light, solar pumping, solar fencing.
9. To study solar cooker, To study solar drying system.
10. To study solar distillation and solar pond.

Course Name: Problematic Soils and their Management

Course Code: 20014800

Course Outline

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils. Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils. Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

Course Name: Production Technology for Fruit and Plantation Crops

Course Code: 20014900

Course Outline

Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut, almond and; minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry, plantation crops-coconut, arecanut, cashew, tea, coffee & rubber.

Course Name: Production Technology for Fruit and Plantation Crops Lab

Course Code: 20015000

Course Outline

1. Seed propagation. Scarification and stratification of seeds.
2. Propagation methods for fruit and plantation crops.
3. Description and identification of fruit.
4. Preparation of plant bio regulators and their uses,

5. Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Course Name: Principles of Seed Technology

Course Code: 20015100

Course Outline

Unit I

Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables.

Unit II

Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular and Biochemical test. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production. Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing.

Unit III

Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Course Name: Principles of Seed Technology Lab

Course Code: 20015200

Course Outline

1. Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi.
2. Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea.
3. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops
4. Seed sampling and testing: Physical purity, germination, viability,etc.

5. Seed and seedling vigour test. Genetic purity test:
6. Grow out test and electrophoresis.
7. Seed certification: Procedure, Field inspection, Preparation of field inspection report.
8. Visit to seed production farms, seed testing laboratories and seed processing plant.

Course Name: Agricultural Marketing Trade & Prices

Course Code: 20015500

Course Outline

Unit I

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities;

Unit II

Product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel;number of channel levels;

Unit III

Marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; ad ministered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade

in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR ,

Suggested Readings

1. Ghosal, SN., Agricultural Financing in India, Asia Publishing House, Bombay, 1966
2. Johi, S.S. and C.V.Moore., Essentials of Farm Financial Management, Today and Tommorow's Printers and Publishers, New Delhi, 1970
3. John, J.Hamptron., Financial Decision Making: Concepts, Problems and Cases, Prentice-Hall of India , New Delhi, 1983
4. Kenneth, Duft D., Principles of Management in Agribusiness, Reston Publishing Company, Reston, 1979
5. Mamoria, C.B. and R.D. Saksena., Co-operation in India, Kitab Mahal, Allahabad, 1973
6. Mamoria, C.B. and Saxena., Agricultural Problems in India, Kitab Mahal, Allahabad
7. Mukhi, H R. 1983. Cooperation in India and Abroad. New Heights Publishers, New Delhi.
8. Muniraj, R., Farm Finance for Development, Oxford & IBH Publishing Company Private Ltd., New Delhi, 1987
9. Subba Reddy, S. and P.Raghuram., Agricultural Finance and Management, Oxford & IBH Publishing Company Private Ltd., New Delhi, 2005
10. Subba Reddy, S., P.Raghu ram., P. Sastry, T.V.N. and Bhavani Devi I. 2010. Agricultural Economics., Oxford & IBH Publishing Company Private Ltd., New Delhi, 2010
11. William, G. Murray and Nelson Aarson, G., Agricultural Finance, The Iowa State University Press, Ames, Iowa, 1960

Course Name: Agricultural Marketing Trade & Prices lab

Course Code: 20015600

Course Outline

1. Plotting and study of demand and supply curves and calculation of elasticities;
2. Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities;
3. Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies,
4. identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class;
5. Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning;
6. Application of principles of comparative advantage of International Trade

Course Name: Introductory Agro-meteorology & Climate Change

Course Code: 20026400

Course Outline

Unit I

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature.

Unit II

Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

Course Name: Introductory Agro-meteorology & Climate Change lab

Course Code: 20026500

Course Outtline

1.Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording.
2. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law.

3. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS.
4. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.
5. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity.
6. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions.
7. Measurement of wind speed and wind direction, preparation of windrose. Measurement, tabulation and analysis of rain.
8. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Suggested Readings:

1. De, Gopal Chandra 1989, Fundamentals of Agronomy. Oxford & IBH Publishing Co., New-Delhi
2. ICAR 1989 Handbook of Agriculture, Indian Council of Agricultural Research, NewDelhi
3. Michael, A.M. and Ojha, T.P. 1986. Principles of Agricultural Engineering, Vol.II Jain Brothers, New Delhi.
4. Morachan, Y.B. 1986, Crop production and management, Oxford & IBH Publishing Co., New-Delhi.
5. Porwal, B.L. and Sharma, D.D. 1991. SashyaVigyanKeAdhunicSiddhant (Hindi) Alka Publishers, Ajmer.
6. Darashikoh – Nuskha Dar Fanni – Falahat (The Art of Agriculture). Translated from Persian to English by Razia Akbar (2000) with commentaries by K.L. Mehra, K.L. Chadhan, J.S. Kanwar and Y.L. Nene. Asian Agri- History Foundation, Secunderabad, Bull No. 3, pp : 136.
7. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology ,Kalyani Publishers, New-Delhi.

Course Name: Farming System & Sustainable Agriculture

Course Code: 20026800

Course Outline

Unit I

Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system;

Unit II

Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

Suggested Readings:

1. Panda, S.C.2004. Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.
2. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
3. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur
4. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2nd edition), Agrobios (India), Jodhpur.
5. Shukla, Rajeev K. 2004. Sustainable Agriculture, Surbhee Publications, Jaipur
6. Palaniappan, S.P.1985. Cropping Systems in the Tropics: Principles and Management, Wiley Easter Ltd. and TNAU, Coimbatore.
7. Reddy S. R. 2016. Principles of Agronomy (5th edition), Kalyani Publishers, Ludhiana.

Course Name: Agriculture Heritage & Human Values & Ethics

Course Code: 20014000

Course Outline

Unit I

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects

Course Name: Ability and Skill Enhancement Module IV

Course Code:20015900

Course Outline - Final Assessment – Mock Interviews & PI Kit Submission

Unit I : Tele – Etiquettes

Receiving Calls, Placing a call, Ending Calls, Transferring calls, Taking Message/ Voice Mails, Placing call on hold, Handling Complaints.

Unit II: Confidence Building & Brain Storming

How to build confidence by positive thinking, identifying negative thoughts, how to control negative thoughts entering our mind, identifying personal talents, and its ways to improve, how to develop good habits and having principles and follow them at all times.

Need to learn new things, ideas and skills, what is brain storming, why do we need it, what are the different ways of brain storming through logics and reasoning, Brain Storming Session.

Unit III: PI Kit

What is resume, Format of Resume, Formatting, Resume Preparation, Covering Letter, PI Kit.

Unit IV: Interview Skills

Mastering the art of giving interviews in - selection or placement interviews, web /video conferencing, Mock Interview, HR Expert Mock Interview, Telephonic Interviews.

Unit V: Internship Preparation: Company Specific Research and Presentation

Identifying domain specific industries, researching the industry, Industry analysis, Presentation on specific industry/company.

Course Name: Agri-business Management

Course Code: 20016000

Course Outline

Unit I

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New

Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture.

Unit II

Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behavior analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Course Name: Agri-business Management Lab

Course Code: 20016100

Course Outline

1. Study of agri-input markets: Seed, fertilizers, pesticides.
2. Study of output markets: grains, fruits, vegetables, flowers.
3. Study of product markets, retails trade commodity trading, and value added products.
4. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.
5. Preparations of projects and Feasibility reports for agribusiness entrepreneur.
6. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques.
7. Case study of agro-based industries.
8. Trend and growth rate of prices of agricultural commodities.
9. Net present worth technique for selection of viable project.
10. Internal rate of return.

Suggested Readings

1. G. L. Meena, S. S. Burark, D. C. Pant and Rajesh Sharma, 2017. Fundamentals of Agribusiness Management, Agrotech Publishing Academy, Udaipur, ISBN: 978-818321-418-6. First edition.

2. Gittinger, J.P, 1984, Economic Analysis of Agricultural Projects, John Hopkins University Press.
3. Kotler, Philip, 1999, Marketing Management, Prentice Hall of India, New Delhi,
4. L.L. Somani and G. L. Meena, 2017. Agribusiness & Farm Management at a Glance, Vol-2, Basic & Applied Fundamentals, Agrotech Publishing Academy, Udaipur, ISBN: 978-81-8321-429-2. Second edition.
5. Mamoria, C. B., Joshi, R. L. and Mulla, N. I. 2005, Principles and Practices of Marketing in India, Kitab Mahal, Allahabad.
6. Sudha, G.S, 2000, Business Management, RBSA Publishers, Jaipur.
7. Tripathi, P. C. and Reddy, P. N, Principles of Management, Tata McGraw Hill Education Private Limited, New Delhi, 2008.

Course Name: Agrochemicals

Course Code: 20016200

Course Outline

Unit I

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.

Herbicides-Major classes, properties and important herbicides. Fate of herbicides.

Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride.

Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb.

Unit II

Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

Unit III

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride,

urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassiumchloride, potassium sulphate and potassium nitrate.
Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Course Name: Agrochemicals Lab

Course Code: 20016300

Course Outline

1. Sampling of fertilizers and pesticides.
2. Pesticides application technology to study about various pesticides appliances.
3. Quick tests for identification of common fertilizers.
4. Identification of anion and cation in fertilizer.
5. Calculation of doses of insecticides to be used.
6. To study and identify various formulations of insecticide available kin market.
7. Estimation of nitrogen in Urea.
8. Estimation of water soluble P_2O_5 and citrate soluble P_2O_5 in single super phosphate.
9. Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer.
10. Determination of copper content in copper oxychloride.
11. Determination of sulphur content in sulphur fungicide.
12. Determination of thiram.
13. Determination of ziram content.

Course Name: Commercial Plant Breeding

Course Code: 20016400

Course Outline

Unit I

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production. Genetic purity test of commercial hybrids. Advances in

hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

Unit II

IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Course Name: Commercial Plant Breeding Lab

Course Code: 20016500

Course Outline

1. Floral biology in self and cross pollinated species, selfing and crossing techniques.
2. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system.
3. Learning techniques in hybrid seed production using male-sterility in field crops.
4. Understanding the difficulties in hybrid seed production.
5. Tools and techniques for optimizing hybrid seed production.
6. Concept of rogueing in seed production plot.
7. Concept of line its multiplication and purification in hybrid seed production.
8. Role of pollinators in hybrid seed production.
9. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.
10. Sampling and analytical procedures for purity testing and detection of spurious seed.
11. Seed drying and storage structure in quality seed management.
12. Screening techniques during seed processing viz., grading and packaging.
13. Visit to public private seed production and processing plants.

Suggested Readings

1. Chopra, V.L. 2000. Breeding of Field Crops (Edt.). Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Mandal, AK., P.K. Ganguli and S.P. Banerjee. 1991. Advances in Plant Breeding. Vol. I and II. CBS Publishers and Distributors, New Delhi.
3. Manjit S. Kang 2004. Crop Improvement: Challenges in the Twenty-First Century (Edt). International Book Distributing Co. Lucknow.
4. Poehlman, J.M. 1987. Breeding of Field Crops. AVI Publishing Co.. INC, East Port, Conneacticut, USA.

5. Ram, H.H. and H.G. Singh. 1994. Crop Breeding and Genetics. Kalyani Publishers, New Delhi.
6. Sharma, A.K. 2005. Breeding Technology of Crop Plants (Edt.). Yash Publishing House, Bikaner.
7. Ram. H.H. 2005. Vegetable Breeding — Principles and Practices. Kalyani Publishers, New Delhi.
8. Agarwal, R.L.1991.Seed Technology. Oxford & IBH Publishing Co. Delhi. 9. Dhirenra Khare and Mohan S. Bhale.2000. Seed Technology. Scientific Publishers India), Jodhpur.
9. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. Beej Pradyogiki. Agrotech Publishing Academy.
10. A.K. Joshi and B.D. Singh.2005.Seed Technology. Kalyani Publishers, New Delhi.
11. Arya, P.S. 2001. Vegetable Breeding and Seed Production. Kalyani Pub., Ludhiana.
12. Singh, B.D. 2005. Plant Breeding. Kalyani Publishing House, New Delhi.
13. Singh, P. 2001.Essentials of Plant Breeding-Principles and Methods. Kalyani Publishing House, New Delhi.
14. Shekhawat, S. S. (ed) (2016). Advances and Current Issues in Agriculture, VoI. III. Shiksha Prakashan, S. M. S. Highway, Jaipur.

Course Name: Landscaping

Course Code: 20016600

Course Outline

Unit I

Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes. Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme,

Unit II

Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Course Name: Landscaping Lab

Course Code: 20016700

1. Identification of trees, shrubs, annuals, pot plants.
2. Propagation of trees, shrubs and annuals.
3. Care and maintenance of plants, potting and repotting.
4. Identification of tools and implements used in landscape design, training and pruning of plants for special effects.
5. Lawn establishment and maintenance.
6. Layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house.
7. Use of computer software.
8. Visit to important gardens/ parks/ institutes.

Suggested Readings

1. Arora J. S. 2006 Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
2. Gopalaswamiengar, K.S. The Complete Gardening in India. The Hosali Press, Bangalore.
3. Bose, T.K. Malti, R.G. Dhua, R.S. & Das, P. Floriculture and Landscaping (2004), Nayaprakash.
4. Bose, T.K. and Mukherjee, D. Gardening in India (2004) Oxford & IBH Publishers.
5. Chadha, K.L. and Chaudhary, B. Ornamental Horticulture in India (1986) ICAR
6. H.S.Grewal and Parminder Singh. Landscape designing and ornamental plants (2014)
7. K.V.Peter. Ornamental plants (2009) New India publishing agency.
8. R.K. Roy Fundamentals of Garden designing (2013) New India publishing agency.
9. Rajesh Srivastava, Fundamentals of Garden designing (2014) Agrotech press, Jaipur
10. Randhawa, G.S. Amitabha Mukhopadhyay Floriculture in India (2004) Allied Publishers Pvt. Ltd., New Delhi
11. Tiwari, A.K. Fundamentals of Ornamental Horticulture and Landscaping Gardening
    NIPA
12. Tiwari, A.K. Fundamentals of Ornamental Horticulture and Landscaping Gardening
    NIPA.

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