6. B.Sc. (Hort.) THIRD YEAR SECOND SEMESTER

6.1 Apiculture [ENTO 321]
1(0+1)

Practical:

Importance and history of apiculture, different species of bees, morphology, anatomy, colony organization and life cycle, bee-keeping equipment, social behavior, reproduction, queen rearing, bee pasturage, seasonal management, economics of beekeeping. Bee enemies, diseases of bees, role of bees in increasing the productivity of horticultural crops in Indian economy, bee products and their uses. Recent trends in apiculture. Acquaintance with honey bee species, morphology, structural adaptation, biology, bee castes, keeping equipment, bee forage plants. Collection and preservation of bee flora, enemies and diseases of bees. Handling of bee colonies and manipulation for honey production.

References books:-

1. Singh, Dharam and Singh Devender Pratap. Hand Book of Beekeeping, Agrobios India,Agro House Behind Nasrani Cinema Chopasani Road Jodhpur 342 002
2. Withhead, S.B. Honey bees and their management-,Axis Books (India), 10-vyas ji ka Nohra, Sardarpura, Chopasani Road, Jodhpur-342 003
3. Ghosh, GK and Nangia, S.B. Beekeeping in india. for Abhishek Publishing house,8/81, Punjabi Bagh, New Delhi 110 026
4. Abrol, D.P. Honey bee diseases and their management. Kalyani Publishers, Newdelhi, India
5. Atwal, Avtar S. The World of Honey bee, , Kalyani Publishers, Newdelhi, India
6. David, B. Basanth raj Elements of economic Entomology, , popular Book Depot, 29 Potters Street Saidapet Chennai 600 015, India
7. Singh Sardar. Bee Keeping in India
8. Naim, M. Bee Keeping, pleasure and profit
9. Abrol, D.P. Bees and Bee keeping In India. Kalyani Publishers, Newdelhi, India

6.2 Breeding and Seed Production of Ornamental Crops [PBG 321] 3(2+1)

History of improvements of ornamental plants, objectives and techniques in ornamental plant breeding. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of ornamental plants. Breeding for disease resistance. Development of promising cultivars of important ornamentals. Role of heterosis and its exploitation, production of F1 hybrids and utilization of male sterility, production of open pollinated seed. Harvesting processing and storage of seeds, seed certification.

Practical:

Study of floral biology and pollination in important species and cultivars. Techniques of inducing polyploidy and mutation. Production of pure and hybrid seeds. Harvesting, conditioning and testing of seeds. Practice in seed production methods

Reference Books:

1. George Levis State. Hand book on breeding:Ornamental Plants. Brookline Botanical Garden.
2. Vainstein, Alexander. (Edt.). Breeding for Ornamental:Classical and Molecular Approaches. kluwer Academic Publisher.
3. Callaway, J. Dorethy and Callaway, N. Brett. (Edt.) (2009) Timber Press, Incorporated.
4. Apuach George. Principles of plant Genetics and Breeding. Balckwell
5. Brown Jack and Ealigari. An introduction to Plant Breeding. Blackwell.

6.3 Entrepreneurship Development and Communication Skills [EXT 321] 2(1+1)

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalisation and the emerging business entrepreneurial environment. Concept

of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to horticulture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of horti inputs industry. Characteristics of Indian horticultural processing and export industry. Social Responsibility of Business. Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, précis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Practical:

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precis writing, summarizing, abstracting; individual and group presentations.

Reference Books:

1. Handbook for Technical Writing- James HS.(1994)
2. MLA Handbook for Writers of Research Papers-2. Joseph G.
3. Technical Writing- Richard WS.
4. Communication Skills for Engineers and Scientists- Mishra, Binod
5. Current English for Colleges- N.Krishnaswamy & T.Shriraman

6.4 Horti- Business Management [AEC 321]
2 (2+0)

Farm management - definition, nature, characteristics and scope. Farm management principles and decision making, production function, technical relationships, cost concepts, curves and functions - factors, product, relationship - factors relationship, product relationship, optimum conditions, principles of opportunity cost-equi-marginal returns and comparative advantages, time value of money, economic of scale, returns to scale, cost of cultivation and production, break even analysis, decision making under risk and uncertainty. Farming systems and types. Planning - meaning, steps and methods of planning, types of plan, characteristics of effective plans. Organizations-forms of business organizations, organizational principles, division of labour. Unity of command, scalar pattern, job design, span of control responsibility, power authority and accountability. Direction - guiding, leading, motivating, supervising, coordination - meaning, types and methods of controlling – evaluation, control systems and devices. Budgeting as a tool for planning and control. Record keeping as a tool of control. Functional areas of management - operations management - physical facilities, implementing the plan, scheduling the work, controlling production in terms of quantity and quality. Materials management - types of inventories, inventory costs, managing the inventories, economic order quantity (EOQ). Personnel management - recruitment, selection and training, job specialization. Marketing management - definitions, planning the marketing programmes, marketing mix and four P's. Financial management - financial statements and rations, capital budgeting. Project management –project preparation evaluation measures.

Reference Books:

1. Acharya, S.S. and Agrawal, N.L. Agricultural Marketing in India.
2. Amarchand and Vardhrajan. An Introduction to Marketing. Vikash publication house New Delhi.
3. Singhal, A.K. Agricultural Marketing in India. Anmol Purloiners Nagpur.
4. Reddy and Shanker. Agricultural Economics. Common Wealth P.N.
5. Desai, P.K. Agricultural Economics. Bio Tec Books Delhi.

6.5 Insect Pests of Vegetable, Ornamental and Spice Crops [ENTO 322] 3(2+1)

Economic importance of insects in vegetable, ornamental and spice crops -ecology and pest management with reference to these crops. Pest surveillance in important vegetable, ornamental and spice crops. Distribution, host range, bio-ecology, injury, integrated management of important insect-pests affecting vegetable, ornamental and spice crops. Important storage insect-pests of vegetable, ornamental and spice crops, their host range, bioecology, injury and integrated management. Insect –pests of processed vegetables and ornamental crops, their host range, bio-ecology, injury and integrated management. Insecticidal residue problems in vegetables and ornamental crops, tolerance limits etc.

Practical:

Study of symptoms, damage, collection, identification, preservation, assessment of damage/population of important insect-pests affecting vegetable, ornamental and spice crops in field and during storage.

References books:-

1. Atwal, A.S. and Dhaliwal, G.S. (2008) Agricultural pests of South-East Asia and their management. Kalyani Publisherws, New Delhi.
2. Atwal, A.S. Agricultural pests of India and South-East Asia.
3. Butani, D.K. Insect and Fruits.
4. David, V.B. and Swami Kumar. Elements of Economic Entomology. Popular Book Depot, Chennai, India.
5. Gupta, H.C.L., Ameta, O.P. and Chechani, S. Management of Insect-pest of Horticultural Crops. Agrotech Publishing Academy, Udaipur, Rajasthan.
6. Insects in Vegetables-D.K. Butani.
7. Singh, R.N. and Singh, J. (2008) Manual on applied Acarology. BHU, Varanasi.
8. Srivastava, K.P. (1996) A text book of applied entomology Vol. I. Kalyani publishers, New Delhi.
9. Gulati Rachna and Kumari Beena (2013) Pest Management and Residual Analysis in Horticultural Crops: An Integrated approach. New India Publishing Agency, New Delhi.

6.6 Post Harvest Management of Horticultural Crops [PHM 321] 3 (2+1)

Importance of post-harvest technology in horticultural crops. Maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, medicinal and aromatic plants. Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural produce, physiological and bio-chemical changes, hardening and delaying ripening process. Post-harvest treatments of horticultural crops. Quality parameters and specification. Structure of fruits, vegetables and cut flowers related to physiological changes after harvest. Methods of storage for local market and export. Pre-harvest treatment and precooling, pre-storage treatments. Different systems of storage, packaging methods and types of packages, recent advances in packaging. Types of containers and cushioning materials, vacuum packaging, cold storage, poly shrink packaging, grape guard packing treatments. Modes of transport.

Practical:

Practice in judging the maturity of various horticultural produce, determination of physiological loss in weight and quality. Grading of horticultural produce, post-harvest treatment of horticultural crops, physical and chemical methods. Packaging studies in fruits, vegetables, plantation crops and cut flowers by using different packaging materials, methods of storage, post-harvest disorders in horticultural produce. Identification of storage pests and diseased in spices. Visit to markets, packaging houses and cold storage units.

Reference books:-

1. Singh, I.S. Post harvest handling & processing of fruits and vegetables. West Wilay New Delhi.
2. Pandey, S.(2011) Post harvest Management and horticultural crops. Kalyani Publication, New Delhi.
3. Sarasawathy, S. Post harvests Management of horticultural crops. Agrobios.
4. Goyal and Ashwini. Post harvest Management and Value addition. Daya Publication.
5. Rathore, N.S., Mathure, G.K. and Chasta, S.S. Post harvests Management and processing of Fruits and Vegetables. ICAR Publication, New Delhi.

6. Bhutani R.C.(2003) Fruits and Vegetables preservations. Biotech.
7. Shudheer K.P. and Indira V. (2007) Post harvest Management and horticultural crops. New India.
8. श्याम सुन्दर श्रीवास्तव. फल परिरक्षण
9. श्याम सुन्दर श्रीवास्तव. फल परिरक्षण दीपिका

6.7 Processing of Horticultural Crops [PHM 322]
3(1+2)

Importance and scope of fruit and vegetable preservation industry in India, food pipe line, losses in post-harvest operations, unit operations in food processing. Principles and guidelines for the location of processing units. Principles and methods of preservation by heat pasteurization, canning, bottling. Methods of preparation of juices, squashes, syrups, cordials and fermented beverages. Jam, jelly and marmalade. Preservation by sugar and chemicals, candies, crystallized fruits, preserves chemical preservatives, preservation with salt and vinegar, pickling, chutneys and sauces, tomato and mushrooms, freezing preservation. Processing of plantation crops, products, spoilage in processed foods, quality control of processed products, Govt. policy on import and export of processed fruits. Food laws.

Practical:

Equipment used in food processing units. Physico-chemical analysis of fruits and vegetables. Canning of fruits and vegetables, preparation of squash, RTS, cordial, syrup, jam, jelly, marmalade, candies, preserves, chutneys, sauces, pickles (hot and sweet). Dehydration of fruits and vegetables- tomato product dehydration, refrigeration and freezing, cut out analysis of processed foods. Processing of plantation crops. Visit to processing units.

Reference books:-

1. Girdharilal, G.S. Siddappa and G.L. Tendon. Preservation of Fruits and vegetables. ICAR, New Delhi.-
2. Goyal and Ashwini. Post harvest Management and Value addition. Daya Publication.
3. Bhutani, R.C. (2003) Fruits and Vegetables preservations. Biotec

4. Shudheer, K.P. and Indira, V. (2007) Post harvest Management and horticultural crops. New India.
5. श्याम सुन्दर श्रीवास्तव. फल परिरक्षण
6. श्याम सुन्दर श्रीवास्तव. फल परिरक्षण दीपिका

6.8 Seed Production of Vegetable, Tuber and Spice Crops [VSC 321] 3(2+1)

Introduction and history of seed industry in India. Definition of seed. Differences between grain and seed. Importance and scope of vegetable seed production in India. Principles of vegetable seed production. Role of temperature, humidity and light in vegetable seed production. Methods of seed production of Cole crops, root vegetables, solanaceous vegetables, cucurbits, leafy vegetables, bulb crops, leguminous vegetables and exotic vegetables. Seed germination and purity analysis. Field and seed standards. Seed drying and extraction. Seed legislation.

Practical:

Study of seed structure, colour size, shape and texture. Field inspection of seed crops. Practices in rouging. Harvesting and seed extraction. Germination and purity analysis. Methods of seed production in cole crops, root vegetables, bulb crops, solanaceous vegetables, cucurbits, leafy vegetables, leguminous vegetables and exotic vegetables. Seed processing machines. Visit to seed production units.

Reference books:

1. Singh, Prabhakar and Asati, B.S. (2008). Seed Production Technology of Vegetables. Daya Publishing House, Daryaganj, New Delhi.
2. Sharma, Premjit (2008). Seed Legislation. Daya Publishing House, Daryaganj, New Delhi.
3. Agrawal, R.L. (1995). Seed Technology. Oxford & IBH Publishing Co. PVT. Ltd., New Delhi.
4. More, T.A., Kale, P.B. and Khule B.W. (1996). Vegetable Seed Production Technology. Maharashtra State Seed corporation, Akola.
5. Gill, H.S. and Kataria, A.S. (1999). Sabjiyon Ka Beej Utpadan. ICAR, New Delhi
6. Fageria, M.S., Arya, P.S. and Choudhary, A.K. (2000). Vegetable Crops : Breeding and Seed Production. Vol. I Kalyani Publishers, New Delhi.