



1. B.Sc. (Hort.) FIRST YEAR FIRST SEMESTER

1.1 Elementary Plant Biochemistry and Biotechnology [EPBB 111] 3(2+1)

Theory:

Carbohydrates: Occurrence classification and structure, physical and chemical properties of carbohydrates, isomerism, optical activity, reducing property, reaction with acids and alkalis, ozone formation. Lipids: Classification, important fatty acids and triglycerides, essential fatty acids. Physical and chemical control of oils, their rancidity, phospholipids, types and importance. Plant pigments - structure and function of chlorophyll and carotenoids, sterols, basic structure, role of brassinosterols in plants. Proteins: Classification, function and solubility, amino acids - classification and structure, essential amino acids, properties of amino acids, colour reactions, amphoteric nature and isomerism; structure of proteins - primary, secondary tertiary and quaternary properties and reaction of proteins. Enzymes: Classification and mechanism of action; factors affecting enzyme action, co-factors and co-enzymes. Vitamins and minerals as co-enzymes/co-factors. Carbohydrate metabolism - glycolysis and TCA-cycle; metabolism of lipids, fatty acid oxidation, biosynthesis of fatty acids, electron transport chain, bioenergetics of glucose and fatty acids, structure and function of nucleic acid replication, transcription and translation. History of biotechnology. Fundamental principles, micro-propagation and scope for commercialization. Application of micro-grafting in horticultural crops, meristem culture, anther culture, pollen culture, embryo culture, callus culture, cell culture, somoclonal variation, protoplast isolation, culture, fusion and applications. Cryopreservation. Genetic engineering. Future scope and present trends. Importance of biotechnology in horticulture

Practical:

Preparation of standard solutions and reagents. Carbohydrates - qualitative reaction, estimation of starch, reducing and non-reducing sugars; reaction of proteins, estimation of proteins by Lowery method. Estimation of free fatty acids; determination of iodine number of vegetable oils. Vitamins - estimation of ascorbic acid. Paper and thin layer chromatography. Sterilization techniques - composition and preparation of media - micro-propagation of tomato. Callus culture, sub-culturing, induction of rooting-techniques in hardening.

**Reference Books:**

1. Chawala, H.S. Plant Biotechnology.
2. Singh, B.D. Biotechnology.
3. Gupta, P.K. Element of Biotechnology.
4. Purohit, S.S. Plant Biotechnology.
5. Primrose, S.B. and Twyman, R. M. Principles of gene Manipulations and genomics. Blackwell Publishing
6. Eric L. conn Paul k. Stumpf, George. Bruening roy H. Dol.Out lines of Biochemistry. Jonn villey & Sons, New York.
7. Lehninger, Albert L. Biochemistry. Kalyani Publishers. Ludhiana.
8. Chawla, H.S. Introductions to plant Biotechnology. Oxford & IBH publishing Co. PVT. LTD., New Delhi.
9. Thara, K.M. Biotechnology Practical manual Vol. 04. MIPA, Publishers.
10. Cundblad, L. Hand book of Biochemistry and Molecular biology. Vatsal publication N. Delhi
11. Parakhari, M.V. Molecular Biology and Biotechnology.
12. NIPA publihseres N. Delhi

1.2 Elementary Statistics and Computer Application [STAT111]**3(2+1)****Theory:**

Basic concepts: Variable statistics, types and sources of data, classification and tabulation of data, construction of frequency distribution, tables, graphic representation of data, simple, multiple component and percentage, bar diagram, pie diagram, histogram, frequency polygon and frequency curve average and measures of location, mean, mode, median, geometric mean, harmonic mean, percentiles and quadrilles, for raw and grouped data. Dispersion: Range, standard deviation, variance, coefficient of variation for raw and grouped data. Probability: Basic concept, additive and multiplicative laws. Theoretical distributions, binominal, poison and normal distributions, sampling, basic concepts, sampling vs. complete enumeration parameter and statistic, sampling methods, simple random sampling and stratified random sampling. Tests of Significance: Basic concepts, tests for equality of means, and independent and



paired t-tests, chi-square test for application of attributes and test for goodness of fit of mendalian ratios. Correlation: Scatter diagram, correlation co-efficient and its properties, regression, fitting of simple linear regression, test of significance of correlation and regression coefficient. Experimental Designs: Basic concepts, completely randomized design, randomized block design, latin square designs, factorial experiments, basic concepts, analysis of factorial experiments up to 3 factors - split plot design, strip plot design, long term experiments, plot size, guard rows. Computer application: Introduction to computers and personal computers, basic concepts, operating system, DOS and Windows 95, introduction to programming languages, BASIC language, concepts, basic and programming techniques, MS Office, Win Word, Excel, Power Point, introduction to Multi-Media and its application. VISUAL BASIC-concepts, basic and programming techniques, introduction to Internet.

Practical:

Construction of frequency distribution table and its graphical representation, histogram, frequency polygon, frequency curve, bar chart, simple, multiple, component and percentage bar charts, pie chart, mean, mode for row and grouped data, percentiles, quadrille, and median for row and grouped data, coefficient of variation, 't' test for independent, will equal and unequal variants, paired 't' test, chi-square test for contingency tables and theoretical ratios, correlation and linear regression. Studies on computer components - BASIC language, VISUAL BASIC, programming techniques, MS Office, Excel, Power Point.

Reference Books:

1. Statistical Methods- S.P. Gupta
2. Fundamentals of Statistics-D.N. Ewlnhance
3. Fundamentals of Statistics Vol-I- A.M. Goon, M.K. Gupta and Das Gupta
4. An out line of statistical Theory- A.M. Goon, M.K. Gupta and Das Gupta
5. A Hand Book of Statistics-S.P.S Chandel
6. A book of Computer: Microsoft



1.3 Fundamentals of Horticulture [FSC 111] 3(2+1)

Theory:

Economic importance and classification of horticultural crops and their culture and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery management practices, soil and climate, vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities. Production and practices for fruit, vegetable and floriculture crops, nursery techniques and their management. Principles and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management, weed management, fertility management in horticultural crops, cropping systems, intercropping, multi-tier cropping, mulching, bearing habits, factors influencing the fruitfulness and unfruitfulness. Rejuvenation of old orchards, top working, frame working, principles of organic farming.

Practical:

Features of orchard, planning and layout of orchard, tools and implements, layout of nutrition garden, preparation of nursery beds for sowing of vegetable seeds, digging of pits for fruit plants, planting systems, training and pruning of orchard trees, preparation of fertilizer mixtures and field application, preparation and application of growth regulators, layout of different irrigation systems, identification and management of nutritional disorder in fruits and vegetables, assessment of bearing habits, maturity standards, harvesting, grading, packaging and storage.

Reference books:

1. Singh, Jitendra (2011). Basic Horticulture. Kalyani publishers, Ludhiana.
2. Peter, KV. (Ed.). 2008. Basics of Horticulture. New India Publishing Agency.
3. Bal, J.S. (2006) Fruit Growing. Kalyani Publishers, Rajendra, Nagar Ludhiana.
4. Chadha, K.L. (2005) Hand book of Horticulture. ICAR, New Delhi.



5. Kunte, Y.N. (2002) Principles of Horticulture & fruit Growing 10th edn. Atalas Book Centre, Delhi.
6. Sontakke (2009) Production & Management of Rainfed Fruit crops. Atlas book Centre, New Delhi.
7. Chattopadhyay, T.K. (2007). A Text book of Pomology Vol-I, Fundamentals of Fruit Growing. Kalyani Publishers, Rajendra Nagar, Ludhiana.
8. Reddy, Parvatha, P. (2008) Organic farming for Sustainable Horticulture: Principles & Practices. International book and Periodicals supply services. New Delhi.

1.4 Fundamentals of Soil Science [SAC 111]

2(1+1)

Theory:

Composition of earth's crust, soil as a natural body – major components. Eluviations and illuviation formation of various soils. Problem soils: salt soils, permeable, flooded, sandy soil properties. Physical parameters; texture – definition, methods of textural analysis, stock's law, assumption, limitations, textural classes, use of textural triangle; absolute specific gravity, definition, apparent specific gravity/bulk density – factors influencing, field bulk density. Relation between BD (bulk density), AD – practical problems. Pore space – definition, factors affecting capillary and non-capillary porosity, soil colour – definition, its significance, colour variable, value hue and chroma. Munsell colour chart, factors influencing, parent material, soil moisture, organic matter, soil structure, definition, classification, clay prism like structure, factors influencing genesis of soil structure, soil consistency, plasticity, Atterberg's constants. Soil air, air capacity, composition, factors influencing, amount of air space, soil air renewal, soil temperature, sources and distribution of heat, factors influencing, measurement, chemical properties, soil colloids, organic, humus, inorganic, secondary silicate, clay, hydrous oxides. Ion exchange, cation-anion importance, soil organic matter decomposition, pH and nutrient availability, soil buffering capacity, soil water, forms, hygroscopic, capillary and gravitational, soil moisture constants, hygroscopic coefficient, wilting point, field capacity, moisture equivalent, maximum water holding capacity, energy concepts, PF



scale, measurement, gravimetric – electric and tensiometer methods – pressure plate and pressure membrane apparatus – Neutron probe – soil water movement – classification – aerial photography – satellite of soil features – their interpretation; soil orders; land capability classification; soil of different ecosystems and their properties, management of problem soils– soils environmental quality. Irrigation water quality, determination of quality parameters, empirical equation management of irrigation water.

Practical:

Collection and preparation of soil samples, estimation of moisture, EC, pH and bulk density. Textural analysis of soil by Robinson's pipette method, chemical analysis of soil – Fe_2O_3 , P, K, Ca, Mg and S, total N, organic carbon and cation exchange capacity.

Reference Books:

1. Rai, M.M. Principles of Soil Science. Macmillan India Limited
2. Nelson c. bready, Nature and properties of soils.
3. osadVs'k Hkkj}kt] e`nk foKku ds ekSfyd fl}kar- izdk'ku funs'kky;} xksfoUn cYyHk ira d`f"k ,oa izksS | ksfxdh fo'ofu | ky;} irauxj
4. Millar and Turk. Fundamental of Soil Science. Astral publishers, New Delhi
5. Thompson. Soil and Soil fertility.

1.4 Introductory Crop Physiology [PP 111]

2(1+1)

Theory:

Water Relations in Plants: Role of water in plant metabolism, osmosis inhibition, diffusion, water potential and its components, measurement of water potential in plants, absorption of water, mechanism of absorption and ascent of sap. Stomata: Structure, distribution, classification, mechanism of opening and closing of stomata. Osmotic pressure, guttation, stem bleeding; transpiration methods and mechanism and factors affecting transpiration. Drought: Different types of stresses; water, heat and cold tolerance; mechanism of tolerance. Plant Nutrition: Essentiality, mechanism of absorption and its role in plant



metabolism. Photosynthesis, structure and function of chloroplast, dark and light reactions, cyclic and non-cyclic electron transfer, CO₂ fixation – C₃, C₄ and CA metabolism, advantages of C₄ pathway. Photorespiration and its implications, factors affecting photosynthesis. Phytohormones, physiological role in controlling plant processes. Environmental stimuli for plant development.

Practical: Measurement of water potential, osmosis, root pressure, structure of the stomata, distribution, opening and closing of the stomata, measurement, transpiration and calculation of transpirational pull demonstration. Importance of light and chlorophyll in photosynthesis, pigment identification in horticultural crops and studying the enzyme activity of catalase, estimation of phenols, studying plant movements, root initiation in cuttings.

Reference Books:

1. Avers, Charlotte J. (1981). Cell Biology, Second Edition. Van Nostrand Reinhold, New York.
2. Burgess, Jeremy. (1985). An Introduction to Plant Cell Development. Cambridge University Press, Cambridge, New York, London.
3. Davies, D.D. Ed. (1987). Physiology of Metabolism. The Biochemistry of Plants, Vol. 12. Academic Press, New York.
4. Davies, P.J. Ed. (1987). Plant Hormones and Their Role in Plant Growth and Development. Martinus Nijhoff Publishers, Boston.
5. Hart, J.W. (1990). Plant Tropisms and Other Growth Movements. Unwin Hyman, London.
6. Hatch, M.D. and N.K. Boardman Eds. 1987, Photosynthesis. The Biochemistry of Plants, Vol. 10. Academic Press, New York.
7. Hewitt, E.J. and T.A. Smith. (1975). Plant Mineral Nutrition. Wiley, New York.
8. Kumar A., and Purohit S.S. (2011). Plant Physiology Fundamentals and Applications. Agrobios (India). Jodhpur.



1.5 Introductory Economics [AEC 111] 2(2+0)

Theory:

Nature and scope of economics, definition and concepts, divisions of economics, economic systems, approaches to the study of economics. Consumption – theory of consumer behaviour, laws of consumption, classification of goods. Wants – their characteristics and classification, utility and its measurement, cardinal and ordinal, law of diminishing marginal utility, law of equi-marginal utility, indifference curve and its properties, consumer equilibrium. Theory of demand, demand schedule and curve, market demand. Price, income and cross elasticities, Engil's law of family expenditure – consumer's surplus. Theory of firm, factors of production – land and its characteristics, labour and division of labour, theories of population. Capital and its characteristics – classification and capital formation. Enterprises – forms of business organization – merits and demerits. Laws or return – law of diminishing marginal return – cost concepts. Law of supply – supply schedule and curve elasticities. Market equilibrium, distribution – theories of rent, wage, interest and profit. Price determination and forecasting under various market structures.

Reference Books:

1. Dewette, K.K. and Verma, J.P. Elements of Economic Theory. Vikash publication house New Delhi.
2. S. Mishra, .K. and Puri, V.K. Indian Economy. Himalaya Publishing House.
3. Sandhu, S.N. and Singh Amarjeet. Fundamentals of Agriculture Economics. Himalaya Publishing House.
4. gjlunkl- कृषि अर्थशास्त्र, रामा पब्लिकेशन हाउस, मेरठ-

1.7 Introductory Microbiology [MICR 111] 2(1+ 1)

Theory:

History and Scope of Microbiology: The discovery of micro-organism, spontaneous generation conflict, germ theory of diseases, microbial effect on organic and inorganic matter. Development of microbiology in India and composition of microbial world. Microscopy and Specimen Preparation: The bright field microscope, fixation, dyes and simple staining, differential staining. Difference between prokaryotic and eucaryotic cells. Procaryotic cell structure



and functions. Types of culture media and pre-culture techniques. Microbial growth in models of bacterial, yeast and mycelial growth curve. Measurement of bacterial growth. General properties of viruses and brief description of bacteriophages. General principle of bacterial genetics, DNA as genetic material. Antibiosis, symbiosis, intra-microbial and extra-microbial association.

Practical:

Examination of natural infusion and living bacteria; examination of stained cells by simple staining and Gram staining. Methods for sterilization and nutrient agar preparation. Broth culture, agar slopes, streak plates and pour plates, turbidimetric estimation of microbial Growth

Reference Books:

1. Jamaluddine. (2006). General microbiology, Scientific publisher, Jodhpur.
2. Singh, R.P. (2012). Microbiology. Kalyani publication, New Delhi.
3. Singh, P.P. (2010). Microbiology, Kalyani publication, New Delhi.
4. Trivedi, P.C. (2010). Agricultural Microbiology, Pointer publication, Jaipur.
5. Balchander, D. (2007). Introductory Microbiology CABI publisher, New York and India publisher, agency, New Delhi.
6. Nandi, S. (2011). Objective, Microbiology, NIPA.

1.6 NSS/NCC/Physical Education [NSS/NCC/PE 111]

1(0+1) NC

NSS 111

NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness, highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition.

Note: Warming up and conditioning exercises are compulsory before the commencement of each class.



OR

NCC 111

NCC: Introduction to NCC, defense services, system of NCC training, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honors, ceremonial drill, weapon training - rifle bayonet, light machine gun, sten machine carbine, introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self defense, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defense, leadership and NCC song.

Note: Warming up and conditioning exercises are compulsory before the commencement of each class.

OR

PE 111

Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules and regulations of important games, skill development in any one of the games - football, hockey, cricket, volleyball, badminton, throw ball, tennikoit. Participation in one of the indoor games - shuttle badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events - broad jump, high jump, triple jump, javelin throw, discuss throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-to-day activities. First-aid training, coaching for major games and indoor games. *Asans* and indigenous ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience.

Note: Warming up and conditioning exercises are compulsory before the commencement of each class.



1.9 Principles of Genetics and Cytogenetics [PBG 111]

3(2+1)

Theory:

Historical background of genetics, theories and hypothesis. Physical basis of heredity, cell reproduction, mitosis, meiosis and its significance. Gametogenesis and syngamy in plants. Mendelian genetics–Mendel’s principles of heredity, deviation from Mendelian inheritance, pleiotropy, threshold characters, co-dominance, penetrance and expressivity. Chromosome theory of inheritance, gene interaction. Modification of monohybrid and dihybrid ratios. Multiple alleles, quantitative inheritance linkage and crossing over, sex linked inheritance and characters. Cytoplasmic inheritance and maternal effects. Chemical basis of heredity, structure of DNA and its replication. Evidence to prove DNA and RNA – as genetic material. Mutations and their classification. Chromosomal aberrations, changes in chromosome structure and number.

Practical:

Study of fixatives and stains. Squash and smear techniques. Demonstrations of permanent slides and cell division, illustration in plant cells, pollen fertility and viability, determination of gametes, Solving problems of monohybrid, dihybrid, and test cross ratios using chi-square test, gene interactions, estimation of linkages using three point test cross from F₂ data and construction of linkage maps. Genetic variation in man.

Reference Books:

1. Singh, B.D. Fundamentals of Genetics. Kalyani Publisher
2. Singh, Phundan. Elements of Genetics. Kalyani Publisher
3. Strickberger, M.W. Genetics.
4. Snoids & Simonds. Principles of Genetics. (4th edition). John Willy Publication, New York
5. Singh, Chouhan and Katiyar. Manual of Practical genetics. Kalyani Publisher
6. Choubey and Bhardwaj. Cytogenetical practices. Kalyani Publisher
7. Gupta, R.K. Genetics.
8. Lewins, Benjamin, Genes IX. Jones and Bartlett Publisher



1.10 Principles of Landscape Gardening [FLA 111] 1(0+1)

Practical:

Principles and elements of landscape design, plant material for landscaping, symbols, tools and implements used in landscape design, layout of formal gardens, informal gardens, special type of gardens (bog garden, sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Landscape design for specific areas.

Reference books:-

1. Floriculture in India- Randhawa and Mukhopadhyaya
2. Introductory commercial floriculture- Arora
3. Gardening in India- Percy Lancaster
4. Flowering Trees- M. S. Randhawa
5. The Rose in India- B. P. Pal
6. Beautiful Shrubs- Pratibha. P. Trivedi
7. Commercial Floriculture- Prasad and Kumar
8. Floriculture and Landscaping- Bose, Maiti, Dhua and Das (eds.)

1.11 Structural Grammar and Spoken English [ENG 111] 2(1+1)NC

Theory:

Structural Grammar: Introduction of Word Classes; Structure of Verb in English; Uses of Tenses; Study of Voice; Study of Conjunctions and Prepositions; Sentence Patterns in English. Spoken English: Conversations of different situations in everyday life; the concept of stress; stress shift in words and sentences; silent letters in words and pronunciation of words with silent letters, the basic intonation patterns.

Practical:

Structural Grammar: Exercises in word classes, identification and study of verbs in sentences, application of tenses and voice, exercises in conjunctions and prepositions, other structural grammar exercises, report writing, letter



writing (different types of letters). Spoken English: Conversations of everyday life, the concept of stress; stress shift. Silent letters in words, basic intonation patterns, preparing and address.

Reference Books:

1. High School English Grammar and Composition- Wren P.C.& Martin H.
2. Courses in Phonetics and Spoken English- Abhishek Sethi J& Dhamija PV
3. Spoken English:Flourish Your Language- Robert C.
4. Current English for Colleges- N.Krishnaswamy & T.Shriraman
5. Word Power Made Easy, Goyal Saab- Lewis, Norman
6. Dictionary of Idioms & Phrases-Kumar Publications