HORT 111 Fundamentals of Horticulture Credit hours: 2(1+1)

Theory

Horticulture-Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; kitchen gardening; garden types and parts; lawn making; medicinal and aromatic plants; species and condiments; use of plant bio-regulators in horticulture. Irrigation & fertilizers application-method and quantity.

Practical

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/nursery bed. Potting media and poly-container.Practice of sexual and asexual methods of propagation. Layout and planting of orchard plants. Training and pruning of fruit trees. Transplanting and care of vegetable seedlings. Making of herbaceous and shrubbery borders. Preparation of potting mixture, potting and repotting. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

Suggested Readings:

1. Bal, J.S. 1970. Fruit Production. Kalyani Publishers, New Delhi
2. Bose, T.K. and Mitra S.K. (3rd Revised Edition) Vol. I & II. Tropical & Subtropical. Naya Udyog, 206, Bidhan Sarni, Calcutta
3. Shanmugavelu, K.G. 1987. Production Technology of Fruit Crops. SBA Publication, 1/1 Meredith Street, Calcutta
4. Chadha, K.L. (New eds). 2010. Handbook of Horticulture. Indian Council of Agricultural Research, New Delhi
5. A.K. Shukla, R.A. Kaushik, L.N. Mahawer, S. Pareek, D. Pandey and D.K. Sarolia 2008. Adhunik Phalotpadan (Hindi). Communication Centre, MPUAT, Udaipur
6. Peter, K.V. 2009. Basics of Horticulture. New India Publishing Agency, New Delhi.
7. Choudhary, B. 1985. Vegetables. National Book Trust India, New Delhi
8. Purthi, J.S. 2001. Major Spices. Indian Council of Agriculture Research, New Delhi
9. Randhawa, G.S. & Mukhopadhyay, A. 1984. Floriculture in India. Allid Publishers, New Delhi.

MBB111 Fundamentals of Plant Biochemistry and Biotechnology Credit hours: 3(2+1)

Theory

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids; Somaclonal variation and its use in crop improvement; cryo-preservation; Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

Suggested Readings

Reginald H. Garnett and Charles M.Grisham (2005). Biochemstry. Thomson Brooks/Cole USA.

Goodwin and Mercer (2003) Introduction to Plant Biochemistry. CBS Publishers & Distributors, New Delh

Purohit S S (2004) Biotechnoology: Fundamentals and Applications 3rd Edn. Student Edition, Jodhpur

Chawla H S (2002) Introduction to Plant Biotechnology. 2nd Edn Oxford IBH publishing New Delhi

Singh BD. 2007. Biotechnology: Expanding Horiozon. Kalyani.

Conn EE & Stumpf PK. 1987. Outlines of Biochemistry. John Wiley.

Nelson DL & Cox MM. 2004. Lehninger's Principles of Biochemistry. MacMillan.

Seth P and Khandelwal SK.2008. Biochemical Analysis. Himanshu Publications.

SSAC-111 FUNDAMENTALS OF SOIL SCIENCE CREDIT HOURS 3(2+1)

Theory

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; soil taxonomical classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth, Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation;.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Determination of soil colour.

Suggested Readings:

1. Boul S.W., Hole R.D., McCracken and Southard R.J. (1998).Soil genesis and classification Fourth Ed Panima Publishing corporation, New delhi.
2. .Baver, L.D. Gardener, W.H. and gardener W.R.(1976) Soil Physics Wiley Eastern Ltd, New Delhi
3. Biswas, T.D. and Mukherjee, S.K. (2006) Text book of soil science. Tata McGraw Hill publishing Co. Ltd, New Delhi
4. Brady, N.C. and Weil, R.R. (2002) The nature and properties of soils, prentice hall of India Pvt. Ltd, M-97, Connaught Circus, New Delhi
5. Das, D.K. (2002) Introductory Soil Science, Kalyani publisher, New Delhi
6. Mehra R.K. (2004) Text book of Soil Science, ICAR, New Delhi
7. ISSS (2009) Fundamentals of Soil Science, Div. of Soil Science, IARI, New Delhi
8. Chopra S.L. and Kanwar, J.S. (1991) Analytical Agricultural Chemistry, Kalyani publisher, Ludhiana
9. Jackson, M.L. (1973) Soil chemical analysis, Prentice Hall of India, Pvt. Ltd New Delhi
10. Piper, C.S. (1950) Soil and plant analysis. .Hans publications, Bombay
11. Richards, L.A. (1960) Diagnosis and improvement of saline and alkali soils., USDA agriculture Hand book 60, Washington D.C., USA

FOR-111 Introduction to Forestry Credit hours 2(1+1)

Theory

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees. Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

Practical

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

Suggested Readings

1. Brandis, Dietrich. 1994. Forestry in India : Origins & Early Development, Natraj Publishers
2. Champion, H.G. and Seth, S.K. .1968 A Revised Survey of Forest Types of India, Govt. of India Press, New Delhi
3. Dwivedi, A.P. 2004. A Text Book of Silviculture.IBD Publishers.
4. Chaturvedi, A.N.1982. Forest Mensuration.IBD Publishers, Dehradun
5. Luna,R.K. 2005. Plantation Trees., IBD,Dehradun

ENG-111 Comprehension and Communication Skills in English **Credit hours 2(1+1)**

Theory

Grammar and Usage: Functional grammar: Tense, Modals, Active/ Passive voice, Articles, Prepositions, Verb, Subject verb Agreement, Direct/ Indirect Narration, Non- finite verbs: Infinitive, Gerund, Participle; Vocabulary: Synonym, Antonym, Prefixes, Suffixes, Homophones, Homonyms, Often confused words.
Written skills: Paragraph writing, Precis writing, Report writing and Proposal writing, Letter/ Application writing, Preparation of Curriculum vitae and Job applications.
Interviews: Types of interviews- purpose- different settings- as interviewer- interviewee- physical makeup and manners- appearance- poise- speech-self reliance- Evaluation process.

Practical

Listening Comprehension: Listening to short talks, lectures- speeches (scientific, commercial and general in nature) Practical: listening to at least two tape- recorded conversations aimed at testing the listening comprehension of students.
Communication: Spoken English- oral communication- importance stress and intonation. Practical: Spoken English practice by using audiovisual aids – the essentials of good conversations- oral exercises in conversation practice (At the Doctor, at the Restaurant, at the Market Yard.)
Oral Presentation of Reports: Seminars and conferences- features of oral presentation- regulating speech- physical appearance- body language posture-eye, eye contact- voice- audience- preparation of visual aids. Practical: One presentation by individual on the given topic related to agriculture like W.T.O. Developing new technologies in Agriculture, Bio fertilizers etc.
Dyadic communication- face to face conversation- Telephonic conversation- rate of speech- clarity of voice speaking and listening politeness- telephone etiquette etc.
Reading skills- using Dictionary- reading dialogues-rapid reading-intensive reading- improving reading skills. Comprehension exercise
Group Discussions and Debates on current topics.
Phonetic sound and symbols pure vowels, Diphthongs and consonants: Phonetics Transcriptions: Word stress and Exercise on Pronunciation.

Suggested Readings

1. Saxena, Vivek. 2010. English & Communication Skills, Neelkanth Publishers (P) Ltd. B- 1178, Mangal Marg, Bapu Nagar, Jaipur.
2. Shukla, Punit. 2011. English Communication Skills (In English & Hindi) - College Book House (P) Ltd. Chaura Rasta, Jaipur
3. Peechaatt, James Thomas. 2015. Holy Faith Essential English Grammar & Composition, Holy Faith International (p) Ltd. Gulab Bhawan, 6, Bahadur Shah Zafar Marg, New Delhi.
4. Jain, B.S. English Communication Skills, College Book Centre, A-19, Sethi Colony, Jaipur.

AGRON-111 Fundamentals of Agronomy Credit hours 4(3+1)

Theory

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil plant water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging.

Weeds- importance, classification, crop-weed competition, concepts of weed management-principles and methods, herbicides- classification, selectivity and resistance, allelopathy.

Growth and development of crops, factors affecting growth and development, plant ideotypes, cropping systems, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

Practical

Identification of crops, seeds, fertilizers, pesticides and tillage implements, sowing methods, Identification of weeds in crops, Methods of herbicide and fertilizer application, Introduction to weed indices, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

Suggested Readings

1. ICAR. 2010. Handbook of Agriculture (6^{th} edition), Indian Council of Agricultural Research, New Delhi.
2. Panda, S.C. 2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
3. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2^{nd} edition), Agrobios (India), Jodhpur
4. Reddy, T.Yellamanda and Reddy, G.H. Sankara. 2016. Principles of Agronomy (2^{nd} edition) , Kalyani Publishers, Ludhiana
5. Reddy, S.R.2012. Principles of Crop Production (4^{th} edition), Kalyani Publishers, Ludhiana.
6. Tomar, Gajendra Singh. 2010. Agronomy Basics and Applied. Satish Serial Publishing House, Azadpur, New Delhi.
7. आर्य, आर. एल. एवं कुरील, आर. एस. 2016. सस्य विज्ञान के सिद्धान्त, साइंटिफिक पब्लिशर्स, जोधपुर
8. पोरवाल, बी. एल., सिंह, पुष्पेन्द्र एवम् शर्मा, डी. डी. 2000. सस्य विज्ञान के मूल तत्व, के. पी. प्रकाशन, उदयपुर

BIO- 111 Introductory Biology Credit hours: 2(1+1)

Theory

Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division. Morphology of flowing plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practical

Morphology of flowering plants – root, stem and leaf and their modifications. Inflorence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.

Suggested Readings

1. Sharma, R.C. 2014.Systematic Biology. Kalyani Publishers
2. Arora, B.B. and Sabharwal, A.K.2017. Modern's ABC of Biology. Modern Publishers, Lucknow.
3. Arora, D.K. and Trivedi, P.C.A text book of Botany. Ramesh Book Depot, Jaipur.
4. Hussain, Khalid and Nawaz, Khalid.2014. Introductory plant taxonomy. Kalyani Publishers

MATHS-111 Elementary Mathematics Credit Hours 2(2+0)

Theory

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines,.Differential Calculus : Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation**.**

Suggested Readings

1. Gokhroo, D.C and jain krishi Ganita , Alka Publication Ajmer.
2. Surjeet Singh & : Modern Algebra Quazi Zameeruddin
3. I.N.Herstein : Topics in algebra 3. R.S.Agrawal : Algebra
4. Gokhroo, Saini : Advanced Abstract Algebra

AGRON-112 **Agriculture Heritage** **Credit hours 1(1+0)**

Theory

Introduction of Indian agricultural heritage, status of farmers in society; advice by sages to kings on their duties towards farmers, soil management in ancient, medieval & pre-modern India and its relevance in modern day sustainable agriculture, heritage of crop & water management, plant growth and development & plant protection through vrikshayurveda and traditional knowledge. Heritage of medicinal plants and their relevance today, seed health in ancient & medieval history and its relevance to present day agriculture, description of Indian civilization and agriculture by travelers from China, Europe and United States, our journey in agriculture, green revolution and its impact and concerns, vision for the future.

Suggested Readings

1. Nene, Y.L. 2007. Glimpses of the Agriculture Heritage of India, Asian Agri-History Foundation, Marketing by Munshiram Manoharial Publishers Pvt. Ltd,
2. Saxena, R.C., Choudhary, S.L. and Nene, Y.L.2009. Textbook on Ancient History of Indian Agriculture, Asian Agri-History Foundation.
3. Kumari, D. and Manimuthu Veeral. 2014. Text Book on Agricultural Heritage of India. Agrotech Publishing Academy, Udaipur
4. ICAR. Introductory Agriculture. ICAR e-course. Indian Council of Agricultural Research, New Delhi. (http://www.agrimoon.com/wp-content/uploads/Introductory-Agriculture.pdf)
5. चौधरी, शिवचरण लाल. 2003. वृक्षायुर्वेद (वनस्पति जीवन का विज्ञान), एशियन एग्री–हिस्ट्री फाउण्डेशन, उदयपुर
6. खण्डेलवाल, एस. के. एवं चौधरी शिवचरण लाल. 2011. कृषि–पराशर (पराशर के अनुसार कृषि), एशियन एग्री–हिस्ट्री फाउण्डेशन, उदयपुर
7. खण्डेलवाल, एस. के. एवं चौधरी शिवचरण लाल. 2013. उपवनविनोदः (आनंद के लिए वनस्थली उद्यान), एशियन एग्री–हिस्ट्री फाउण्डेशन, उदयपुर
8. Randhawa, M.S. 1980. A History of Agriculture in India Vol. I, ICAR, New Delhi
9. Randhawa, M.S. 1982. A History of Agriculture in India Vol. II, ICAR, New Delhi
10. Randhawa, M.S. 1983. A History of Agriculture in India Vol. III, ICAR, New Delhi
11. Randhawa, M.S. 1986. A History of Agriculture in India Vol. IV, ICAR, New Delhi

EXT-111 Rural Sociology & Educational Psychology 2(2+0)

Theory

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification, Concept of culture, Social control, Social Processes, Social Institution, Social Change & Development; Rural Leadership: concept and definition, types, qualities and methods of selection of leaders.

Educational psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain, Personality, Motivation, Theories of Motivation. Concept of intelligence, perception, emotions, attitude, teaching – learning process.

Suggested readings

Chitambar, J.B. 1973. Introductory rural sociology. John Wilex and Sons New York.

Desai, A.R. 1978. Rural sociology in India. Bombay, Popular Prakashan, 5th Rev. Ed.

Doshi, S.L. 2007. Rural sociology. Rawat Publishers, Delhi.

Jayapalan, N. 2002. Rural sociology. Altanic Publishers New Delhi.

Sharma, K.L. 1997. Rural society in India. Rawat Publishers, Delhi.

Maslow, A.H. 1970. Motivation and personality. Harper and Row publishers , New York.

Perelson, B. and Steiner, G. 1964. Human behaviour. Harcourt Brace Jovanovich , New York.

HVE-111 Human Values and Ethics 1(1+0)

Theory

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.

Suggested Readings

Gaur, R.R., Sangal, R. & Bagaria, G.P. 2011. A Foundation Course in Human Values and Professional Ethics. Excel Books.

Mathur, S.S. 2010. Education for Values, Environment and Human Rights. RSA International.

Sharma, R.A. 2011. Human Values and Education -Axiology, Inculcation and Research. R. Lall Book Depot.p

Sharma, R.P. & Sharma, M. 2011. Value Education and Professional Ethics. Kanishka Publishers.

Srivastava, S. 2011. Human Values and Professional Ethics. S K Kataria & Sons.

Srivastava, S. 2011. Environmental Science. S K Kataria & Sons.

Tripathi, A.N. 2009. Human Values. New Age International (P) Ltd. Publishers.