

## Syllabus of B.Sc. (Hons) Agriculture Part I, Semester I

HORT-111	Fundamentals of Horticulture	2(1+1)
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### 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; Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation - methods, Fertilizer application in horticultural crops.

### Practical

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

### Reference Books

S. No.	Title of Book	Author	Publisher
1	Handbook of Horticulture (2002)	Chadha, K.L.	ICAR, NewDelhi
2	A handbook of Fruit Science and Technology (2013)	D.K. Salunkhe and S.S. Kadam	CRC Press
3	Basic Horticulture (2011)	Jitendra Singh	Kalyani Publications, New Delhi
4	Basics Horticulture (2009)	K.V.Peter	New India Publishing Agency
5	Fundamentals of Horticulture 2014	Kausal Kumar Misra and Rajesh Kumar	Biotech Books
6	Introduction to Horticulture (1990)	Kumar, N.	Rajyalakshmi publications, Nagarcoil, Tamilnadu
7	Basic concepts of Fruit Science (2005)	Neeraj Pratap Singh	IBDC Publishers
8	Principles of Horticulture 2 <sup>nd</sup> Edn. 2014	Prasad and Kumar	Agrobios (India)
9	A handbook of Fruit Production (2010)	S. Prasad & U. Kumar	Agrobios (India)
10	Precision farming	Singh Jitender	NIPA
11	Advances in Horticulture Biotechnology Vol.-7: Diagnostics for Horticulture crops	Singh, H.P.	Westville
12	Ethnobotany: A recent approach	Kapoor, B.	Madhu
13	Plant Growth Regulators in Agriculture & Horticulture: Their Role and commercial use	Basra, A.S.	IBD
14	Precision Farming in Horticulture: Approaches and Strategies	Swain, S.	NPH
15	Biometrical methods in Horticultural Sciences	Sharma, N.	NIPA

BIOCHEM-111	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)
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### Theory

Importance of Biochemistry; Properties of Water, pH and Buffer.

Carbohydrate: Importance and Classification, Reducing and Nonreducing sugars, Structures and properties of Monosaccharides, Disaccharides and Polysaccharides.

Lipid: Importance and classification, Structures and properties of fatty acids including membrane lipids.

Proteins: Importance and classification, Structures, titration and zwitter ion nature of amino acids, Structural organization of proteins.

Enzymes: General properties, Classification, Mechanism of action, Allosteric enzymes.

Nucleic acids: Importance and classification, Structure of Nucleotides, Secondary and Tertiary structures.

Metabolism of carbohydrates including Glycolysis, TCA cycle and Electron Transport Chain. Metabolism of lipids: Beta oxidation and Biosynthesis.

Plant Biotechnology: Concepts, Scope and applications. Scope and applications of organ cultures, embryo, cell suspension, callus, anther, pollen and ovule culture.

Micro-propagation methods: Organogenesis, Embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance, Somatic hybridization and cybrids.

Somaclonal variation and its use in crop improvement and Cryo-preservation.

Introduction to recombinant DNA methods: Physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods.

Transgenics: PCR techniques and its applications including Molecular Markers in crop improvement and Biotechnology regulations.

### Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids.

Quantitative estimation of glucose/ proteins. Estimation of amino acids/lipids, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides.

Sterilization techniques. Demonstration of isolation of DNA and gel electrophoresis techniques.

### Reference Books

SSAC-111	Fundamentals of Soil Science	3(2+1)
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### 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, problem 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.

### References

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
12. Gupta, I.C. & Sharma, S.K. (1988) Crop production in salt affected soils, Oxford and IBH Publication, New Delhi.
13. Agarwal, R.R., Yadav, J.S.P. & Gupta, R.N. (1982) Saline and alkali soils of India. ICAR, New Delhi.
14. Sehgal, J. (2000) Pedology: Concepts and applications, Kalyani publisher, Ludhiana

HORT-112	Introduction to Forestry	2(1+1)
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### 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.

### References

ENG-111	Comprehension & Communication Skills in English (Gradiual course)	2(1+1)
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### Theory

War Minus Shooting- The sporting Spirit. A Dilemma - A layman looks at science Raymond B. Fosdick. You and Your English- Spoken English and broken English G.B. Shaw. Reading Comprehension, Vocabulary-Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

### Practical

Listening Comprehension : Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation : rate of speech, clarity of voice, speaking and Listening, politeness & Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: test in initiative, team spirit, leadership, intellectual ability. Group Discussions.

### References

AGRON-111	Fundamentals of Agronomy	4(3+1)
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### 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, 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, Effect of sowing depth on germination and seedling vigour, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, 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.

### References:

1. ICAR. 2010. Handbook of Agriculture (6<sup>th</sup> 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<sup>nd</sup> edition), Agrobios (India), Jodhpur
4. Reddy, T.Yellamanda and Reddy, G.H. Sankara. 2016. Principles of Agronomy (2<sup>nd</sup> edition) , Kalyani Publishers, Ludhiana
5. Reddy, S.R. 2012. Principles of Crop Production (4<sup>th</sup> edition), Kalyani Publishers, Ludhiana.
6. Gupta , O.P. 2005. Weed Management: Principles and Practices (2<sup>nd</sup> Ed) Agribios (India) Jodhpur.
7. De, Gopal Chandra 1989, Fundamentals of Agronomy. Oxford & IBH Publishing Co., New-Delhi.
8. Michael, A.M. 1987. Irrigation - Theory and Practice, Vikas Publishing House Pvt. Ltd., New-Delhi.
9. Mishra, R.D. and Ahmed, M. 1987. Manual on Irrigation Agronomy, Oxford & IBH Publishing Co.Pvt..Ltd., New-Delhi.ngs
10. आर्य, आ.एल एवं कुरील, आ.एस. 2016. सस्य विज्ञान के सिद्धान्त, साइंटिफिक पब्लिशर्स, जोधपुर
11. पोखवाल, बी. एल., सिंह, पुष्पेन्द्र एवम् शर्मा, डी. डी. 2000. सस्य विज्ञान के मूल तत्व, के. पी. प्रकाशन, उदयपुर

BIO-111	Introductory Biology (New)	2(1+1)
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### **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 flowering 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. Inflorescence, 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.

**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, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points  $(x_1, y_1)$  and  $(x_2, y_2)$ , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line  $y = mx + c$  to the given circle  $x^2 + y^2 = a^2$ . Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of  $x^n, e^x, \sin x$  &  $\cos x$  from first principle, 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.

AGHR-111	Agricultural Heritage (New Course)	1(1+0)*
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### Theory

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.

### References:

1. ICAR 1989 Handbook of Agriculture, Indian Council of Agricultural Research, New-Delhi
2. Nene, Y.L. 2007. Glimpses of the Agricultural Heritage of India. Asian Agri- History Foundation, Secunderabad, Andhra Pradesh.
3. Nene, Y.L., Saxena, R.C. and Choudhary, S.L. 2009. A Textbook on Ancient History of Indian Agriculture, Munshiram Manoharial Publishers Pvt. Ltd,
4. Nene, Y.L., Choudhary, S.L. and Saxena, R.C. 2010. Textbook on Ancient History of Indian Agriculture, Asian Agri-History Foundation.
5. D. Kumari, Manimuthu Veeral. 2014. Text Book on Agricultural Heritage of India. Agrotech Publishing Academy.
6. ICAR. Introductory Agriculture. ICAR e-course. Indian Council of Agricultural Research, New Delhi. (<http://www.agrimoon.com/wp-content/uploads/Introductory-Agriculture.pdf>)

EXCOM-111	Rural Sociology & Educational Psychology	2 (2+0)
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**Theory:**

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology: Definition, objectives, history, challenges and social ecology in Indian context, Rural society: Important characteristics, differences & Relationship between Rural and Urban societies., Social Groups: Meaning, Definition, Classification, Factors considered in formation and organization of groups. Social Stratification - Meaning, Definition, Functions, Forms of Social stratification. Culture concept - Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions - Meaning, Definition and their role in Agricultural Extension. Social Institution: Meaning, Definition, Major institutions in Rural society, Functions., Social Change & Development: Meaning, Definition, Nature of Social change and factors of social change. Social process- Meaning, Definition, types. Social Control- - Meaning, Definition, Need and Means of Social control.. Rural Leadership: concept and definition, types and roles of leaders in rural context; Methods of selection of leaders.

Educational psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain, Cognitive skills, Personality- Meaning, Definition, Types, Factors influencing the Personality and Role of Personality in Agricultural Extension., Motivation; Meaning , Definition, Importance in extension, Theories of Motivation, Intelligence-Meaning, Definition, Types, Factors affecting intelligence..Teaching Learning Process process- Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Perception, Emotions.

**Suggested readings**

1. Chidambaram, J.B. 1973. Introductory rural sociology. New York, John Wiley and Sons.
2. Desai, A.R. 1978. Rural sociology in India. Bombay, Popular Prakashan, 5<sup>th</sup> Rev. ed.
3. Doshi, S.L. 2007. Rural sociology. Rawat Publishers, Delhi.
4. Jayapalan, N. 2002. Rural sociology. Altanic Publishers, New Delhi.
5. Sharma, K.L. 1997. Rural society in India. Rawat Publishers, Delhi.
6. Bhatia, H.R. 1965. A Text Book of Educational Psychology, Asia Publishing House, New Delhi.
7. Pujari, D. 2002. Educational Psychology in Agriculture, Agrotech Publishing Academy, Udaipur
8. Bhushan, V. and Sachdeva, D.R. 2010. An introduction to Sociology, Kitab Mahal , New Delhi.
9. Rao, C.N.S. 2015. Sociology, S.Chand & Company, New Delhi.
10. Maslow, A.H (1970) Motivation and personality. Harper and Row publishers , New York.

HVE-111	Human Value and Ethics (Non-gradial Course)	1 (1+0)
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**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.

NSS	National Service Scheme Syllabus (Non-gradual Course)	2 (0+2)
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### **Introduction and basic components of NSS:**

**Orientation:** history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

### **NSS programmes and activities**

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary

### **Understanding youth**

Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

### **Community mobilisation**

Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

### **Social harmony and national integration**

Indian history and culture, role of youth in nation building, conflict resolution and peace-building

### **Volunteerism and shramdan**

Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

### **Citizenship, constitution and human rights**

Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

### **Family and society**

Concept of family, community (PRIs and other community based organisations) and society

*Chmery*