उद्यानविद्या महाविद्यालय
डॉ. पंजाबराव देशमुख कृषि विद्यापीठ
कृषिनगर, अकोला (महाराष्ट्र) – ४४४ १०४

College of Horticulture
Dr. Panjabrao Deshmukh Krishi Vidyapeeth
Krishi Nagar, Akola - 444 104 (M.S.)

डॉ. व्ही. एन. दोड
सहयोगी अधिष्ठाता
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Associate Dean

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No. Hort./ 3055
Akola. Date 6/9/2013

To,

Dr. Girdhari Waghmare
Head,
Department of Horticulture
VNMAU, Parbhani

Subject : Publication of layout and syllabus for B.Sc (Horticulture) degree programme...

Reference: Decision of Dean, Coordination committee meeting held at Pune.

R/sir,

Kindly find enclosed herewith copy of layout and syllabus for B.Sc (Horticulture) degree programme for your kind perusal.

Yours Sincerely

(V.N. Dod)

Encl : As above

Layout and Syllabus

for

B.Sc. (Horticulture) Degree Programme

(Ref : IVth Deans' Committee Report, ICAR, New Delhi)

Compiled by

Dr.V.N.Dod
Associate Dean, College of Horticulture, Akola and
Head, Department of Horticulture, Dr.P.D.K.V., Akola

Dr.Parag Haldankar
Head, Department of Horticulture, Dr.B.S.K.K.V., Dapoli

Dr.Shrimant Ranpise
Head, Department of Horticulture, M.P.K.V., Rahuri

Dr.Girdhari Waghmare
Head, Department of Horticulture, M.A.U., Parbhani

Syllabus of B.Sc Horticulture

SEMESTER I

Sr.No.	Course No.	Course Title	Credits
1	H/HORT-111	Fundamentals of Horticulture	2+1=3
2	H/FL-111	Ornamental Horticulture	1+1=2
3	H/SSAC-111	Fundamentals of Soil Science	1+1=2
4	H/BOT-111	Principles of Genetics and Cytogenetics	2+1=3
5	H/EXTN-111	Fundamentals of Extension Education	1+1=2
6	H/ECON-111	Introductory Economics	2+0=2
7	H/AGROMET-111	Agriculture Meteorology	1+1=2
8	H/COMP-111	Computer application	1+1=2
9	H/MIBO-111	Introductory Microbiology	1+1=2
		Total credits	**12+8=20**
10	LANG-111	Structural grammar and spoken english	1+1=2=NC
11	H/PHY.EDN-111	Physical Education	0+1=NC
12	MATH-111	Mathematics(Deficiency course)	1+1=NC

SEMESTER II (NEW)

1	H/HORT-122	Plant Propagation and Nursery Management	2+1
2	H/HORT-123	Growth and development of Horticultural Crops.	1+1
3	H/ASSAC-122	Soil Fertility and Nutrition Management	2+1
4	H/AGRO-121	Water Management in Horticultural Crops	1+1
5	H/BOT-122	Principles of Plant Breeding	1+1
6	H/BOT-123	Introductory Plant Physiology	1+1
7	H/PATH-121	Fundamentals of Plant Pathology	1+1
8	H/ENTO-121	Fundamentals of Entomology	1+1
9	H/STAT-121	Elementary Statistics	1+1
10	H/EXTH-122	Agricultural Communication and Journalism	0+1
11	H/NSS-121	National Service Scheme	0+1 NC
		Total credits	**11+10=21**

SEMESTER III

Sr.No.	Course No.	Title	*Credit*
1	H/FS-231	Tropical & Subtropical fruit crops	2+1=3
2	H/VS-231	Tropical and subtropical vegetable crops	2+1=3
3	H/PHT-231	Post Harvest Management of Horticultural Crops	2+1=3
4	H/SPICON-231	Spices and Condiments	1+1=2
5	H/FL-232	Landscape Gardening	1+1=2
6	H/AGRO-232	Weed Management in Horticultural Crops.	1+1=2
7	H/PATH-232	Diseases of vegetable, Ornamental and Spice Crops	2+1=3
8	H/SSAC-233	Fundamentals of Biochemistry	1+1=2
		Total Credits	**12+8=20**

Semester IV (New)

1	H/FS-242	Breeding of Fruit and Plantation Crops	2+1=3
2	H/FS -243	Arid Fruit Crops	1+1=2
3	H/VS -242	Temperate vegetables	1+1=2
4	H/FL -243	Commercial Floriculture.	2+1=3
5	H/AGRO-243	Organic Farming	1+1=2
6	H/PATH-243	Diseases of Fruits, plantations, medicinal and aromatic crops	2+1=3
7	H/AROMED -241	Aromatic and medicinal plants	1+1=2
8	H/SSAC-244	Soil ,irrigation water and Plant Analysis	0+1=1
9	H/ECON-242	Horti- Business Management	2+0=2
		Total credits	**12+8=20**

SEMESTER V (NEW)

Sr. no.	Course no.	Course title	No. of credits
1	H/VS-353	Breeding of vegetable crops	2+1
2	H/FS-354	Temperate Fruits and Plantation Crops	2+1
3	H/HORT-354	Introductory agro forestry and hort-silvi pasture	1+1
4	H/FS-354	Protected cultivation of flower crops	1+1
5	H/BOT-354	Environmental science and agroecology	1+1
6	H/ENTO-352	Insect Pest Management of Fruit, Medicinal and Aromatic Crops	2+1
7	H/ENTO-353	Insect Pest Management of vegetables, ornamental & spices crops	2+1
8	H/PATH-354	Mushroom Culture	0+1
9	H/ENGG-351	Farm Power and Machinery	1+1
		Total Credits	**12+9=21**

SEMESTER VI (NEW)

H/FL 365	Breeding and seed production of ornamental crops	1+1=2
H/VS-364	Seed production in vegetable crops	2+1=3
H/VS -365	Protected cultivation of vegetable crops	1+1=2
H/PHT-362	Processing and value addition of Horticultural crops	1+1=2
H/BIOT-361	Fundamentals of Biotechnology	1+1=2
H/ENTO-364	Nematode of horticultural crops and their management	1+1=1
H/ENTO-365	Apiculture	0+1=1
EXTN-363	Entrepreneurship Development and Communication Skills	1+1=2
H/MIBO-362	Applied microbiology	0+1=1
	Total credits	**8+9=17**

SEMESTER : VII (New)

Sr. no.	Course no.	Course title	No. of credits
1	**H/HORT-EL-471**	**Nursery Production and Management**	**0+20**
I	H/HORT-EL-471/1	Importance and establishment of nursery	0+4
II	H/HORT-EL-471/2	Commercial productions and maintenance of nursery	0+8
III	H/HORT-EL-471/3	Nursery Management	0+4
IV	H/HORT-EL-471/4	Economics of Nursery Production	0+4
		Total	**0+20**

SEMESTER VIII (New)

Sr. No.	Course No.	Title	*Credit*
1	**H/HORT EL-483**	**Protected cultivation of high value horticultural crops**	**0+20**
I	H/HORT EL-483/1	Basic principles of protected cultivation	0+3
II	H/HORT EL-483/2	Production technology of vegetables under protected cultivation	0+5
III	H/HORT EL-483/3	Production technology of flower crops under greenhouse	0+6
IV	H/HORT EL-483/4	Production technology of cut flower under shade house	0+6
		Total	**0+20**

Syllabus of B.Sc. (Horticulture)

SEMESTER I

Sr.No.	Course No.	Course Title	Credits
1	H/HORT-111	Fundamentals of Horticulture	2+1=3
2	H/FL-111	Ornamental Horticulture	1+1=2
3	H/SSAC-111	Fundamentals of Soil Science	1+1=2
4	H/BOT-111	Principles of Genetics and Cytogenetics	2+1=3
5	H/EXTN-111	Fundamentals of Extension Education	1+1=2
6	H/ECON-111	Introductory Economics	2+0=2
7	H/AGROMET-111	Agriculture Meteorology	1+1=2
8	H/COMP-111	Computer application	1+1=2
9	H/MIBO-111	Introductory Microbiology	1+1=2
		Total credits	**12+8=20**
10	LANG-111	Structural grammar and spoken english	1+1=2=NC
11	H/PHY.EDN-111	Physical Education	0+1=NC
12	MATH-111	Mathematics(Deficiency course)	1+1=NC

(2)

Revised Syllabous for B.Sc. (HORT)
Course No. H/HORT- 111
Title: Fundamentals of Horticulture
Credits: 3 (2+1)

Theory:

Economics, importance, area and production of Horticultural crops, Export-import scenario of Horticultural crops, Classification of Horticultural crops, Agroclimatic zones of India for fruit sand vegetables cultivation, Soil and climatic requirements of Horticultural crops, Vegetable gardens-Nutrition, garden, kitchen garden and other types, Ornamental gardens, Selection of site for establishing orchard, Layout and planting of an orchard, Planting systems and planting densities, Management of orchards, Special horticultural practices, Principles and methods of training and pruning of fruit crops, Classification of bio-regulators and their uses in Horticulture, Water management, weed management, mulching and nutritional management of Horticultural crops, Cropping systems-inter cropping, mixed cropping, mixed farming and multistoried cropping, Bearing habits in fruit crops, Fruitfulness, unfruitfulness; factors affecting unfruitfulness and remedies, Rejuvenation methods- top working, crown working, bridge grafting, etc, Canopy management of fruit crops, Organic farming – Definition and principles

Practical:

Identification and uses of tools and implements, Planning and layout of orchard. Planning and layout of nutrition garden, Preparation of nursery for vegetable seeds crops, Planting systems and planting of horticultural crops, Training and pruning of fruit trees, Application of manures and fertilizers, Formulation and application of bio regulators, Layout of different irrigation systems, Study of bearing habits of fruit crops, Identification and management of nutritional disorders in fruit and vegetables, Maturity standards of fruit crops, Maturity standards of vegetable crops, Harvesting, grading, packaging and storage of fruits. Harvesting, grading, packaging and storage of vegetables. Determination of no. of plants /ha, fertilizer doses, PBG formulations, pesticide and fungicide formulation.

Books Recommended:

1. Fruits of India-Tropical and Subtropical, Bose T. K. (1990) Naya Prakash, Culcutta.
2. Hand Book of Horticulture – ICAR
3. Fruit culture in India – Sham Singh and others
4. Principles of Horticulture and fruit growing – Kunte and Yawalkar
5. Pomology – Kumar
6. Production Technology of fruit crops – Shammugavellu k. G.

Course No. H/HORT- 111
Title: Fundamentals of Horticulture
Credits: 3 (2+1)
Topics

Lesson No.	Topic	Marks
1 & 2	Economics, importance, area and production of Horticultural crops	10
3	Export-import scenario of Horticultural crops.	5
4	Classification of Horticultural crops.	10
5	Agroclimatic zones of India for fruit sand vegetables cultivation.	5
6 & 7	Soil and climatic requirements of Horticultural crops.	10
8	Vegetable gardens-Nutrition, garden, kitchen garden and other types.	10
9	Ornamental gardens.	5
10	Selection of site for establishing orchard.	10
11 & 12	Layout and planting of an orchard.	10
13 & 14	Planting systems and planting densities.	10
15 & 16	Management of orchards.	10
17 & 18	Special horticultural practices.	10
19 & 20	Principles and methods of training and pruning of fruit crops.	10
21 & 22	Classification of bio-regulators and their uses in Horticulture.	10
23 & 24	Water management, weed management, mulching and nutritional management of Horticultural crops.	5
25 & 26	Cropping systems-inter cropping, mixed cropping, mixed farming and multistoried cropping.	10
27	Bearing habits in fruit crops.	5
28 & 29	Fruitfulness, unfruitfulness; factors affecting unfruitfulness and remedies.	10
30	Rejuvenation methods- top working, crown working, bridge grafting, etc.	10
31	Canopy management of fruit crops.	5
32	Organic farming – Definition and principles.	5

Practicals

1. Identification and uses of tools and implements.
2. Planning and layout of orchard.
3. Planning and layout of nutrition garden.
4. Preparation of nursery for vegetable seeds crops.

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5. Planting systems and planting of horticultural crops
6. Training and pruning of fruit trees
7. Application of manures and fertilizers
8. Formulation and application of bio regulators
9. Layout of different irrigation systems
10. Study of bearing habits of fruit crops
11. Identification and management of nutritional disorders in fruit and vegetables
12. Maturity standards of fruit crops
13. Maturity standards of vegetable crops
14. Harvesting, grading, packaging and storage of fruits.
15. Harvesting, grading, packaging and storage of vegetables.
16. Determination of no. of plants /ha, fertilizer doses, PBG formulations, pesticide and fungicide formulation.

Books Recommended

7. Fruits of India-Tropical and Subtropical, Bose T. K. (1990) Naya Prakash, Culcutta.
8. Hand Book of Horticulture – ICAR
9. Fruit culture in India – Sham Singh and others
10. Principles of Horticulture and fruit growing – Kunte and Yawalkar
11. Pomology – Kumar
12. Production Technology of fruit crops – Shammugvellu k. G.

Revised Syllabus for B.Sc. (HORT)
Course No. H/FLOR-111
Ornamental Horticulture
Credits 1+1=2

Theory:

History importance and scope of ornamental gardening, Types of gardens, Ornamental industry: Area, production and industrial importance, Principles of gardening, Garden components and adornments, Types of lawn grasses and methods of lawn making, Rockery and methods of designing rockeries, Water Garden and methods of designing water gardens, Special types of garden (Japanese, English, Mughal), Walk, paths, bridges, constructed features etc, Types of trees, their propagation and their planting, Types of shrubs and herbacious perennials and planting, Types of climbers, creepers, cacti and succulents, Flower arrangement and Ikebana, Bioasthetic planting, its importance, urban planning, beautifying railway station, residential colonies etc, Bonsai and bonsai culture.

Practicals:

Identification and Study of annuals, Identification and Study of herbaceous shrubs, Identification and Study of climber and creepers, Identification and Study of foliage and flowering trees, Identification and Study of edges, hedges and succulents, Planning and designing garden, Layout of different garden components, Designing of home garden, Designing of road avenues and traffic islands, Study of types of lawn grasses and methods of lawn making, Layout of rockery, Layout of water garden, Layout of Japanese garden, Layout of children gardens, Practices of flower arrangements, Preparation of Bonsai.

Books Recommended:

1. Bose T. K. : Floriculture and landscaping.
2. Randhava and Mukhopadhyay : Floriculture in India
3. Laury : Fundamentals of floriculture.

Course No. H/FLOR-111
Ornamental Horticulture
Credits 1+1=2

Lecture No.	Topic	Marks
1	History importance and scope of ornamental gardening	10
2	Types of gardens	10
3	Ornamental industry : Area, production and industrial importance	10
4	Principles of gardening	10
5	Garden components and adornments	10
6	Types of lawn grasses and methods of lawn making	10
7	Rockery and methods of designing rockeries	10
8	Water Garden and methods of designing water gardens	10
9	Special types of garden (Japanese, English, Mughal)	10
10	Walk, paths, bridges, constructed features etc.	10
11	Types of trees, their propagation and their planting	3
12	Types of shrubs and herbacious perennials and planting	5
13	Types of climbers, creepers, cacti and succulents	5
14	Flower arrangement and Ikebana	10
15	Bioasthetic planting, its importance, urban planning, beautifying railway station, residential colonies etc.	5
16	Bonsai and bonsai culture.	5

Practicals:

1. Identification and Study of annuals.
2. Identification and Study of herbacious shrubs.
3. Identification and Study of climber and creepers.
4. Identification and Study of foliage and flowering trees.
5. Identification and Study of edges, hedges and succulants.
6. Planning and designing garden.
7. Layout of different garden components.
8. Designing of home garden.
9. Designing of road avenues and traffic islands.
10. Study of types of lawn grasses and methods of lawn making.
11. Layout of rockery.
12. Layout of water garden.
13. Layout of Japanese garden.
14. Layout of children gardens.
15. Practices of flower arrangements.
16. Preparation of Bonsai.

Books Recommended:

4. Bose T. K. : Floriculture and landscaping.
5. Randhava and Mukhopadhyay : Floriculture in India
6. Laury : Fundamentals of floriculture.

Course Title : Fundamentals of Soil Science : B. Sc. (Hort.)

Course No. : H/SSAC-111 **Semester : I**

Credit : 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 density – factors influencing, field bulk density. Relation between BD (bulk density), PD – practical problems. Pore space – definition. Factors affecting capillary and non-capillary porosity, soil colour – definition, its significance, 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 eco-system and their properties, management of problem soils – soils environmental quality. Irrigation water quality, determination of quality parameters, empirics 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.

Teaching Schedule

Course Title : Fundamentals of Soil Science : B. Sc. (Hort.)

Course No. : H/SSAC-111 **Semester : I**

Credit : 2(1+1)

Lect. No.	Topic	Weightages
1	Composition of earths crust, soil as a natural body- major components	2
2	Physical parameters, texture – definition, textural classes and its significance	3
3	Definition particle density and bulk density, factors influencing, field bulk density, significance of bulk density	4
4-5	Pore space – definition, factors affecting capillary and non-capillary, pores, porosity, soil colour definition, its significance, soil colour and related factors,	4
6	Soil structure, definition, classification, factors influencing, genesis of soil structure, soil consistency, plasticity,	4
7	Soil air, composition, factors influencing, amount of air space, soil air renewal, soil temperature, sources and distribution of heat, factors influencing, measurement	3
8-9	Soil chemical properties, organic and inorganic soil colloids and their properties	3
10	MID TERM	
11	Ion exchange, cation-anion- exchange importance	3
12	Soil organic matter, decomposition	3
13	pH and nutrient availability, soil buffering capacity	3
14-16	Soil water, forms, soil moisture constants, hygroscopic coefficient, wilting point, field capacity, moisture equivalent, energy concepts, pF scale, measurement gravimetric – electric and tensiometer method, pressure plate and pressure membrane apparatus, soil moisture meter	5
17	Problem soils : salt affected soils, permeable and flooded soils and their properties	4
18	Soil orders, land capability classification	4

PRACTICALS

Pract. No.	Name of practical
1	Collection and preparation of soil samples
2	Estimation of soil bulk density
3	Determination of soil moisture (gravimetric method)
4-5	Textural analysis of soil
6	Determination of soil pH and EC
7	Determination of organic carbon from soil
8	Determination of Available nitrogen from soil
9	Determination of Available phosphorus from soil
.10	MID TERM
11	Determination of Available potassium from soil
12	Determination of Available sulphur from soil
13-14	Determination of cation exchange capacity from soil
15	Determination of exchangeable Ca and Mg from soil
16	Determination of gypsum / lime requirement of soil
17	Determination of exchangeable sodium from soil

TEXT BOOKS

1. Text book of Soil Science by J. A. Daji., J. R. Kadam and N. D. Patil (2002)
2. Physical properties of soil by C. C. Shah and N. Narayana (1966)
3. Fundamentals of Soil Science (8th edition) 1990 by Henry, D. Foth.
4. Text book of Soil Science (Second edition) 1994 by Biswas and Mukharjiee
5. Nature and properties of soils by N. C. Brady, prentice Hall of India Pvt. Ltd., New Delhi.
6. Fundamental Soil Science by ISSS, New Delhi.

HORTICULTURE SYLLABUS

H/BOT- 111 : Principle of Genetics and Cytogenetics 2+1 = 3

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 rations. Multiple alleles, quantitative inheritance linkage and crossing over, sex linked inheritance and characters. Cytoplasmic inheritance and material effects. 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 F_2 data and construction of linkage maps Genetics variation in man.

Books Recommended :

1. Sunderaj D.D., Thulsidas G and Dorairaj M.S. (1997). Introductic to cytogenetics and plant breeding, Popular Book Depot, Chennai.
2. Singh B.D. (1990). Fundamentals of Genetics, Kalyani Publisher, Ludhiana.
3. Gupta P.K. (1997). Genetics, Rastogi Publications, Meerut.
4. Gardner, E.J. (1981). Principles of Genetics, Johan Wiley and Sons, U.S.A.
5. Griffiths, A.J.F., Miller, J.H. Suzuki, D.T., Lewantin, R.C. and W.M. Gelbart (1996). An Introduction to Genetic Analysis (6th edition). W.H. Freeman, New York.
6. Stickberger M.W. (1996). Genetics (3rd edition) Mac Millan Publishing Co. New Delhi.

B. Sc. (Horticulture)

H/EXTN-111 Fundamentals of Extension Education

Credits: 2 (1+1) Semester - I

THEORY:

- Extension education – History, Meaning, definition, nature, scope, objectives, principles and approaches.
- Horticultural extension - Selected programmes of leading national and international Horticultural institutes.
- Peoples participation in Horticultural programmes.
- Motivation of women community, children, youth and voluntary organizations for Horticultural extension work.
- Rural Development - Meaning, definition and objectives.
- Transfer of technology programmes like Lab to Land Programmes (LLP), National Demonstration Schemes (NDS), Front Line Demonstration (FLD), Krishi Vigyan Kendras (KVK), Technology Assessment and Refinement Programme (TARP) of ICAR.
- Communication - Meaning, definition, elements and selected models.
- Audio-visual aids - Importance, classification and selection.
- Programme planning process – Meaning, scope, principles and steps.
- Evaluation- Meaning, Importance and methods.
- Scope and importance of Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA).
- Management and Administration - Meaning, definition, principles and functions.
- Concepts of human resource development (HRD).
- Leader- Meaning, Definition, types and role in Horticultural Extension.

PRACTICAL:

- Visit to study structure, functions, linkages and extension programmes of voluntary organization/ Mahila Mandal, Village Panchayat, State Deptt. of Horticulture.
- Planning, preparation and use of NPVA like poster, charts, flash cards, folders etc. and AVA namely OHP and LCD.
- Identification of local leaders to study their role in extension work.
- Evaluation of some selected case studies of Horticultural development programmes.

Faculty of Horticulture
B.Sc.(Horti.degree programme)

H/ECON -111 Introductory Economics : 2 (2+0)
I semester

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 marginalutility, law of equi-marginal utility, indifference curve and its properties, consumer equilibrium. Theory of demand, demand schedule and curve, market demand. Price, incomeand cross elasticities, Engil' s law of family expenditure – consumer' s surplus. Theory offirm, 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 ofdiminishing marginal return – cost concepts. Law of supply – supply schedule and curveelasticities. Market equilibrium, distribution – theories of rent, wage, interest and profit.Price determination and forecasting under various market structures

Courses to be offered by Agronomy Department for under graduate degree programme (Horticulture)

1. HORTAGRO-111 Agricultural Meteorology 2 (1+1)

Theory

Agricultural meteorology, its importance in Agriculture

Weather and climate, weather elements and factors affecting them.

Earth's atmosphere, composition and structure of atmosphere.

Solar radiation – nature, properties, depletion, factors affecting solar radiation, solar constant and energy balance.

Atmospheric temperature – factors affecting temperature, importance of air temperature, horizontal and vertical distribution and variations in temperature and global warming.

Soil temperature – importance of soil temperature, variation of soil temperature.

Air pressure – Variations, isobars and pressure gradients.

Wind – Types, classification, importance of wind in Agriculture, forces acting to produce wind, cyclones, anticyclones and general circulation system of earth.

Atmospheric humidity – saturated and actual vapour pressure, specific and relative humidity, diurnal variation of humidity.

Process of condensation, formation of dew, fog, frost, mist, snow, rain and hail.

Cloud – types, formation and classification.

Precipitation – hydrologic cycle, types of rain – thunder and hail storms, types of monsoon, agricultural seasons.

Drought – its classification, strategy to mitigate drought.

Microclimate

Weather forecasting – Basics, types and importance of weather forecasting.

Remote sensing and introduction to crop modeling.

Practical : Site selection for Agromet observatory; Measurement of temperature; Measurement of rainfall; Measurement of evaporation (atmospheric/soil); Measurement of atmospheric pressure; Measurement of sunshine duration and solar radiation; Measurement of wind direction and speed and relative humidity; Study of weather forecasting and synoptic charts.

Practical

Ex. No.	Name of the exercise
1	Study of Agro-meteorological observatory, its types, selection of site and plan of layout and visit to Agro-meteorological observatory.
2 and 3	Study of meteorological instruments and methods of recording observations.
4	Measurement of Air temperature.
5	Measurement of soil temperature.
6 and 7	Measurement of rainfall with the help of different rainguages.
8	Measurement of wind velocity with the help of cup anemometer and study of wind vane.
9	Measurement of evaporation by USWB Class A open pan evaporimeter.
10	Measurement of evapotranspiration by Lysimeter.
11	Measurement of Bright Sunshine hours by Campbell stokes sunshine recorder.
12	Measurement of solar radiation
13 and 14	Measurement of atmospheric pressure. Calculation of vapour pressure and relative humidity with the help of Assman's Psychrometer.
15	Measurement of dew.
16	Preparation of synoptic charts.
17	Study of Automatic weather station.

Theory : Teaching Schedule

Lecture No.	Topic to be covered	Weightage
1	Definition of Meteorology, Agricultural Meteorology, its importance, scope in general and agriculture in particular.	6
2 and 3	Weather and climate, difference between weather and climate, weather elements and factors affecting them.	8
4	Earth's atmosphere, composition and structure of atmosphere.	6
5 and 6	Solar radiation, nature properties, depletion (direct, diffuse) its significance, factors affecting solar radiation, solar constant, and energy balance	8
7 and 8	Atmospheric temperature, factors affecting temperature, importance of air temperature, horizontal and vertical temperature distribution, temperature variation, DALR, SALR, temperature inversion, stability and instability of air, heating of atmosphere, global warming	9
9	Soil temperature, importance of soil temperature, variation of soil temperature	7
	Mid Term Examination	
10	Air pressure, variation with height, isobars and pressure gradients	7
11	Wind, types and classification, importance of wind in agriculture, forces acting to produce wind, cyclone and anticyclones, general circulation system of earth	8
12	Atmospheric humidity, saturated and actual vapour pressure, specific and relative humidity, diurnal variation of humidity	7
13	Process of condensation, its forms, dew, frost, fog, mist, snow, rain and hail.	7
14	Cloud, its types, classification. Precipitation, its process and forms. Hydrological cycle.	7
15	Types of rains, thunder and hail storms, introduction to monsoon, its types. Agricultural seasons.	7
16	Drought, its classification, strategy to mitigate drought. Microclimate	6
17	Weather forecasting, basics, types, importance of weather forecasting, remote sensing, introduction to crop modeling.	7

Reference Books

1. Atmosphere, weather and climate – Barry R.G. and Charley R.J. The Englis.. Language Book Society and Mathuen and Co. Ltd., Sultolk.
2. Contemporary climatology – Handarson Sellers A. and Robinson P.J. Longman Scientific and Technical, England.
3. Introduction to Agrometeorology – H.S. Mavi, Oxford and IBH Publishing Co., New Delhi.
4. Meteorology – S.R. Ghadekar
5. Agricultural Climatology – J.R. Kakade
6. Our atmosphere by – Smita Bhutani
7. Climate, weather and crops in India – D. Lenka

B.Sc. (Hort.)

Course Title: Computer Applications : HCOMP-111 2 (1+1)

Introduction to Computers, Anatomy of Computers, Input and Output Devices. Units of Memory, Hardware, Software and Classification of Computers. Personal Computers, Types of Processors, booting of computer, warm and cold booting. Computers Viruses, Worms and Vaccines. Operating System – DOS and WINDOWS. Disk Operating System (DOS): Some fundamental DOS Commands, FORMAT, DIR, COPY, PATH, LABEL, VOL, MD, CD and DELTREE, Rules for naming files in DOS and Types of files. WINDOWS: GUI, Desktop and its elements, WINDOWS Explorer, working with files and folders; setting time and date, starting and shutting down of WINDOWS. Anatomy of a WINDOW, Title Bar, Minimum, Maximum and Close Buttons, Scroll Bars, Menus and Tool Bars. Applications – MSWORD: Word, processing and units of document, features of word-processing packages. Creating, Editing, Formatting and Saving a document in MSWARD; MSEXCEL: ELECTRONIC Spreadsheets, concept, packages. Creating, Editing and Saving a spreadsheet with MSEXCEL. Use of in-built Statistical and other functions and writing expressions. Use of Data Analysis Tools, Correlation. Creating Graphs. MS Power Point: Features of Power Package. MSACCESS: Concept of Database, Units of database, creating database; Principles of Programming: Flow Charts and Algorithms, illustration through examples. Internet: World Wide Web (W W W), Concepts, Web Browsing and Electronic Mail.

Practical: Study of Computer Components; Booting of Computer and its Shut Down; Practice of some fundamental DOS Commands, TIME, DATE, DIR, COPY, FORMAT. VOL, LABEL, PATH; Practicing WINDOWS Operating System, Use of Mouse, Title Bar, Minimum, Maximum and Close Buttons, Scroll Bars, Menus and Tools Bars; WINDOWS Explorer, Creating Folders, COPY and PASTE functions; MSWORD: Creating a Document, Saving and Editing; MSWORD, Use of options from Tools Bars, Format, Insert and Tools (Spelling & Grammar) Alignment of text; MSWORD, Creating a Table, Merging of Cells, Column and Row width; MSEXCEL: Creating A Spreadsheet, Alignment of rows, columns and cells using Format tool bar; MSEXCEL: Entering AVERAGE, STDEV; MSEXCEL: Data Analysis using inbuilt Tools Packs, Correlation & Regression: MSEXCEL: Creating Graphs and Saving with & without data: MSACCESS: Creating Database, Structuring with different types of fields: MS Power Point: Preparation of slides on Power Point: Transforming the data of WORD, EXCEL and ACCESS to other formats: Internet Browsing: Browsing a Web Page and Creating of E-Mail ID.

LESSON PLAN (TEACHING SCHEDULE)

Course Title : **Computer Applications**
Course No. **H/COMP-111**
Credits : 2 (1+1)

Text Books:

1) Computer Fundamentals by Pradeep K. Sinha and Priti Sinha, III edition, BPB Publications B-14 connaught place. New Delhi 110001.
2) Computer Fundamentals by P.K. Sinha, BPB, publications, B-14, Connaught place. New Delhi.
3) Fundamentals of computer by V. Rajavaman, 2nd edition, Prentice Hall of India Pvt. Ltd. New Delhi.
4) DOS for Dummies, 3rd edition, Comdex Computer Publishing Pustak Mahal, Delhi.
5) Rapidex Computer course by Vikas Gupta, Pustak Mahal, Delhi.
6) Mastering Office Professional for window 95, BPB Publications, B-14 Connaught place, New Delhi.
7) Statistical Methods for Agricultural worksers by V.G.Panse and P.V.Sukhatme, ICAR, New Delhi.

Lect. No.	Book No.	Article No./ Page No.	Topic/s
1	1	1-3, 15-19	Introduction to computer, Anatomy of Computers
	2	1-2, 9-11	
2	1	139-158	Input – output devices
	2	95-110	
3	2	75-78	Units of Memory
	1	162-165	Hardware, Software
	3	257-259	Classification of Computers, personal Computers
	1	362-367	
4	1	97-102	Types of processor
	4	7-12	Booting of computers – warm and cold booting
	4	252-254	Computer Viruses, Worms and Vaccines
5	1	237-238	Operating system – DOS and Windows
	1	257-259	DOS – windows
	5	61-85	Disk operating system (DOS) some fundamental DOS Commands – FORMAT, DIR, COPY, PATH, LABEL, VOL., MD, CD, DEL., TREE
	4	237-292	
6	5	55-60	Rules for naming files in DOS and types of files
7	6	15-43	WINDOWS : GUI, Desktop, & its elements windows Explorer, working with files, and folders, setting time and date starting & shutting down of windows
8	6	92-107	Anatomy of window, Title bar, Minimum and close buttons, scroll bars, menus and Tool bars.
9	6	114-206	Applications : MS WORD- Word, Processing and units of documents, features of word processing

			packages, creating, editing, formatting and saving a documents in MSWORD.
10	6	368 –376	MS EXCEL: Electronic spread sheet, Concept, packages, crating, editing & saving a spreadsheet with MS EXCEL
11	6	435-441	Use of in built statistical and other functions and writing expressions.
12	6	567 – 596	Use of data analysis tools, correlation and regression, t-test for two samples and ANOVA with one way classification.
	7	53-58	
	7	97 –113	
	6	471 – 482	Creating graphs
13	6	672-686	MS POWER POINT : Features of power point package
14	6	836 – 861	MSACESS : Concept of database, units of database creating database
15	2	118 – 138	Principles of programming, Flow charts and algorithms,
			Illustrations through examples
16	1	341 – 346	Internet, world wide web, (www), concept, web Browsing & electronic mail.

List of Practicals

Practical No. **Title**

1. Study of Computer Components, Booting, shutdown of Computer
2. Operating System – DOS
3. Operating System (O.S.) – Windows – I
4. Operating System (O.S.) – Windows – II
5. Word processing-I
6. Word processing – II
7. Creation of spread sheet
8. Handling of in-built functions by MS EXCEL
9. Data Analysis by in – built function in MS EXCEL
10. Creation of graph with MS EXCEL
11. MSACESS : Creation of database
12. MSACESS : Structuring / querying of data base
13. MS Power Point : Preparation of slides
14. Data transfer
15. Internet, Browsing and E – mail ID

Course No. : H/MIBO-111 **Credits : 1+1=2**

Title: Introductory Microbiology **Semester: I**

A. Syllabus

Theory:

History and Scope of Microbiology: The discovery of micro-organism, spontaneous generation conflict, germ theory of diseases, microbial degradation of organic and inorganic matter. Development of microbiology. Microscopy and Specimen Preparation: The bright field microscope, fixation, dyes and simple staining, differential staining. Composition of microbial world. Morphology and general characters of bacteria, fungi, algae, actinomycetes and related organisms. Difference between prokaryotic and eukaryotic cells. Prokaryotic cell structure and functions. Types of culture media and pre-culture techniques. Microbial growth: 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:

Acquaintance with microscope and other laboratory equipments. Examination of natural infusion and living bacteria; Examination of stained cells by simple staining and Gram staining. Methods for sterilization and nutrient agar preparation. Methods for isolation of pure cultures of bacteria. Broth culture, agar slopes, streak plates and pour plates, turbid metric estimation of microbial population. Estimation of microbial count by pours plate techniques.

Books recommended:

1. Atlas, R.M. 1995. Microorganisms in our world, Mosby Year Book Inc. WM C. Borwn Pub. Oxford.
2. Atlas, R.M. 1995. Laboratory manual of Experimental Microbiology. Mosby year book Ine. Missouri.
3. Brock, T.D. and M.T. Madigar, 1991. Biology of Microorganisms Prentice Hall, New Jersey.
4. Janeway, C.A. 1994. Immunology. Black well Sci. Pub., Oxford.
5. Pelczar M. J. E.C.S. Chan and N.L. Krieg. 1996. Microbiology, Mc Graw Hill, New York.
6. Schlegal, H.G. 1996. General Microbiology, Cambridge University Press, New York.
7. Sullia, S.B. and Santharam.1998.General Microbiology. Oxford and IBH Publ., New Delhi.

B) Teaching Schedule

Lecture No.	Topics to be covered
1.	History and Scope of Microbiology:
2.	The discovery of micro-organism, spontaneous generation conflict,
3.	Germ theory of diseases, microbial degradation of organic and inorganic matter
4-5	Microscopy and Specimen Preparation: The bright field microscope, fixation, dyes and simple staining, differential staining.
6-8	Composition of microbial world. Morphology and general characters of bacteria, fungi, algae, actinomycetes and mycoplasma and related organisms.
9	Difference between prokaryotic and eukaryotic cells.

10-11	Prokaryotic cell structure and functions.
12	Types of culture media and pre-culture techniques.
13	Microbial growth: growth curve. Measurement of bacterial growth.
14	General properties of viruses and brief description of bacteriophages.
15-16	General principle of bacterial genetics, DNA as genetic material.
17	Antibiosis, symbiosis, intra-microbial and extra-microbial association.

C) Lesson Plan

Lecture No.	Topics to be covered
1.	History and Scope of Microbiology: Microbiology introduction. Microorganisms. Scope of microbes in agriculture and allied fields.
2.	The discovery of microorganism, spontaneous generation conflict. Invention of microscope and contribution of Anton Leeuwenhock in discovering microorganisms. Settlement of spontaneous generation conflict.
3.	Germ theory of diseases, microbial degradation of organic and inorganic matter. Role of microbes in fermentation and germ theory of diseases. Contributions of Robert Koch and Louis Pasteur. Koch's Postulates
4-5	Microscopy and Specimen Preparation: The bright field microscope, Various types of microscopes, resolution power, use of oil-immersion objective, technique for specimen preparation for observing under microscope, fixation, dyes and simple staining, differential staining, staining methods, Gram staining, spore and capsule staining.
6-8	Composition of microbial world. Morphology and general characters of bacteria, fungi, algae, actinomycetes and mycoplasma and related organisms.
9	Difference between prokaryotic and eukaryotic cells. Major differences in cell structure and examples of prokaryotic and eukaryotic organisms.
10-11	Prokaryotic cell structure and functions. Bacterial cell structure, functions of internal and external parts, size, shape and morphological groups of bacteria, cell groupings, endospore and capsule formation in bacteria.
12	Types of culture media and pre-culture techniques. Nutrition of bacteria, nutritional groups of bacteria, Nutrient media and their types. Methods of preparing common nutrient media.
13	Microbial growth: growth curve and measurement of bacterial growth. Growth phases.
14	General properties of viruses and brief description of bacteriophages.; Viruses, characters, importance, structure of bacteriophages, lysogenic and lytic bacteriophages.
15-16	General principle of bacterial genetics, DNA as genetic material. Mutation in bacteria, bacterial recombination, conjugation, transformation and transduction.
17	Antibiosis, symbiosis, intra-microbial and extra-microbial association. Different harmful and beneficial associations of microorganism: Parasitism, mycoparasitism, predation, symbiosis, antibiosis, and commensalism.

D) Weightages

Group	Topics	Weightages (Marks)
I.	History and Scope of Microbiology. The discovery of micro-organism, spontaneous generation conflict. Germ theory of diseases, microbial degradation of organic and inorganic matter	4-6
II	Microscopy and Specimen Preparation: The bright field microscope, fixation, dyes and simple staining, differential staining.	4-6
III	Composition of microbial world. Morphology and general characters of bacteria, fungi, algae, actinomycetes and mycoplasma and related organisms. Difference between prokaryotic and eukaryotic cells. Prokaryotic cell structure and functions	10-12
IV	Types of culture media and pre-culture techniques	4-6
V	Microbial growth: growth curve and measurement of bacterial growth	4-6
VI	General properties of viruses and brief description of bacteriophages.	4-6
VII	General principle of bacterial genetics, DNA as genetic material.	6-8
VIII	Antibiosis, symbiosis, intra-microbial and extra-microbial association.	4-6
	Total	**40-56**

E) Exercise schedule (Practical)

Exercise No.	Title of exercise
1	Acquaintance with microscope and other laboratory equipments.
2	Examination of natural infusion and living bacteria
3	Staining of bacteria: different methods
4-5	Examination of stained cells by simple staining and Gram staining
6-7	Endospore and capsule staining of bacteria.
8	Methods for sterilization. : Autoclaving and nutrient agar preparation.
9	Methods for sterilization.: Sterilization of glassware by dry heating
10-11	Methods of preparing nutrient media. : Preparation of nutrient broth, nutrient agar plates, nutrient agar slants and stabs
12-14	Methods for isolation and purification of bacterial cultures.
15	Isolation of bacteria by enrichment culture technique.
16	Turbid metric estimation of microbial population.
17	Estimation of microbial count by dilution pours plate techniques.

Syllabus for English Courses

H/LANG-111 Structural Grammar and Spoken English

2 (1+1) (NC) Semester - I

THEORY:

Descriptive writing, reading comprehension-short answer questions, choice of best alternative, vocabulary exercises – word groups, word forms, synonyms and antonyms, words and phrases, derivation of adjectives from verbs, derivation of verbs from nouns, derivation of nouns from verbs, comprehension tests, true of false, compound words, often confused words, homonyms and homophones, auxiliaries – modal auxiliaries.

PRACTICAL:

Applied Grammar: Articles, prepositions, verbs, tenses, voice, direct indirect speech, agreement of verb with subject, relative pronouns and relative adverbs, simple, compound and complex sentences, infinitives, clauses, word order, gerunds. Use of for and since, sentence patterns.
Listening comprehension: Listening to lectures, speeches, talks.
Spoken English: Importance of stress and intonation.
Assignments on written skills, letter writing, précis writing, paragraph writing, brief essay writing

Text: Current English for language skills by M. L. Tickoo and A. E. Subramanian, Publisher Macmillan India Limited

1. The Book of Nature: Jawaharlal Nehru
2. A Days Wait : Earnest Hemingway,
3. I Was Gandhi's Jailer : Patrick Quinn,
4. Too Dear : Leo Tolstoy,
5. My Greatest Olympic Prize: Jesse Owens,

6 & 7 Fighting the Invisible - I & II: Navin Sullivan

8. My Struggle for an Education : Brooker T. Washington
9. Hari: Nayantara Sahgal
10. My Lost Dollar: Stephen Leacock

COURSE NO : H/PHY EDN-111 **Title:** Physical Education

Sem : I **Credit : 1 (0+1) (NC)**

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. NCC: Introduction to NCC, defence 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 honour, 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 defence, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defence, leadership and NCC song. Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules regulations of important games, skill development in any one of the games, football, hockey, cricket, volleyball, badminton, throw ball, tennis. Participation in one of the indoor games, badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events, long 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.

(12)

LESSION PLAN (Teaching Schedule)

B. Sc. (Hort.)

Title : **Mathematics (Deficiency Course)**
Course No. : **H/Maths-111** Semester 1ST
Credits : 2(1 + 1)
Book Recommended:

1. Higher Algebra - by Hall and Knight
2. Plane Trigonometry - 1 - by S.L. Loney
3. Coordinate Geometry - by S.L. Loney
4. Differential Calculus - Shanti Narayan
5. Integral Calculus - Shanti Narayan
6. Mensuration - I - by Pierpoint

Lecture No.	Topic	Topic/Topics to be covered in theory period	Book No.	Articles/Page No. (s)
1	Quadratic equation	Definition of quadratic equation factorization method, and Method of perfect square (Statement only) for solving quadratic equation. Nature of roots, sum and Product of roots	1	111,112,113 , 114,115
2	Mensuration	Ordinates & common distance between them. Simpson's rule statement and its application for measuring areas of irregular field and other Illustrations.	6	98, 99, 100, 101, 102
3,4	Determinants	Definition of second order and third order determinants (Statements) minors, Expansion of determinant. Elementary Properties of determinant (Statement only)	1	486,487,488 489,490,491 492,493,494 495,
5	Circle	Definition of circle, radius, centre, Equation to circle, centre and radius form, General equation, its radius and centre (formulae only)	3	138, 140, 142 144
6,7	Function, Limit	Definition of function, Different types of functions, viz, Algebraic, Logarithmic, Trgonometric, Inverse, Exponential (Illustrations only), Definition of limits and continuity, theorems and standard limits (only statements),	4	1.51, 1.52, 1.53, 3.2, 3.21, 3.3, 3.53, 3.6
8,9	Theorems of differntiation, chain Rule, Differentiation of various types of function	Statements of Theorems of differentiations, Composite function, Chain Rule, Differention of algebraic function x, & n, and trigonometric function, Sinx and cosx, List of derivatives of logarithmic, exponential, other trigonometric, inverse trigonometric functions,	4	4,11, 4,12, 4,13, 4,21, 4,22, 4,31, 4,32, 4,33, 4,34

8,9	Theorems of differentiation, chain Rule, Differentiation of various types of function	Statements of Theorems of differentiation, Composite function, Chain Rule, Differentiation of algebraic function x. & n. and trigonometric function. Sinx and cosx. List of derivatives of logarithmic, exponential, other trigonometric, inverse trigonometric functions.	4	4.11, 4.12, 4.13, 4.21, 4.22, 4.31, 4.32, 4.33, 4.34
10,11,12	Differential calculus	1. Geometric Interpretation of derivative. Concept of derivative as a slope of tangent to a curve (statement only) 2. Equation of tangent and normal to a curve (statement only) 3. Concept of maxima and minima statements of necessary condition and sufficient condition for extreme values.	3 3 3	4.15 12.11 7.1, 7.2, 7.3
13,14	Concept of Indefinite integral, as an inverse process of differentiation constant of integration, definite Integral.	Definition of Integral of a function, Integral and process of Integration. constant of Integration, Indefinite Integrals as Inverse process of differentiation Illustration by list of simple examples, definition of definite integral.	5	1.1, 1.3, 1.4 1.51, 1.52, 1.6
15,16	Integral calculus	1. Determination of area under a curve using the concept of definite integral (statement and definition) 2. Volumes of solids of revolution (Statements of formulae)	4 4	7.1 (without Note) 9.1, 9.2, 9.2(Note)

Note: 1. The credit "+1" of (1+1) credit be used for tutorial periods

2. In these tutorial periods practice of solving examples using suitable theory portion, covered in theory periods, be made for which in addition to the books, mentioned above books of Mathematics for XI and XIIth standard of Maharashtra State used.

If any book, in the list of prescribed book is not available then the topics may be covered as per column (3) for the book available. viz. Some topics of Algebra are covered in "Algebra Made Easy" by K.P.Basu, in the periods of Sr. No. 1 to 3.