



## Second Year

## Semester IV

Subject Title	Subject Code	Credit
Introduction to Forestry	AG-401	2(1+1)

### Theory

**Unit-I** 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.

**Unit-II** 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.

**Unit-III** Agro forestry – definitions, importance, criteria of selection of trees in agroforestry, different agro forestry systems prevalent in the country, shifting cultivation, taungya, alley cropping 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

- Indian Forestry
- Principles and Practices of Silviculture
- A Text Book Of Agroforestry
- A Hand Book of Forestry

K. Manikandan and S. Prabhu  
A.P.dwivedi  
B.S.Chundawant and S.K.Goutam  
S.S. Negi

□ Plantation Trees

R.K.Luna

## Second Year

## Semester IV

Subject Title	Subject Code	Credit
Introductory Biology*/Elementary Mathematics*	AG-402	2(1+1) /2(2+0)*

### Introductory Biology (New) 2(1+1) Theory

**Unit-I** Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.

**Unit-II** Binomial nomenclature and classification Cell and cell division. Morphology of flowering plants. Seed and seed germination.

**Unit –III** Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

### References

- |  |                                  |
|--|----------------------------------|
| □ Hand of biology                              | Arihant Publication Meerut       |
| □ A Class Book of Botany                       | A.C. Dutta, 2000                 |
| □ Textbook of Botany                           | V.Verma, 2009                    |
| □ College Botany Vol I                         | Gangulee Das & Dutta 2009        |
| □ College Botany Vol II                        | Gangulee & Kar 2011              |
| □ Introductory Botany                          | Rastogi Publication.Meerut       |
|  | Ashok Bendre and P.C. Pande 1996 |
| □ Textbook of Botany Class XI and XII. (2012 ) | NCERT Publications               |
| □ Biology: Study Material                      | NCERT Publications               |

## Elementary Mathematics (New) 2(2+0)

### Theory

**Unit-I** 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 center 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  $(x_1, y_1)$  &  $(x_2, y_2)$ , 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  $x^2 + y^2 = a^2$ .

**Unit-II** Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problem 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.

### References

- Agricultural Mathematics
- A Text Book Of Matrices
- Calculus by
- Mathematics for Agriculture

R.Singh, Alok Kansal, Meerut Aman Publication  
Shasnti Narayan, S.Chand publication  
Gilbert strang, Wellesley Cambridge press  
Betty C. Rogers, 2<sup>nd</sup> Edition

**Second Year****Semester IV**

Subject Title	Subject Code	Credit
Human Values & Ethics (non gradial)	AG-403	1(1+0)

**Theory**

**Unit-I** Values and Ethics- An Introduction .Goal and Mission of Life .Vision of Life .Principles and Philosophy. SelfExploration. SelfAwareness. SelfSatisfaction. DecisionMaking. Motivation. Sensitivity. Success.Selfless Service .Case Study of Ethical Lives .Positive Spirit .Body, Mind and Soul .Attachment and Detachment . Spirituality Quotient .Examination.

**References**

Human Values and Professional Ethics  
 Foundation of Ethics and Management  
 Human Values  
 Science and Humanism

R.R.Gaur, R. Sangal and G.P. Bagaria  
 Excel Books  
 A.N. Tripathy- New Age International Publication  
 P.L.Dhar, R.R. Gaur – Commonwealth publisher

**Second Year****Semester IV**

Subject Title	Subject Code	Credit
Production Technology for Ornamental Crops, MAPs and Landscaping	AG-404	2(1+1)

**Theory**

**Unit-I** Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping.Landscape uses of trees, shrubs and climbers.

**Unit-II** Production technology of important cut flowers like rose, gerbera, carnation, liliun and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions.

**Unit-III** Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.Processing

and value addition in ornamental crops and MAPs produce.

**Practical**

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nurserybed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layout of garden. Bed preparation and planting of MAP. Protected structures – care and maintenance. Intercultural operations in flowers and MAP. Harvesting and post harvest handling of cut and loose flowers. Processing of MAP.

**References**

<ul style="list-style-type: none"> <li><input type="checkbox"/> Complete Gardening in India</li> <li><input type="checkbox"/> Floriculture in India</li> <li><input type="checkbox"/> Flower Production Technology (Hindi)</li> <li><input type="checkbox"/> Commercial Flowers</li> <li><input type="checkbox"/> Medicinal, plantation, Aromatic and Spices</li> <li><input type="checkbox"/> A handbook of Medicinal Plants</li> <li><input type="checkbox"/> Introductory Ornamental Horticulture</li> <li><input type="checkbox"/> Fundamental of Entrepreneurial</li> <li><input type="checkbox"/> Dynamics of Entrepreneurial</li>   <li><input type="checkbox"/> Farm Communication through Mass in the New Millennium</li>   <li><input type="checkbox"/> Entrepreneurship Development Programme in India and its relevance</li> </ul>	<p>K. S. Gopalswamiengar            G.S. Randhawa and A. Mukhopadhyay            S.S. Shrivastava            T.K. Bose            N. Kumar            N. D. Prajapati            J.S. Arora, Kalyani Publisher            Agrawal R.C., Laxmi Narayan Agrawal, Agra (U.P.)            Desai, Vasant, Himalayan Publication House, New Delhi            Samant, A.G. Associated Media Publishing Company, Karol Bag, New Delhi            Patel, V.G.</p>
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**Second Year**

**Semester IV**

Subject Title	Subject Code	Credit
Renewable Energy and Green Technology	AG-405	2(1+1)

**Theory**

**Unit-I** Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifies, biogas, bio alcohol, biodiesel and biooilproduction and their utilization as bioenergy resource, introduction of solar energy, collectionand their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

**Practical**

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio- fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

**References**

- New and renewable energy Sources A.N . Mathur, N.S. Rathore
- Bio- gas Technology K.C. Khandelwal and S.S.Mandi
- Renewable Energy Sources J.N.Twiveel and a. weir
- Bio- mass Combustion Technologies FAO 1988
- Advances in **biogas** Technology O.P. Chawla
- Solar Energy S.P. Sukhatme
- Non Conventional Sources of energy G.D.Rai

**Second Year**

**Semester IV**

Subject Title	Subject Code	Credit
Problematic Soils and their Management	AG-406	2(2+0)

**Theory**

**Unit-I** Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils,

Flooded soils, Polluted soils.

**Unit-II** Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

**Unit-III** Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

### References

- |   |                              |
|---|------------------------------|
| <input type="checkbox"/> Salt affected Soil: Reclamation and management | S.K. Gupta & I.C.Gupta       |
| <input type="checkbox"/> Soil salinity Assessment                       | FAO                          |
| <input type="checkbox"/> Remote sensing & GIS                           | Kail Charan Sahu             |
| <input type="checkbox"/> Fundamentals of Soil Science                   | ICAR Publication , New Delhi |

## Second Year

## Semester IV

Subject Title	Subject Code	Credit
Farming System & Sustainable Agriculture	AG-407	1(1+0)

### Theory

**Unit –I** Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance.

**Unit-II** Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability.

**Unit-III** Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

### References

- |  |                                  |
|--|----------------------------------|
| <input type="checkbox"/> Cropping and Farming system | S.C. Panda, Agrobios Publication |
|--|----------------------------------|



- Proceeding of Symposium on efficient Cropping      Indian Society of Cropping System, Agronomy,  
New Delhi
- Principles and Practices of Agronomy                      S.S. Singh, Kalyani Publication
- Farm Management    S.K.Tondon and S.P.Dondhyal

**Second Year**

**Semester IV**

Subject Title	Subject Code	Credit
Agricultural Marketing Trade & Prices	AG-408	3(2+1)

**Theory**

**Unit-I** Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets.

**Unit-II** demand, supply and producer’s surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer’s surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities.

**Unit-III** product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel, number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs.

**Unit-IV** Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage.

Present status and prospects of international trade in agri- commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

**Practical**

Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour overtime for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions

– NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

**References**

- Agricultural Marketing in India S.S.Acharya and N.L.Agrawal, Oxford and IBN Publication Co. Pvt. Ltd., New Delhi
- An Introduction to Marketing Amarchand, D. and B. Vardhrajn, Vikash Publication House Pvt. Let., New Delhi
- Export Marketing Balagopal
- Agricultural Marketing and Cooperation L.K. Wader and C.Murty, ICar, New Dehli
- Agricultural Marketing in India S.S. Chinna-Kalyani Publishers

**Second Year**

**Semester IV**

Subject Title	Subject Code	Credit
Environmental Studies and Disaster Management	AG-409	3(2+1)

**Theory**

**Unit-I** Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c)

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles.

**Unit -IV Environmental Pollution** **Unit-II Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Unit-III Biodiversity and its conservation:** - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

: definition, cause, effects and control measures of: a. Air pollution. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

**Unit-V Human Population and the Environment:** population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

## ***Disaster Management***

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

## **Practical**

Pollution case studies. Case Studies- Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site- Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems- pond, river, hill slopes, etc.

## **References**

- |  |                                  |
|--|----------------------------------|
| <input type="checkbox"/> Principles of agricultural Ecology        | G.S. Dhaliwal & G.S. Klear       |
| <input type="checkbox"/> Fundamentals Of Environmental Environment | K.CAgrawal Biology Ecology and   |
| <input type="checkbox"/> Ecology and Environment                   | P.D.Sharma                       |
| <input type="checkbox"/> A text book Environment                   | V. Subramaniam                   |
| <input type="checkbox"/> Ecology and Environmental Science         | Purohit, S.S. and agrawal, A.K.  |
| <input type="checkbox"/> Environmental Studies                     | S.Singhal and N.Sighal           |
| <input type="checkbox"/> Essentials Of Environmental Science       | Dhaliwal, G.S. and Kukal, S.S.   |
| <input type="checkbox"/> Environmental Biology                     | P.D.Sharma                       |
| <input type="checkbox"/> Environmental Studies                     | Rajesh Dharkar                   |
| <input type="checkbox"/> Environmental Biology                     | K.C.Agrawal                      |
| <input type="checkbox"/> A text book Environment Science           | G.S.Bhaliwal, G.S.Sanjha         |
| <input type="checkbox"/> Perspectives in Environmental Studies     | Kaushik, A. and Kausshik, O.P.   |
| <input type="checkbox"/> Ecology                                   | Subramanyam, N.S. and Sambaurthy |
| <input type="checkbox"/> Environmental Studies                     | H.Kaur                           |

**Second Year**

Subject Title	Subject Code	Credit
Crop Production Technology –II (Rabi Crops)	AG-410	2(1+1)

**Theory**

**Unit-I** Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; cereals –wheat and barley, pulses-chickpea, lentil, peas, oilseeds- rapeseed, mustard and sunflower; sugar crops-sugarcane.

**Unit-II** Medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.

**Practical**

Sowing methods of wheat and sugarcane, identification of weeds in *rabiseason* crops, study of morphological characteristics of *rabicrops*, study of yield contributing characters of *rabiseasoncrops*, yield and juice quality analysis of sugarcane, study of important agronomic experiments of *rabicrops* at experimental farms. Study of *rabiforage* experiments, oil extraction of medicinal crops, visit to research stations of related crops.

**References**

- Text book of field Crops
- Crop Management
- Modern Techniques of Raising Field Crops
- Field Crops
- Scientific Crop Production

Rajendra Prasad, ICAR Publication  
 S.S. Singh  
 Chhidda Singh  
 Y.M.Iyyer  
 C. Thakur