Semester –II

Course No.	Courses	Credit		
		T	P	Total
A)	**Core Course**			
AGRO-123	Fundamentals of Agronomy-II	1	1	2
BOT 121	Fundamentals of Crop Physiology	1	1	2
ECON 121	Fundamentals of Agricultural Economics	2	0	2
ENGG 121	Soil and Water Conservation Engineering	1	1	2
ENTO-121	Fundamentals of Entomology	1	1	2
EXTN 122	Fundamentals of Agricultural Extension Education	2	1	3
GPB 121	Fundamentals of Genetics	2	1	3
PATH 121	Fundamentals of Plant Pathology	2	1	3
	Total	**12**	**7**	**19**
B)	**Non-Gradial course**			
FRST 121	Introduction to Forestry	1	1	2
EDNT 121	Educational Tour*	0	1	1
	Subtotal	**1**	**2**	**3**
C)	**Common Course**			
EXTN 123	Communication Skills and personality Developments	1	1	2
	Subtotal	**1**	**1**	**2**
	Total Credits (A+B+C)	**14**	**10**	**24**

* Educational Tour shall be organized after completion of Sem.II and before start of Sem.III

Course :	*AGRO 123*		***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Fundamentals of Agronomy -II*				

Syllabus

Theory: Water Resources of India and Maharashtra and Development Water Management - Role of water in plants. Irrigation scheduling criteria and methods.Quality of irrigation water.Crop water requirement.Water use efficiency, Soil - water–plant relationship.Classification of Soil Water, Soil Moisture Constants, Soil Moisture characteristic curve. Volume Mass Relationship, retention of soil water .Water absorption.

Rooting characteristics of plants and moisture extraction patterns and SPAC.Water requirement of different Agronomic crops. Evaporation, Transpiration, Evapo-transpiration, Potential-evapotranspiration, effective raifall and consumptive use of water. Water Use efficiency, Irrigation Efficiencies. Water logging and Management of water logged soils. Crop water management techniques in problematic areas.

Practical: Estimation of soil moisture. Determination of Bulk and Particle Density, Determination of Field Capacity. Determination of PWP. Study of Soil moisture Measuring Devices and its installation, Determination of Infiltration. Estimation of Gross water requirement, Net water requirement, Irrigation Interval, Available Soil Moisture, Scheduling of Irrigation . Methods of surface irrigation, Irrigation Layouts, Study of Drip and Subsurface irrigation Systems and their components, Installation of drip Irrigation system in field, Fertigation , Care and Maintenance of Drip system, Sprinkler, Rain gun, Installation of various measuring devices and Measurement of Irrigation water, Visit to Atomized Irrigation Unit, Visit to ill-drained fields. Study of Drainage systems.

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	Definition of Irrigation and Water Management, its Objectives and Role of water in plants.	8
2	Water Resources of India and Maharashtra and Development	6
3& 4	Soil- water–plant Relationship, Soil Water, Movement of soil water, Infiltration, permeability, percolation, seepage.	12
5	Volume Mass Relationship, retention of soil water and factors affecting it.	6
6	Classification of Soil Water, Soil Moisture Constants, Soil Moisture characteristic curve	8
7	Water absorption, factors affecting absorption, rooting characteristics, Moisture extraction patterns and SPAC	6
8 & 9	Water requirement, Irrigation Requirement, Gross Irrigation, Net Irrigation, Irrigation interval and Methods of estimation of water requirement and factors affecting it	12
10	Water requirement of different Agronomic crops	6
11 & 12	Evaporation, Transpiration, Evapo-transpiration Potential-evapotranspiration, effective raifall and consumptive use of water and factors affecting it.	12
13	Water Use efficiency, Irrigation Efficiencies and factors affecting it.	6
14	Criteria for scheduling of irrigation, Methods of irrigation, advantages, disadvantages.	6
15	Water Quality parameters, Water logging, Causes of water logging, Management of water logged soils.	6
16	Crop management techniques in problematic areas i.e. saline, alkaline, acidic soils.	6

b) Practical

Experiment	Topic
1	Estimation of soil moisture by different methods
2	Determination of Bulk and Particle Density.
3	Determination of Field Capacity by field method and by pressure plate membrane apparatus
4	Determination of PWP by sunflower method and by pressure plate membrane apparatus
5	Study of Soil moisture Measuring Devices and its installation.
6	Determination of Infiltration by Double Ring Infiltrometer.
7	Estimation of Gross water requirement, Net water requirement, Irrigation Interval, Available Soil Moisture.
8	Scheduling of Irrigation by different methods.
9	Methods of surface irrigation, Irrigation Layouts.
10	Study of Drip and Subsurface irrigation Systems and their components.
11	Installation of drip Irrigation system in field.
12	Study of Drip System, Fertigation , Care and Maintenance of Drip system.
13	Study of Pressurized irrigation system, Sprinkler, Rain gun.
14	Installation of various measuring devices and Measurement of Irrigation water.
15	Visit to Atomized Irrigation Units.
16	Visit to ill-drained fields and study of Drainage systems.

Suggested Readings:

1) Principles of Agronomy by S. R. Reddy

2) Crop production and Management by Y. B. Morachand

3) Principles of Agronomy by Sankaran S and V. T. SubbiahMudliyar

4) Principles of Agronomy by T. Yellamanda Reddy and G. H. Sankara Reddy

5) Irrigation Water Managemnt by Dilip Kumar Muzumdar

6) Principles and Practices of Water Management by A. M. Michel

7) Irrigation and Drainage by Lenka D. .

8) Soil Management and organic farming By S.C. Panda Agrobios

Course :	*GPB 121*		***Credit:***	*3(2+1)*	***Semester-II***
Course title:	*Fundamentals of Genetics*				

Syllabus

Theory

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity.Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes.Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis.Probability and Chi-square.Dominance relationships, Epistatic interactions with example.

Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics.Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation.Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance.Genetic disorders.Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Practical

Study of microscope.Study of cell structure.Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data).Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.

Teaching Schedule

A) Theory

Lecture	Topic	Weightages (%)
1	**Pre and post Mendelian concepts of heredity:** **Pre Mendelian concepts: (500 BC -1850 A.D.)** 1.Pre formation Theory 2.Theory Epigenesis 3.Theory of Acquired characters 4.Theory of Pangenes 5.Germplsm theory Other contributions during pre-Mendelian era **Mendelian Era:(1850 -1900):**Contributions during Mendelian era **Post Mendelian concepts:** Contributions during Post-Mendelian era and recent advances after 1900. Role of different disciplines in the advancement of Genetics. Impact of Genetics and its applications in different disciplines	2

Lecture	Topic	Weightages (%)
	(Role in Agriculture)	
2	**Mendelian principles of heredity:** Laws of Mendel, Reasons of Mendel's success Mendelian deviations or exceptions or anomalies	3
3 & 4	**Cell division: Mitosis, Meiosis:** Cell: Ultra structure, Cell organells& their functions. Types of Cell, Difference between animal cell and plant cell. **Stages of mitosis & meiosis.** Significance of mitosis & meiosis Difference between mitosis & meiosis.	4
5	**Dominance relationships:** Different patterns of dominance relationship like Complete dominance, Incomplete dominace, Co-dominance, Overdominance and Lethal gene action.	2
6, 7 & 8	**Gene interaction, Epistasis interactions with examples:** Difference and similarities between epistasis and dominance. 1.Recessive epistasis (Supplementary gene action) 2.Dominant epistasis (Simple epistasis) 3. Dominant Inhibitory epistasis (Inhibitory gene action) 4. Duplicate recessive epistasis (Complementary gene action) 5. Duplicate dominant epistasis (Duplicate gene action) 6. Polymeric gene action 7.Typical dihybrid ratio	8
9	**Multiple alleles:** Important features of multiple alleles Examples of multiple alleles 1) Fur colour in a rabbit, 2) ABO blood group in man	3
10	Pleiotropism , pseudo-alleles, penetrance and expressivity	2
11 & 12	**Sex determination and sex linkage, Sex limited and sex influenced traits.** Introduction, Importance of Sex determination, Difference between autosomes and allosomes. Allosomal sex determination: 1.XX-XY System 2. XX-XO System 3.XO-XX System 4. ZW-ZZ (XY-XX) System Sex linked characters: (Colour blindness in human being) Difference between Sex limited and sex influenced traits:	6
13	**Linkage and its estimation:** Introduction, Features of Linkage, Phases of Linkage, Types of Linkage, Linkage and pleiotropy, Significance of Linkage.	4
14	**Crossing over mechanisms:** Introduction; main features of crossing over; Types of crossing over; Molecular Mechanism of Crossing over; Factors affecting crossing over, Interference and Coincidence; Differences between crossing over and linkage; Significance of Crossing over.	4
15	**Probability and Chi-square :** Definition of Probability and Chi-square; The application and requirement of Chi-square test.	2
16	**Chromosome mapping:** Definition and Concept.	2

Lecture	Topic	Weightages (%)
17	**Structural changes in chromosome:** Introduction; Types of Structural chromosome changes; Genetic effects and Significance.	4
18 &19	**Mutation**: Introduction; Characteristics of Mutation;classification of Mutation; Kinds of Mutation, Mutagenic agents and induction of mutation;Application in crop improvement.	8
20	**Qualitative & quantitative traits, Polygenes and continuous variations:** Introduction; Characteristics ofQualitative & quantitative traits; Examples of Qualitative & quantitative traits.	4
21	**Multiple factor hypothesis:** Introduction; Concept of multiple factor hypothesis by Nilsson – Ehle in Wheat.	4
22	**Cytoplasmic inheritance:** Introduction; Characteristics of Cytoplasmic inheritance; Difference between mendelian inheritance and Cytoplasmic inheritance; classes of cytoplasmic inheritance; Plastid and mitochondrial inheritance; Significance of Cytoplasmic inheritance in crop improvement.	3
23	**Genetic disorders:** Introduction; Gene action in man, diseases caused by metabolic disorders like Alkaptonuria, Phenyl ketonuria, Albinism, tyrosinosis and Goitrosus Cretinism, Sickel cell anemia.	3
24 & 25	**Nature, structure & replication of genetic material:** Introduction; DNA as a genetic material, Structure of DNA; Replication of DNA- Dispersive, Conservative, Semi-Conservative. Difference between DNA and RNA	8
26 & 27	**Protein synthesis, Transcription and translational mechanism of genetic material:** Introduction;Transcription; mechanism of transcription; Translational; mechanism of translational; Difference between transcription and translational.	8
28 & 29	**Gene concept** : Gene structure, fine structure of gene, Classical and modern concept of gene, Benzer concept of fine structure of gene., Citron, Recon, Muton	8
30, 31 &32	**Gene function and gene regulations, Lac and operons:** Introduction; Mechanism of gene regulation 1. Negative regulation 2. Positive regulation The Operon Model	8
	Total	**100**

B) Practical

Exercise	Topic
1	Study of microscopes
2	Study of cell structure
3	Preparation of microscopic Slides of mitosis - onion root tips

Exercise	Topic
4	Preparation of microscopic Slides of meiosis – tradescantia/onion /Wheat inflorescence
5.	Methods of finding out the gametes and gameticrecombination
6.	Problems on monohybrid ration and its modification
7	Problems on dihybrid ratio and its modification
8	Experiments on test cross and back cross
9	Gene interaction – I Gene interaction without modification of F_2ratio (comb-shape) and complementary gene interaction.
10	Gene interaction – II Gene interaction with modification of F_2ratio: supplementary factor, epistatis factor, inhibitory factor
11	Gene interaction – III Gene interaction with modification of F_2ratio: Additive factor, duplicate factor and lethal factor
12	Problems on probability and Chi-square test
13	Chi-square test Problems on
14	Determination of linkage and cross over analysis (though two point test cross and three point test cross data)
15	Study on sex linked inheritance in Drosophila
16	Study of models on DNA and RNA structure

Suggested Reading:

Sr. No	Title of Book	Author/Authors	Publisher
1.	Principle of Genetics	E. J. Gardner , M. J. Simmons, D. P. Snustad	Wiley India (P) Ltd.
2.	Genetics	P. K. Gupta	Restogi publication Meerut -(p)
3.	Fundamentals of Genetics	B. D. Singh	Kalyani Publication, New Delhi.
4.	Genetics	M.W. Strickbearger	Peerson education, Inc.
5.	Elements of Genetics	Phundansingh	Kalyani Publication, New Delhi
6.	Genetics	Sushant Elrod and William Stansfield	McGraw Hill Publishing company Limited, New Delhi.

Course :	*BOT 121*		***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Fundamentals of Crop Physiology*				

Syllabus

Theory

Introduction to Crop Physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Practical

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO_2 assimilation by Infra Red Gas Analyser (IRGA).

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	Introduction to Crop Physiology and its importance in Agriculture	5
2	Plant cell- structure, cell organelles and their role	5
3-4	Absorption of water and path of water. Ascent of sap and theories of ascent of sap	10
5	Transpiration- Definition, types , structure of stomata, physiology of stomata, factors affecting transpiration, Water use efficiency & factors affecting W.U. E.	5
6	Mineral nutrition of plants. Classification of mineral element, criteria of essentiality. General and specific role of mineral element and deficiency symptoms, mechanism of mineral element uptake.	10
7-8	Photosynthesis : Definition pigment involved, structure of chloroplast, light reaction- Photolysis of water, Emersion effect, Cyclic and non cyclic electron transfer, Significance of light reaction.	10
9	Dark reaction- C_3, C_4 and CAM plants factors affecting photosynthesis,	5

Lecture	Topic	Weightage (%)
	Photorespiration	
10	Respiration- Definition, types, glycolsis TCA cycle and electron transport chain	10
11	Fat metabolism- fatty acid synthesis and break down	5
12	Plant Growth Regulators, Definition, types , physiological role and Agricultural uses of PGRS.	10
13	Growth : Definition, types of growth, measurement of growth, growth analysis	5
14-15	Physiological aspects of growth and development of important cereals, pulses and oil seed crops	15
16	Photoperiodism- Definition, types, SDP, LDP and Day neutral plants- Induction a flowering and florigene concept	5
Total		100

b) Practical

Experiment	Topic
1	Study of plant cell
2	Study of imbibitions
3	Study of osmosis
4	Study of plasmolysis
5	Study of root pressure
6	Measurement of rate of transpiration
7	Study of structure and distribution of stomata
8	Estimation of relative water content of tissue
9	Study of separation of photosynthetic pigment through paper chromatography
10	Measurement of rate of photosynthesis by different methods
11	Study of respiration and respiratory quotient
12	Rapid tissue tests for macro-elements
13	Rapid tissue tests for micro-elements
14	Study of use of PGR in fruit ripening
15	Effect of osmotic pressure on seed germination.
16	Measurement of Plant growth.

Suggested Readings:

SR	Name of Book	Author	Publisher
1	A Text Book Plant Physiology*	Dr. V. Verma	Emkay Publisher, Delhi-110 051
2	Plant Physiology*	S. N. Pandey& B. K. Sinha	Vikas Publishing House, New Delhi-110 014
3	Practical Plant Physiology*1967	Amar Singh	Kalyani Publisher, Ludhiana
4	Plant Physiology*2005	C. P. Malik	Kalyani Publisher, Ludhiana
5	Plant Physiology@	K. N. Dhumal, T. N. More and M. R. Munnali	Niraliprakashan, Pune
6	Plant Physiology	Robert M. Devlin & Francis H. Witham	CBS Publisher & Distributors, Delhi-110 032
7	Plant Physiology@	H. S. Shrivastava	Rustogi Publications, Meerut-250 002
8	Crop Physiology*	C. N. Chore, S. R. Ghadekar& R. K. Patil	Agromet Publisher, Nagpur-440 010
9	Plant physiology 2005@	S. Mukharji and A. K. Ghosh	New central book agency, Kolkatta
10	Plant physiology*2010	Taiz&Zeiger, E	Sinaurasso.Inc,USA
11	Introductory Plant physiology* 2013	G. Roy Noggle& George friz	PHI learning pvt ltd, N. Delhi
12	A Text Book Plant Physiology* 2005	c. P. Malik & A. K. Srivastava	Kalyani publisher, Ludhiyana
13	Plant Physiology@1993	S. Chandra Datta	Wiley Eastern ltd, Daryaganj, N. Delhi
14	Experiment in Plant Physiology –A Lab. Manual * 1998	DayanandBajracharya	Narosa publishing house, panchshil park, N. Delhi
15	Plant Physiology – fundamentals & applications @2005	Arvindkumar& S. S. Purohit	Agrobios (India), Jodhpur
16	Modern Plant physiology 2007@	R. K. Sinha	Narosa publishing house, panchshil park, N. Delhi

**Text book & practical book*

@Reference book

Course :	*ENTO 121*		***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Fundamentals of Entomology*				

Syllabus

Theory

Part-I

Introduction and History of Entomology in India. Definitions: Insect, Entomology, Agricultural Entomology. Classification of phylum Arthropoda up to classes. Relationship of class Insecta with other classes of Arthropoda. Insect Dominance. Economic importance of insects: Harmful, Beneficial and productive insects. Premier institutes concerned with Entomology. **Morphology:-** Insect integument: structure and functions. Cuticular appendages and processes. Moulting: Definition and steps in moulting. Body segmentation: Structure of head, thorax and abdomen. Insect head capsule: Important sclerites and sutures. Positions of head. Structure and modifications of insect antennae, mouth parts, legs and wings (wing venation, wing coupling apparatus). Structure of thorax and abdomen: segmentation, appendages and processes, pregenital and post genital appendages and structure of male and female genital organ. Metamorphosis: Definition and types of metamorphosis with examples and its significance. Insect Diapause: Definition and example, Seasonal adaptations in insects: aestivation, hibernation and quiescence: Definitions; Insect egg: General structure, types of egg with examples (at least one). Types of larva and pupa with examples. Structure and functions of digestive, nervous, circulatory, respiratory, excretory, secretary and reproductive systems in insects. Types of reproduction in insects. Sensory organs sound producing organs in insects

Part-II

Systematics: Definitions: Taxonomy, Systematics, Binomial nomenclature, Order, Family, Genus, Species, Subspecies, Biotype. Binomial nomenclature: Definition and Rules. Classification of Class Insectaupto Orders. Important orders: Important distinguishing/taxonomic characters of orders with families of agricultural importance with examples.Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae, Lophopidae, Lacciferidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae;Coleoptera:Coccinellidae,Chrysomelidae,Cerambycidae,Curculionidae,Bruchidae,Scarabaeidae;Hymenoptera:Tenthridinidae,Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae,Muscidae, Tephritidae.

Practical:

Methods of collection and preservation of insects. External features of Cockroach. Types of insect antennae, mouthparts (dissection) and legs. Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae. Dissection of digestive system, Central nervous system, male and female reproductive systems in insects (Cockroach/Grasshopper). Distinguishing/taxonomic characters of orders: Orthoptera,

Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance with examples.

Teaching Schedules

a) Theory

Lecture	Topic	Weightage (%)
1-2	• *Introduction and history of entomology in India including contribution of scientists in brief.* *Definitions: Insect, Entomology and Agril. Entomology.* • *Classification of phylum Arthropoda up to classes.* • *Relationship of class Insecta with other classes of Arthropoda.* • *Insect dominance.* • *Economic importance of insects: Harmful, beneficial and productive insects.* • *Premier institutes concerned with Entomology: IARI (Indian Agricultural Research Institute), CAB (Commonwealth Agricultural Bureau), IOBC (International Organization of Biological Control), IIIP (International Institute of Insect Physiology), NBAIR (National Bureau of Agriculture Insect Resources), NIPHM (National Institute of Plant Health Management), IINRG (Indian Institute of Natural Resins and Gums), CIB & RC (Central Insecticide Board and Registration Committee), CSB (Central Silk Board), NRCIPM (National Research Centre for Integrated Pest Management), IGSMRI (Indian Grain Storage Management and Research Institute), etc*	**10**
3-4	• *Insect Integument: Structure and functions.Cuticular appendages and processes. Moulting: Definition and steps in moulting.* • *Body segmentation: Structure of head, thorax and abdomen.*	**10**
5-6	• *Insect head capsule: Important sclerites and sutures. Positions of head.* • *Structure and modifications (with examples) of insect antennae, mouth parts, legs and wings (wing venation, wing coupling apparatus with examples).* • *Structure of thorax and abdomen: segmentation, appendages and processes, pregenital and post genital appendages and structure of male and female genital organ.*	**20**
7-8	• *Metamorphosis: Definition and types of metamorphosis with examples and its significance. Insect diapause: Definition and example, Seasonal adaptations in insects: Aestivation, Hibernation and quiescence: Definitions* • *Insect egg: General structure, types of egg with examples (at*	**10**

Lecture	Topic	Weightage (%)
	least one) • *Types of larva and pupa with examples.* • *Sensory organs like Mechanoreceptors(Trichoidsensillacampaniformsensilla, chordotonal organ), chemo receptors (gustatory/olfactory), audio receptors: Johnston's organ and tympanum, photoreceptors- Compound eyes and simple eye, thermo/hygro receptors* • *Sound producing organs in insects*	
9-12	• *Structure and functions of digestive, nervous, circulatory, respiratory, excretory, secretary and reproductive system in insects. Types of reproduction in insects.*	**20**
13	***Systematics:*** • *Definitions: Taxonomy, Systematics, Binomial nomenclature, Order, Family, Genus, Species, Subspecies, Biotype.* • *Binomial nomenclature: Definition and Rules.* • *Classification of Class Insecta up to Orders.*	**10**
14	• *Study of important insect orders: Important distinguishing taxonomic characters of orders. Families of agricultural importance with examples. Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae.*	**20**
15-16	• *Hemiptera: Pentatomidae, Coreidae, Cimicidae,Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae, Lophopidae, Lacciferidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae.*	
17-18	• *Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae, Braconidae, Trichogrammatidae, lchneumonidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, TephritidaeSyrphidae.*	
	Total	**100**

b) Practical

Experiment	Topic
1.	Methods of collection and preservation of insects including immature stages
2.	External features of typical insect (e.g. Cockroach) structure of head, thorax and abdomen/General body organization of insect

3.	Structure of antennae and its modifications along with examples.
4.	Study and dissection of chewing and biting type of mouthparts.
5.	Study and dissection of chewing and lapping type of mouthparts.
6.	Study and dissection of piercing and sucking type of mouthparts.
7.	Study and dissection of sponging type of mouthparts.
8.	Structure of typical leg and modifications of legs.
9.	Study of insect wings: Structure, wing venation, types of wings and wing coupling apparatus along with examples.
10.	Types of larva and pupa.
11.	Study and dissection of digestive system of cockroach.
12.	Study and dissection of central nervous system of cockroach
13.	Study and dissection of female reproductive system of cockroach
14.	Study and Dissection of male reproductive system of Cockroach
15.	Study of distinguishing taxonomic characters of orders and families of agricultural importance: Odonata, Orthoptera, Dictyoptera.
16.	Study of distinguishing taxonomic characters of orders and families of agricultural importance: Isoptera, Thysanoptera and Hemiptera.
17.	Study of distinguishing taxonomic characters of orders and families of agricultural importance: Neuroptera, Lepidoptera and Hymenoptera.
18.	Study of distinguishing taxonomic characters of orders and families of agricultural importance: Diptera and Coleoptera.

Assignment: Each student should collect at least 100 insect specimens belonging to the aforesaid orders.

Distribution of Marks: Practical

Particular		**Marks**
Collection	**:**	**05**
Practical Manual	**:**	**05**
Dissection (System)	**:**	**12**
Mouth part dissection	**:**	**08**
Spotting	**:**	**16**
Viva-voce	**:**	**04**
Total marks		**50**

Suggested Readings:

1) *Chapman, R. F. – The Insects : Structure and Functions*
2) *David, B. V. and T. Kumarswami – Elements of Economic Entomology*
3) *Marc J. Klowden- Physiological Systems in Insects*
4) *Pant N.C. and SwarajGhai – Insect Physiology and Anatomy*
5) *Nayar, K. K.; Anathkrishanan T.N. and B.V.David – General and Applied Entomology*
6) *Richards O.W. and R.G. Davies – Imms' General Text Book of Entomology –Vol.I& II*

7) *Patton R.L.- Introductory Insects Physiology*

8) *Wigglesworth – Principles of Insects Physiology*

9) *Metcalf and Flint – Destructive and Useful Insects; their habits and control.*

Course :	*ECON 121*		***Credit:***	*2(2+0)*	***Semester-II***
Course title:	*Fundamentals of Agricultural Economics*				

Syllabus

Theory

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare.

Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.

Demand: meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer's surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

Production: process, creation of utility, factors of production, input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale.

Cost: Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply.

Market structure: meaning and types of markets, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points.

Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit.

National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control.

Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy.

Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect

taxes, agricultural taxation, VAT. *Economic systems:* Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Teaching Schedule

Lecture No.	Topic/Lesson	Weightage
1	*Economics:* Meaning, subject matter scope and definitions of economics, divisions of economics-Traditional and Modern Approach	2
2	Approaches to economic analysis; micro and macroeconomics, positive and normative analysis- Deductive and Inductive methods of investigation	2
3	Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior.	2
4	Basic concepts: Goods and services, classification of goods, characteristics of goods and services, desire, want, demand, utility, Cardinal and Ordinal approaches, Characteristics of utility - Forms of utility. Cost and price, wealth, capital, income and welfare, Classification of Wealth	4
5	Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development.	4
6	Cardinal approach/utility theory, Law of Diminishing Marginal Utility – statement, assumptions of law, explanation, limitations of the law, Importance	5
7	Law of Equi-marginal Utility – Meaning, Assumptions, Explanation of the Law, Practical Importance, Limitations	5
8	Consumer's Surplus – Meaning, Assumptions, Explanation, Difficulties in measuring Consumer's Surplus, Importance. Ordinal Approach-Consumer's equilibrium, indifference curve analysis	5
9	Demand – Meaning, Definition, Types of demand - income demand, price demand, cross demand. Demand schedule , demand curve, Law of demand – contraction and extension, increase and decrease in demand, Determinants of demand	6
10	Elasticity of demand – Definition, elastic and inelastic demand, kinds of elasticity of demand, perfectly elastic, perfectly inelastic, relatively elastic, relatively inelastic, unitary elastic demand. Types of elasticity of demand , Price elasticity, income elasticity and cross elasticity of demand, factors affecting demand , practical importance of elasticity of demand	5
11	Production: meaning, process, creation of utility, factors of production, input output relationship.	2
12	*Laws of returns*: Law of variable proportions and law of returns to scale	4
13	*Cost:* Cost concepts, short run and long run cost curves	3

Lecture No.	Topic/Lesson	Weightage
14	Supply – meaning, definition, law of supply, supply schedule, supply curve. Increase and decrease in supply, contraction and extension in supply, factors affecting supply.	5
15	Elasticity of supply, kinds of elasticity of supply – perfectly elastic, perfectly inelastic, relatively elastic, relatively inelastic and unitary elastic - factors affecting elasticity of supply.	2
16	Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets.	2
17	Price determination under perfect competition;	2
18	Short run and long run equilibrium of firm and industry, shut down point, normal & super normal profits	2
19	Distribution theory: meaning, factor market and pricing of factors of production.	2
20	Concepts of rent, wage, interest and profit.	2
21	*National income:* Meaning and importance, circular flow, concepts of national income accounting- Gross domestic product, gross national product, net national product, net domestic product-national income at factor cost, personal income, disposable income	5
22	Methods/Approaches of measurement of NI – product method, income method and expenditure method, Difficulties in measurement.	4
23	Population: Importance, Malthusian and Optimum population theories,	3
24	Natural and socio-economic determinants, current policies and programmes on population control.	2
25	Money: Barter system of exchange and its problems, evolution, meaning and functions of money,	2
26	Classification of money, money supply,	3
27	General price index, inflation and deflation.	3
28	Central bank functions and important policies	2
29	Public revenue and public expenditure	3
30	*Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT.	3
31	*Economic systems:* Concepts of economy and its functions	2
32	Important features of capitalistic, socialistic and mixed economies, elements of economic planning.	2

Suggested Readings:

1) Dewett, K.K. and Chand, A.2009 Modern Economic Theory S.Chand and Co., New Delhi

2) Dewett, K.K. and Varma, J.D. 1986 Elementary Economics S.Chand and Co., New Delhi.

3) Jhingan, M.L.1990 Advanced Economic Theory Vikas Publishing House, New Delhi

4) Subba Reddy, S, Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010

5) Agricultural Economics Oxford & IBH Publishing Co., Pvt. Ltd., New Delhi

6) Nagpure S.C., and Patil E.R.2011,2014, Principles of Agricultural Economics by, Agroment Publishers, 52 B, Indraprasta, Opp. Asha Mangal, Dharampeth, Nagpur-440010(MS)India.

Course :	*EXTN 122*		***Credit:***	*3(2+1)*	***Semester-II***
Course title:	*Fundamentals of Agricultural Extension Education*				

Syllabus

Theory

- ***Education****:Meaning, definition andtypes – Formal, informal and non formal education*
- ***Extension Education****-Meaning, definition, need, scope and process; history, objectives, philosophy, principles and approaches.*
- ***ExtensionProgrammePlanning****- Meaning, process, principles and steps in programmedevelopment.*
- ***Extension systems in India****:*
  - *Extension efforts in pre-independence era : Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment*
  - *Post-independence era : Etawah Pilot Project, Nilokheri Experiment*
  - *Present extension System : Department of Agriculture : Structure, Function*
- ***Various extension/ agriculture development programmes launched by ICAR/ Government of India :*** *Introduction, Objectives and Salient Achievements*
  - *Intensive Agricultural DistrictProgramme (IADP)*
  - *Intensive Agricultural Area Programme (IAAP)*
  - *High Yielding Varieties Programme (HYVP)*
  - *Institution-Village Linkage Programme (IVLP)*
  - *Operational Research Project (ORP)*
  - *National Agricultural Technology Project (NATP)*
  - *National Agricultural Innovation Project (NAIP)*
  - *RashtriyaKrishiVikasYojana (RKVY).*
- ***New trends in agricultural extension:****Meaning , Objectives, Salient features*
  - *Privatization in extension,*
  - *ICT in Extension education - Cyber extension/ e-extension,*
  - *Market-led extension,*
  - *Farmer-led extension,*
- ***Rural Development:****Concept, meaning, definition, objectivesand genesis*
- ***Various rural development programmes launched by Government of India*** *: Introduction, Objectives and salient features*

- *Swarnajayanti Gram SwarojgarYojana (SGSY)*
- *Indira AwasYojana (IAY)*
- *Mahatma Gandhi National Rural Employment Guarantee Act*
- *Prime Ministers' RozgarYojana (PMRY)*
- *District Rural Development Agency (DRDA)*
- *Integrated Watershed Development Programme (IWDP)*
- *Providing Urban Amenities in Rural Area (PURA)*
- *Rashtriya MahilaKosh – (National Credit Fund for Women)*
- *MahilaArthikVikasMahamandal (MAVIM)*

- ***Community Development****. : Meaning, definition, concept, principles and philosophy.*
- ***Democratic Decentralization (Panchayati Raj)*** *: Meaning, Constitution and functions*
- ***Extension administration and management****:Meaning and concept, principles, functions and differences*
- ***Evaluation in Extension*** *: Meaning, definition, types of evaluation, monitoring and evaluation*
- **Transfer of technology programmes**: Lab to Land programme (LLP),National Demonstration (ND), Front Line Demonstration (FLD),KrishiVigyanKendras (KVK), Technology Assessment and Refinement Programme (TARP) of ICAR.
- ***Capacity building of extension personnel and farmers*** *: Meaning, Training and Education, Types of training, Training institutes in India, Concept of Human Resource Development*
- ***Extension Teaching Methods and Audio-Visual Aids*** *: Meaning, definition, importance, classification, media mix strategies; Factors affecting selection and use of methods and aids*
- ***Communication:*** *Meaning and definition; elements, selected models and barriers to communication.*
- ***Agriculture journalism*** *: Meaning, definitions, news writing*
- ***Diffusion and adoption of innovation****: Concept and meaning, Attributes of innovation, Innovation decision process, adopter categories.*

Practical

1. *Study of university extension system.*
2. *Organizing group discussion- exercise;*
3. *Handling and use of digital camera*
4. *Handling and use of LCD projector*
5. *Handling and use of Public Address System,*
6. *Preparation of extension literature – leaflet, folder,*
7. *Preparation of effective power point presentations*
8. *Writing of news story*
9. *Writing success story*
10. *Study of structure and functioning of DRDA*
11. *Study of structure and functioning of Department of Agriculture*
12. *Visit to NGO and learning from their experience in rural development;*
13. *Visit to village to understand PRA techniques and their application in village development planning;*
14. *Visit to community radio / television studio for understanding the process of programme production;*

15. Writing for print / electronic media,
16. Developing script for radio / television.

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	**Education:**Meaning, definition and types – Formal, informal and non formal education	2
2, 3, 4	**Extension Education-** Meaning, definition, need, scope and process; history, objectives, philosophy, principles and approaches.	10
5, 6	**Extension ProgrammePlanning-** Meaning, process, principles and steps in programmedevelopment	5
7, 8	**Extension systems in India:** ▪ *Extension efforts in pre-independence era : Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment* ▪ *Post-independence era : Etawah Pilot Project, Nilokheri Experiment* ▪ *Present extension System : Department of Agriculture : Structure, Function*	5
9, 10	**Various extension/ agriculture development programmes launched by ICAR/ Government of India :** Introduction, Objectives and Salient Achievements ▪ *Intensive Agricultural District Programme (IADP)* ▪ *Intensive Agricultural Area Programme (IAAP)* ▪ *High Yielding Varieties Programme (HYVP)* ▪ *Institution-Village Linkage Programme (IVLP)* ▪ *Operational Research Project (ORP)* ▪ *National Agricultural Technology Project (NATP)* ▪ *National Agricultural Innovation Project (NAIP)* ▪ *RashtriyaKrishiVikasYojana (RKVY).*	10
11, 12	**New trends in agricultural extension:** Meaning , Objectives, Salient features ▪ *Privatization in extension,* ▪ *ICT in Extension education - Cyber extension/ e-extension,* ▪ *Market-led extension,* ▪ *Farmer-led extension,*	5
13	**Rural Development:**Concept, meaning, definition, objectives and genesis	5
14, 15, 16	**Various rural development programmes launched by Government of India** : Introduction, Objectives and salient features ▪ *Swarnajayanti Gram SwarojgarYojana (SGSY)* ▪ *Indira AwasYojana (IAY)* ▪ *Mahatma Gandhi National Rural Employment Guarantee Act* ▪ *Prime Ministers' RozgarYojana (PMRY)* ▪ *District Rural Development Agency (DRDA)* ▪ *Integrated Watershed Development Programme (IWDP)* ▪ *Providing Urban Amenities in Rural Area (PURA)* ▪ *Rashtriya MahilaKosh – (National Credit Fund for Women)*	10

Lecture	Topic	Weightage (%)
	▪ *MahilaArthikVikasMahamandal (MAVIM)*	
17	**Community Development. :** Meaning, definition, concept, principles and philosophy	3
18	**Democratic Decentralization (Panchayati Raj) :** Meaning, Constitution and functions	2
19	**Extension administration and management:** Meaning and concept, principles, functions and differences	3
20	**Evaluation in Extension** : Meaning, definition, types of evaluation, monitoring and evaluation	2
21, 22	**Transfer of technology programmes :** Lab to Land programme (LLP), National Demonstration (ND), Front Line Demonstration (FLD), KrishiVigyanKendras (KVK), Technology Assessment and Refinement Programme (TARP) of ICAR	5
23, 24	**Capacity building of extension personnel and farmers** : Meaning, Training and Education, Types of training, Training institutes in India, Concept of Human Resource Development	5
25, 26, 27	**Extension Teaching Methods and Audio-Visual Aids** : Meaning, definition, importance, classification, media mix strategies; Factors affecting selection and use of methods and aids	10
28, 29	**Communication: Meaning and definition;** elements, selected models and barriers to communication	10
30	**Agriculture journalism** : Meaning, definitions, news writing	3
31, 32	**Diffusion and adoption of innovation:** Concept and meaning, Attributes of innovation, Innovation decision process, adopter categories.	5
	Total	**100**

b) Practical

Experiment	Topic
1	Study of university extension system
2	Organizing group discussion- exercise
3	Handling and use of digital camera
4	Handling and use of LCD projector
5	Handling and use of Public Address System
6	Preparation of extension literature – leaflet, folder
7	Preparation of effective power point presentations
8	Writing of news story
9	Writing success story
10	Study of structure and functioning of DRDA
11	Study of structure and functioning of Department of Agriculture
12	Visit to NGO and learning from their experience in rural development
13	Visit to village to understand PRA techniques and their application in village development planning
14	Visit to community radio / television studio for understanding the process of programme production
15	Writing for print / electronic media
16	Developing script for radio / television

Suggested Readings

1) *Dahama, O.P. and Bhatnagar, O.P. 1980. Education and Communication for Development. Oxford &lBH Publishing Co. Pvt. Ltd., New Delhi.*

2) Dudhani, C.M.; Hirevenkatgoudar, L.V., Manjunath, L.; Hanchinal, S.N. and Patil, S.L. (2004). Extension Teaching Methods and Communication Technology, UAS, Dharwad.

3) Kamat, M.G. (1985). Writing for Farm Families. Allied Publishers, New Delhi.

4) Kelsey, L.D. and Hearne, G.C. (1963). Cooperative Extension Work, Comstar Publishing Associate, New York.

5) Mehta, D.S.(1981). Mass Communication and Journalism in India. Vikas Publication, New Delhi.

6) Ray, G.L. (1991). Extension Communication and Management. NoyaPrakash, Calcutta.

7) Reddy, A.A 2005 Extension Education. Sri Lakshmi Press, Bapatla.

8) Rogers, E.M. 2003. Diffusion of Innovations. Free Press, New Delhi.

9) Samanta, R.K. (1990). Development Communication for Agriculture. BR Publishing Corporation, Delhi.

10) Sandhu, A.S. (1993).Textbbok on Agricultural Communication : Process and Methods. Oxford and IBH Publishing Pvt.Ltd., New Delhi.

11) Singh, A.K., Lakhan Singh, R. and Roy Burman (2006). Dimensions of Agricultural Extension. Aman Publishing House, Meerut

Course :	*EXTN 123*		***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Communication Skills and personality Developments (Common Course)*				

Syllabus

Theory

- *Definition and Basics of Personality.*
- *Analyzing Strength and Weakness.*
- ***Personality Development :*** *Concept and Process*
- ***Body Language*** *– Meaning, Definition, Use of body language - Gesture, Posture, Eye contact, facial expression*
- *Preparation of Self -Introduction.*
- ***Communication Skills:*** *Listening, writing, speakingskills*
- ***Communication Barriers;****Overcoming these barriers.*
- *Building Self-Esteem and Self- Confidence.*
- ***Attitudes:*** *Meaning, Types - Assertive, Aggressive and Submissive; Positive, Negative, Neutral*
- *Introduction to Leadership; Leadership Styles; Group Dynamics.*
- ***Team Building :*** *Meaning, Steps*
- *Interpersonal* ***Communication and Relationship;*** *Use of verbal and non verbal communication*
- *Conflict Management: Introduction, Levels of Conflict and Managing Conflict.*

- ***Time Management:*** *Concept, Importance and Need, Steps towards better Time Management.*
- ***Public Speaking:*** *Introduction, Increasing Vocabulary, Voice Modulation, Social Graces*
- *Email and Telephone Etiquettes*

Practical

1. *One-on-One Sessions for Individual Personality Traits*
2. *Role Play and Impromptu Conversation/Public Speaking Practice focusing on Body Language;*
3. *Vocabulary Practices: Developing a repertoire of words in various fields like Agriculture, Politics, Economics, Family, Personal Grooming etc.*
4. *Role Play for Self Introduction in the class;*
5. *Listening to recorded Shot*
6. *Questionnaires for Building Self-Esteem and Self Confidence;*
7. *Case Studies based on Development of Attitudes;*
8. *Case Studies on Leadership Development;*
9. *Case Studies on Leadership Development;*
10. *Group Games, Ice breakers, Warm-ups and Energizers Team Building Activities*
11. *Practice of Non-Verbal Communication Skills: Dumb Charades and Dubsmash Practice;*
12. *Exercise on Mutually Acceptable Proximity; and Eye Contact;*
13. *Time Management Games to Practice and Experience the Importance of Planning / Delegating Work among them to properly manage time and complete the task in the shortest time possible;*
14. *Public Speaking Games: (Introducing a friend with his/her life style; Describing a funny image provided by the teacher; Continuing a Story starting with one student and others try to continue with it and try to complete it Take any object available and try to make a commercial for it;*
15. *Practice of Emails*

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	Definition and Basics of Personality	5
2	Analyzing Strength and Weakness	5
3	Personality Development : Concept and Process	5
4	Body Language – Meaning, Definition, Use of body language - Gesture, Posture, Eye contact, facial expression	10
5	Preparation of Self -Introduction	5
6	Communication Skills: Listening, writing, speaking skills	10
7	Communication Barriers; Overcoming these barriers	5
8	Building Self-Esteem and Self- Confidence	5
9	Attitudes: Meaning, Types - Assertive, Aggressive and Submissive; Positive, Negative, Neutral	10
10	Introduction to Leadership; Leadership Styles; Group Dynamics	5
11	Team Building : Meaning, Steps	5

12	Interpersonal Communication and Relationship; Use of verbal and non verbal communication	10
13	Conflict Management: Introduction, Levels of Conflict and Managing Conflict	5
14	Time Management: Concept, Importance and Need, Steps towards better Time Management	5
15	Public Speaking: Introduction, Increasing Vocabulary, Voice Modulation, Social Graces	5
16	Email and Telephone Etiquettes	5

b) Practical

Exercise	Topic
1	One-on-One Sessions for Individual Personality Traits
2	Role Play and Impromptu Conversation/Public Speaking Practice focusing on Body Language
3	Vocabulary Practices: Developing a repertoire of words in various fields like Agriculture, Politics, Economics, Family, Personal Grooming etc
4	Role Play for Self Introduction in the class
5	Listening to recorded Shot
6	Questionnaires for Building Self-Esteem and Self Confidence
7	Case Studies based on Development of Attitudes
8	Case Studies on Leadership Development
9	Case Studies on Leadership Development
10	Group Games, Ice breakers, Warm-ups and Energizers Team Building Activities
11	Practice of Non-Verbal Communication Skills: Dumb Charades and Dubsmash Practice
12	Exercise on Mutually Acceptable Proximity; and Eye Contact
13	Time Management Games to Practice and Experience the Importance of Planning / Delegating Work among them to properly manage time and complete the task in the shortest time possible
14	Public Speaking Games: (Introducing a friend with his/her life style; Describing a funny image provided by the teacher; Continuing a Story starting with one student and others try to continue with it and try to complete it Take any object available and try to make a commercial for it
15	Practice of Emails
16	Presentations by the students

Suggested Reading

1) Balasubramanian T. 1989. A Textbook of Phonetics for Indian Students. Orient Longman, New Delhi.
2) Balasubrmanyam M. 1985. Business Communication. Vani Educational Books, New Delhi.
3) Naterop, Jean, B. and Rod Revell. 1997. Telephoning in English. Cambridge University Press, Cambridge.
4) Mohan Krishna and Meera Banerjee. 1990. Developing Communication Skills. Macmillan India Ltd. New Delhi.
5) Krishnaswamy,. N and Sriraman, T. 1995. Current English for Colleges. Macmillan India Ltd. Madras.
6) Narayanaswamy V R. 1979. Strengthen your writing. Orient Longman, New Delhi.
7) Sharma R C and Krishna Mohan. 1978. Business Correspondence. Tata McGraw Hill publishing Company, New Delhi.

8) Carnegie, Dale. 2012. *How to Win Friends and Influence People in the Digital Age.* Simon & Schuster.
9) Covey Stephen R. 1989. *The Seven Habits of Highly Successful People.* Free Press.
10) Spitzberg B, Barge K &Morreale, Sherwyn P. 2006. *Human Communication: Motivation,Knowledge& Skills.* Wadsworth.
11) Verma, KC. 2013. *The Art of Communication*. Kalpaz.
12) MamathaBhatnagar and NitinBhatnagar. 2011. Effective Communication and Soft Skills. Person Education.
13) Meenakshi Raman, Sangeeta Sharma. Technical Communication Principles and Practice
14) Harold Wallace and Ann Masters. Personality Development. Cengage Publishers.
15) Andrea J. Rutherford. Basic Communication Skills for Technology. Pearson Education.
16) Carroll, B.J. 1986. English for College, Macmillan India Ltd. New Delhi
17) Hahn, "The Internet complete reference", TMH
18) Hornby, A.S. 1975. Guide to patterns and usage in English. Oxford University, New Delhi.
19) Qurik, R and Green Baum, S 2002. A University Grammar

Course :	*ENGG 121*		***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Soil and Water Conservation Engineering*				

Syllabus

Theory

Introduction of soil and water conservation - definition and scope, causes of soil erosion, types, geological and accelerated soil erosion, Accelerated soil erosion - water and wind erosion definitions, Forms of water erosion, Wind erosion : Principle, mechanics, types of soil movement, Land use capability classification and planning, erosion control measures – Agronomical and Engineering measures (examples on grassed waterways) Contouring, strip cropping, contour bunds, graded bunds, terracing, waterways , Gully development classification and control measures : Temporary and permanent structures , Soil loss estimation by USLE (examples), Hydrological cycle, Runoff: Definition, types, factors affecting, estimation. Examples on rational formula, Water harvesting and its techniques, types (examples on capacity), Introduction of surveying: definitions, object of surveying, use of surveying, classification of surveying and principles of surveying, Watershed: definition, characteristics, deterioration, classification, Watershed management: definition and objects, steps of watershed management, Watershed monitoring and evaluation.

Practical

General status of soil conservation in India, Study of surveying instruments, Study of leveling instruments, Chain triangulation survey, Plane table survey, Estimation of runoff by rational method, Estimation of soil loss (USLE), Measurement of soil loss (multi slot divisor), Study of grassed waterway, Study of graded bunds, Study of contour bund and compartmental bunding, Study of terrace, Study of CCT and staggered trenches, Study of gully control structures (KT weir, Drop spillway, earthen nala bund), Determination of pond capacity, Visit to a developed watershed

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	Introduction of soil and water conservation - definition and scope, causes of soil erosion, types, geological and accelerated soil erosion	7
2	Accelerated soil erosion - water and wind erosion definitions, types of water erosion	7
3	Wind erosion : Principle, mechanics, types of soil movement	6
4 & 5	Land use capability classification and planning, erosion control measures (list and adoptability of agronomical and engineering measures) Contouring, strip cropping, contour bunds, graded bunds, terracing, waterways	8
6	Gully development, classification and control measures : Temporary and permanent gully control structures	7
Lecture	**Topic**	**Weightage (%)**
7	Soil loss estimation by USLE (examples)	7
8 & 9	Hydrological cycle, Runoff: Definition, types, factors affecting	9
10	Estimation of runoff. Examples on rational formula with Tc	7
11	Water harvesting and its types (examples on capacity of dug out types FP)	7
12	Introduction of surveying: definitions, object of surveying, use of surveying, classification of surveying and principle of surveying	8
13	Contour : definition, uses and characteristics	6
14	Watershed: definition, characteristics, deterioration, classification	7
15	Watershed management: definition and objects, steps of watershed management	8
16	Watershed monitoring and evaluation	6
	Total	**100**

b) Practical

Experiment	Topic
1	General status of soil conservation in India
2	Study of surveying instruments
3	Study of leveling instruments
4	Chain triangulation survey
5	Plane table survey
6	Estimation of runoff by rational method
7	Estimation of soil loss (USLE)
8	Measurement of soil loss (multi slot divisor)
9	Study of grassed waterway
10	Study of graded bunds
11	Study of contour bund and compartmental bunding
12	Study of terrace
13	Study of CCT and staggered trenches
14	Study of gully control structures (KT weir, Drop spillway, Earthen Nala bund)

15	Determination of pond capacity
16	Visit to a developed watershed

Suggested Readings

1) *Principles of Agril. Engg.- Vol – II by A. M. Maichael& T. P. Ojha (2011), Jain Brothers, New Delhi*
2) *Soil and Water Conservation Engineering by R. Suresh (2000), Standard Publishers Distributrs,Delhi*
3) *Surveying &LevellingPart – 1 by T.P.Kanetkar and S.V.Kulkarni (2002), Pune VidyarthiGrihaPrakashan, Pune*
4) *Irrigation Theory and Practice By A. M. Michael (2005), Vikas Publishing House Pvt Ltd, New Delhi*
5) *Soil Conservation in India by Rama Rao M.S.V. (1974) ICAR, New Delhi.*
6) *Manual of Soil & Water Conservation Practices by Gurmel Singh and others (1996), Oxford & IBH publishing Co. Pvt. Ltd., New Delhi*
7) *Watershed Hydrology by R. Suresh (1997),Standard Publishers Distributrs, Delhi*
8) *Surveying &Levelling Part – 1 by N. N. Basak (2005) Tata McGraw-Hill Publishing Company Ltd, New Delhi*
9) *Manual of SWCE by Scwab G. O. et al (1996) WMC Brown Co. Publishers, Lowa, USA*
10) *Agricultural Engineer's Handbook by Richey et al (1961) Tata McGraw-Hill Publishing Company Ltd, Nw York*

Course :	*PATH 121*		***Credit:***	*3(2+1)*	***Semester-II***
Course title:	*Fundamentals of Plant Pathology*				

Syllabus

Theory

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work.Terms and concepts in Plant Pathology.Pathogenesis.Cause and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, Phytoplasmas, spiroplasmas,viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes. Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues,modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions,sub-divisions, orders and classes.Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction.Viruses: nature, architecture, multiplication and transmission.Study of phanerogamic plant parasites.Nematodes: General

morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, *Anguina* etc.)Principles and methods of plant disease management.Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

Practical

Acquaintance with various laboratory equipments and microscopy. Preparation of media,isolation and Koch's postulates. General study of different structures of fungi.Study of symptoms of various plant diseases.Study of representative fungal genera.Staining and identification of plant pathogenic bacteria.Transmission of plant viruses.Study of phanerogamic ant parasites.Study of morphological features and identification of plant parasitic nematodes.Extraction of nematodes from soil.Study of fungicides and their formulations.Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

Teaching Schedule

a) Theory

Lecture	Topic	Weightage (%)
1	Importance of plant diseases, scope and objectives of Plant Pathology.....	3
2	History of Plant Pathology with special reference to Indian work	3
3,4	Terms and concepts in Plant Pathology, Pathogenesis	6
5	classification of plant diseases	5
6,7, 8	Causes of Plant Disease Biotic (fungi, bacteria, fastidious vesicular bacteria, Phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, and nematodes) and abiotic causes with examples of diseases caused by them	10
9	Study of phanerogamic plant parasites.	3
10, 11	Symptoms of plant diseases	6
12,13, 14	Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus,	7
15	Reproduction in fungi (asexual and sexual).	4
16, 17	Nomenclature, Binomial system of nomenclature, rules of nomenclature,	6
18, 19	Classification of fungi.Key to divisions, sub-divisions, orders and classes.	6
20, 21, 22	Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction in bacteria	8
23,24, 25	Viruses: nature, architecture, multiplication and transmission	7
26, 27	Nematodes: General morphology and reproduction, classification of nematode Symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, *Anguina* etc.)	6
28, 29, 30	Principles and methods of plant disease management.	6

31, 32, 33	Nature, chemical combination, classification of fungicides and antibiotics.	7
34, 35, 36	Mode of action and formulations of fungicides and antibiotics.	7
	Total	**100**

b) Practical

Experiment	Topic
1.	Acquaintance with various laboratory equipments and microscopy
2.	General study of different structures of fungi.
3.	Study of symptoms of various plant diseases.
4.	Study of representative fungal genera
5.	Staining and identification of plant pathogenic bacteria
6	Study of phanerogamic plant parasites
7	Transmission of plant viruses
8	Study of morphological features and identification of plant parasitic nematodes.
9	Preparation of media
10	Isolation and purification of fungi and bacteria
11	Extraction of nematodes from soil
12	Koch's postulates
13	Study of fungicides and their formulations
14	Methods of pesticide application and their safe use
15	Calculation of fungicide sprays concentrations**.**
16	Collection and preservation of disease specimen

Suggested Readings

1) Pathak, V. N. Essentials of Plant Pathology. Prakash Pub., Jaipur

2) Agrios, GN. 2010. *Plant Pathology*. Acad. Press.

3) Kamat, M. N. Introductory Plant Pathology. Prakash Pub, Jaipur

4) Singh RS. 2008. *Plant Diseases.*8th Ed. Oxford & IBH.Pub.Co.

5) Singh RS. 2013. *Introduction to Principles of Plant Pathology*.Oxford and IBH Pub.Co.

6) Alexopoulos, Mims and Blackwel. Introductory Mycology

7) Mehrotra RS & Aggarwal A. 2007.Plant Pathology.7th Ed. Tata Mc Graw Hill Publ. Co. Ltd.

8) Gibbs A & Harrison B. 1976. *Plant Virology - The Principles*. Edward Arnold, London.

9) Hull R. 2002. *Mathew.s Plant Virology*. 4th Ed. Academic Press, New York.

10) Verma JP. 1998. *The Bacteria*. Malhotra Publ. House, New Delhi.

11) Goto M. 1990. *Fundamentals of Plant Bacteriology*. Academic Press, New York.

12) Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press, London, Tokyo.

13) Nene YL & Thapliyal PN. 1993. *Fungicides in Plant Disease Control.* 3rd Ed. Oxford & IBH, New Delhi.

14) Vyas SC. 1993. *Handbook of Systemic Fungicides*. Vols. I-III. Tata McGraw Hill, New Delhi.

15) Rajeev K & Mukherjee RC. 1996. Role of Plant Quarantine in IPM. Aditya Books.

16) Rhower GG. 1991. Regulatory Plant Pest Management. In: Handbook of Pest Management in Agriculture. 2nd Ed. Vol. II. (Ed. David Pimental). CRC Press.

17) Singh RS & Sitaramaiah K. 1994. *Plant Pathogens – Nematodes*. Oxford & IBH, New Delhi.

18) Thorne G. 1961. *Principles of Nematology*. McGraw Hill, New Delhi.

19) Walia RK & Bajaj HK. 2003. *Text Book on Introductory Plant Nematology*. ICAR, New Delhi.

Course :	*FRST 121*	***Credit:***	*2(1+1)*	***Semester-II***
Course title:	*Introduction to Forestry*			

Syllabus

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.

Lesson Plan

Lecture	Topic	Weightage (%)
1 & 2	Definitions of basic terms related to forestry, Definition of Silviculture, objectives of silviculture, forest classification- 16 Major types of forest with species composition	**5**
3	Salient features of Indian Forest Policies	**5**
4	Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers with examples	**10**
5	Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations for AR	**10**
6	Crown classification of trees	**5**
7	Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning	**5**
8	Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement	**5**
9	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	**5**
10	Tree stem form, form factor, form quotient	**5**
11	measurement of volume of felled and standing trees, age determination of trees.	**5**
12 & 13	Agroforestry – definitions, importance, Classification of Agroforestry systems, criteria of selection of trees in agroforestry	**10**
14	different agroforestry systems prevalent in the country,	**5**
15	shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens with regional examples	**10**
16 & 17	Cultivation practices of two important fast growing tree species of the region.	**5**

Practical

Experiment	Topic
1	Identification of tree-species of the Campus and its classification according to uses and preperation of herbarium
2	Measurements of diameter-girth and basal area of trees using Calipers, Tape, Ruler, Pentaprism Tree Caliper etc
3	Measurement of height using non instrumental method and Instrumental methods like Hypsometer, Ravi Multimeter, Abney level
4	Volme estimation of logs and standing trees using Quarter girth formula
5	Study of Natural regeneration in forest area and mode of regeneration
6	Planning and layout of forest plantations, Choice of species, methods of planting and after care
7	Exercise on tree nursery practice- seed collection, seed pre-treatment, bed preparation and sowing
8	Field exercise on various tending operations in forest/plantations like thining,

Experiment	Topic
	pruning, climber removal etc.
9	Study of Traditional agroforestry systems in the region and visits to some of the local agroforestry systems and recording its components.
10	Study of Tree Architecture, structure and growth of trees, crown and root architecture
11	Identification of trees suitable for Windbreaks & Shelterbelts, Fodder etc.
12	Visit to forest plantation and study of its growth and general condition of plantation.

Suggested readings

Dwivedi.A.P. 1993.Textbook of Silviculture. International Book Distributors.

Khanna,L.S.1989. Principles and Practice of Silviculture. Khanna Bandhu, 7 Tilak Marg, DehraDun

Kumar, B. and Nair, P.K.R. (eds). 2006. *Tropical Homegardens*: A Time-Tested Example of Sustainable Agroforestry. Volume 3 in the Book Series "Advances in Agroforestry". Springer Science, the Netherlands

Chaturvedi, A.N and L.S. Khanna. 2011. Forest Mensuration and Biometry (5th edition). KhannaBandhu. Dehra Dun. 364 pp.

Husch, B., Beers, T.W. and Kershaw, J. J.A. 2002.Forest Mensuration (4th edition).John Wiley & Sons, Nature.456 pp.

Khanna, L.S. 1989. Principles and Practice of Silviculture. Khanna Bandhu, New Delhi, 473p.

Nair, P.K.R. 1993. An Introduction to Agroforestry. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Pathak P.S. and Ram Newaj (eds.) 2003. Agroforestry: Potentials and Opportunities. Agrobios, Jodhpur.

Chundawat B S and S K Gautam. Text Book of Agroforestry, Oxford and IBH Publishing New Delhi.

Dwivedi A P . Principles and Practices of Agroforestry.

Course :	*EDNT 121*	***Credit:***	*1(0+1)*	***Semester-II***
Course title:	*Educational Tour*			

And

Course :	*EDNT 242*	***Credit:***	*1(0+1)*	***Semester-IV***
Course title:	*Educational Tour*			

Students Study and Educational Tours, to well-known institutes and organizations and interaction with faculty help students broaden their knowledge and skills. The ICAR has made a

provision of Rs. 5000/- to each student once in a degree course for educational tours subject to maximum support of Rs. 15 lakh per University.

The Educational Tour (EDNT 121, credit :1(0+1), shall be conducted after completion Sem. II and before start of Sem. III. and Educational Tour (EDNT 242, Credit :1(0+1) shall be conducted after completion of Sem.- IV and before start of Sem.- V.

Formats for Educational Tour Report and its Evaluation

1) ***Maharashtra Study Tour or 1. India Study Tour***
2) ***Name of the student:***
3) ***Reg. No :***
4) ***Tour In-charge Professors :***
5) ***Duration and Dates of Tour :***
6) ***Visited Places , Institutions, Companies and Historical Monuments and Their Specialties***

Place	Date and Time	Names and its Specialties			Learning outcome
		Institutions	Companies	Historical Monuments	

7) ***Shouldered responsibilities related to the tour (Prior to tour / During tour) individually and in group***

(Rating points – Excellent-5, Very good-4, Good-3, Fair-2, Just OK -1, Poor-Nil)

Sr. No.	**Shouldered Duties**	**Individually / In group**	**Self- Rating about Performance**
1)	Collection of information about places to be visited and presenting it in class		
2)	Making list of materials required for tour by all and getting them issued from College and using them wisely in tour		
3)	Photo shoot work of all in all places (formal and can did ones) 3 groups		

Sr. No.	Shouldered Duties	Individually / In group	Self- Rating about Performance
4)	Discipline task – Taking roll call before and after visits, announcing timings of it and monitoring time management of all		
5)	Taking care of money collection – for ticketing trains/ buses, historical places, common eatables etc		
6)	Attending health issues of Classmates- first aid, other help		
7)	Taking care of safety of belongings of students and college in tour		
8)	Making thanks giving cards using creativity, with good finish and messages to present to staff / institutions to express gratitude for their help		
9)	Taking care of cleanliness in vehicles, at accommodation places		
10)	Taking care of inter- personal relations of students with positive and professional attitude for group coherence		
11)	Taking care task of trouble- shooting throughout the tour		
12)	Rendering assistance to staff for successful tour		
13)	Any other		

8) ***Marking Scheme for Evaluation of Study / Educational Tour***

Sr.No	Items	Allotted Max. Marks(50)	Acquired by eachstudent
1	Tour dairy evaluation	20	
2	Shouldered duties in group / individually	10	
3	Presentation of tour report with pictures in PPT in group (PPT slides must divided by group- mates and each one should present their share)	10	
4	Discipline, devotion and sincerity	10	
	Total	**50**	

Sr. No.	Reg. No.	Name of student	Tour dairy evaluation	Shouldered duties in group / individually	Presentation of tour eport with pictures in PPT –group wise	Discipline, devotion and sincerity	Total	Remarks
			20 marks	10 marks	10 marks	10 marks	50 marks	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

For Format for Compilation of Results of Educational Tour 1 & 2