



**UNIVERSITY OF AGRICULTURAL  
SCIENCES, DHARWAD - 580 005**



# **SYLLABUS**

FOR

**B.Sc.  
( Agriculture )**

**SEMESTER SYSTEM**

2007-2008



**UNIVERSITY OF AGRICULTURAL  
SCIENCES, DHARWAD**



**SYLLABUS**

*Courses  
for  
the Undergraduate Programme of*

**B.Sc. (Agriculture)**

*Semester System*

**2007-2008**

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B. Sc. (Agriculture)**

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**SCHEDULE OF COURSES FOR B.SC. (AGRI.)**

Course No.	Department-Wise Courses	Credit Hours
1	2	3
<b>I. BASIC SCIENCE &amp; HUMANITIES</b>		
ENG.101	Comprehension and Communication Skills in English	2 (1+1)
AEX.101	Rural Sociology and Constitution of India	1 (0+1)
AEX.102	Educational Psychology	1 (0+1)
MAT.101	Introduction to Computer Applications	2 (1+1)
BCH.101	Plant Biochemistry	3 (2+1)
PED.101 / NSS.101 / NCC.101		1 (0+1)*
PED.102 / NSS.102 / NCC.102		1 (0+1)*
<b>Total</b>		<b>11 (4+5+2*)</b>
<b>II. AGRICULTURAL SCIENCES</b>		
<b>Agricultural Economics</b>		
AEC.101	Principles of Agricultural Economics	2 (2+0)
AEC.102	Agricultural Finance and Co-operation	2 (1+1)
AEC.202	Production Economics and Farm Management	2 (1+1)
AEC.203	Agricultural Marketing, Trade and Prices	2 (1+1)
AEC.301	Fundamentals of Agribusiness Management	1 (1+0)
<b>Total</b>		<b>9 (6+3)</b>
<b>Agricultural Engineering</b>		
AEG.101	Principles of Soil and Water Engineering	2 (1+1)
AEG.201	Farm Power and Machinery	2 (1+1)
AEG.301	Protected Cultivation Structures and Agro-Processing	2 (1+1)
AEG.302	Energy Sources and their Application in Agriculture	2 (1+1)
<b>Total</b>		<b>8 (4+4)</b>

1	2	3
<b>Agricultural Entomology</b>		
AET.101	General Entomology	3 (2+1)
AET.201	Economic Entomology	3 (2+1)
AET.301	Crop Pests and their Management	3 (2+1)
AET.302	Sericulture	1 (0+1)
<b>Total</b>		<b>10 (6+4)</b>
<b>Agricultural Extension Education</b>		
AEX.201	Dimensions of Agricultural Extension	1 (1+0)
AEX.301	Extension Methodologies for Transfer of Agricultural Technology	2 (1+1)
AEX.302	Entrepreneurship Development and Communication Skills	2 (1+1)
<b>Total</b>		<b>5 (3+2)</b>
<b>Agricultural Microbiology</b>		
AMB.201	Agricultural Microbiology	3 (2+1)
AMB.301	Soil Microbiology	2 (1+1)
<b>Total</b>		<b>5 (3+2)</b>
<b>Agricultural Statistics</b>		
AST.101	Fundamentals of Statistics	<b>2 (1+1)</b>
<b>Agronomy</b>		
AGR.101	Introductory Agriculture, Principles of Agronomy and Agricultural Meteorology	3 (2+1)
AGR.201	Field Crops-I ( <i>Kharif</i> )	3 (2+1)
AGR.202	Practical Crop Production – I	1 (0+1)
AGR.203	Practical Crop Production – II	1 (0+1)
AGR.204	Weed Management	1 (0+1)
AGR.301	Irrigation Water Management	2 (1+1)
AGR.302	Field Crops-II ( <i>Rabi</i> )	3 (2+1)
AGR.303	Rainfed Agriculture and Watershed Management	2 (1+1)
AGR.304	Farming Systems, Organic Farming and Sustainable Agriculture	2 (1+1)
AGR.305	Experimental Techniques in Agricultural Research-I	1 (1+0)

1	2	3
<b>A. Natural Resource Management (NRM)</b>		<b>20</b>
i. Soil Health Clinic (SAC)		
ii. Watershed Management (AGR)		
iii. Techniques of Irrigation Water Management (AGR)		
iv. Integrated Farming Systems and Organic Farming (AGR)		
v. Farm Mechanization (AEG)		
<b>B Crop Protection</b>		<b>20</b>
i. Diagnosis Management of Diseases (PAT)		
ii. Diseases and Management of Pests (AET)		
iii. Weeds and their Management (AGR / CPH)		
iv. Post Harvest Technology of Field and Horticultural Crops (AET/PAT)		
v. Plant Protection Equipments (AEG)		
<b>C Horticulture</b>		<b>20</b>
i. Plant Propagation and Nursery Management (HRT)		
ii. Commercial Production of Horticultural Crops (HRT)		
iii. Hi-Tech Horticulture (HRT)		
iv. Value Addition of Horticultural Produce (HRT)		
<b>D Agribusiness Management</b>		<b>20</b>
i. Production Management (AEC)		
ii. Financial Management (AEC)		
iii. Marketing Management (AEC)		
iv. Management Information System (AEC)		
v. Project Planning, Monitoring and Evaluation (AEC)		
<b>E Social Sciences</b>		<b>20</b>
i. Agricultural Journalism (AEX)		
ii. Visual and Graphic Communication (AEX)		
iii. e-Extension (AEX)		
iv. Behavioural Skills (AEX)		
v. Emerging Trends in Agricultural Extension (AEX)		

1	2	3
<b>F Integrated Livestock Farming (Animal Science and Veterinary)</b>		<b>20</b>
i. Poultry Production Management		
ii. Dairy Production Management		
iii. Sheep and Goat Production and Management		
iv. Value Addition to Animal Products		
v. Veterinary Care Practices		
<b>G Bio-inputs</b>		<b>20</b>
i. Bio-fertilizers (AMB)		
ii. Bio-fungicides (PAT)		
iii. Bio-Insecticides (AET)		
iv. Vermi-composting (AET)		
v. Farm Pollutants and their Management (ENS, AMB, PAT, ENT & PHY)		
<b>H Commercial Agriculture</b>		<b>20</b>
i. Mushroom Cultivation (AMB)		
ii. Apiculture (AET)		
iii. Sericulture (AET)		
iv. Farm Forestry		
v. Seed Production (SST)		
<b>I. Genetics and Biotechnology</b>		<b>20</b>
i. Crop Breeding		
ii. Plant Tissue Culture		
iii. Molecular Diagnostics		
iv. Hybrid Seed Production		

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SL. NO.	COURSE NO.	TITLE	CREDITS
4.	AGR.302	Field Crops-II ( <i>Rabi</i> )	3 (2+1)
5.	AMB.201	Agricultural Microbiology	3 (2+1)
6.	AST.101	Fundamentals of Statistics	2 (1+1)
7.	GPB.201	Principles of Plant Breeding	3 (2+1)
8.	PAT.202	Principles of Plant Disease Management	2 (2+0)
9.	SST.101	Principles of Seed Production and Certification	3 (2+1)
<b>TOTAL</b>			<b>21</b>
<b>III YEAR I SEMESTER</b>			
1.	AEC.301	Fundamentals of Agribusiness Management	1 (1+0)
2.	AEG.301	Protected Cultivation Structures and Agro-Processing	2 (1+1)
3.	AET.301	Crop Pests and their Management	3 (2+1)
4.	AET.302	Sericulture	1 (0+1)
5.	AGR.301	Irrigation Water Management	2 (1+1)
6.	AGR.303	Rainfed Agriculture and Watershed Management	2 (1+1)
7.	AMB.301	Soil Microbiology	2 (1+1)
8.	ENS.301	Environmental Science	2 (1+1)
9.	HRT.301	Vegetables and Ornamental Horticulture	3 (2+1)
10.	PAT.301	Diseases of Field Crops and their Management	3 (2+1)
<b>TOTAL</b>			<b>21</b>

SL. NO.	COURSE NO.	TITLE	CREDITS
<b>III YEAR II SEMESTER</b>			
1.	AEG.302	Energy Sources and their Application in Agriculture	2 (1+1)
2.	AEX.302	Entrepreneurship Development and Communication Skills	2 (1+1)
3.	AGR.304	Farming Systems, Organic Farming and Sustainable Agriculture	2 (1+1)
4.	AGR.305	Experimental Techniques in Agricultural Research-I	1 (1+0)
5.	AGR.306	Experimental Techniques in Agricultural Research-II	1 (0+1)
6.	BTH.101	Principles of Plant Biotechnology	2 (2+0)
7.	GPB.301	Breeding of Field and Horticulture Crops	3 (2+1)
8.	HRT.302	Post-Harvest Management and Value Addition to Fruits and Vegetables	2 (1+1)
9.	PAT.302	Diseases of Horticultural Crops and their Management	3 (2+1)
10.	SAC.301	Soil Fertility and Manures	3 (2+1)
<b>TOTAL</b>			<b>21</b>
<b>IV YEAR I SEMESTER</b>			
Rural Agricultural Work Experience			20
<b>TOTAL</b>			<b>20</b>
<b>IV YEAR II SEMESTER</b>			
Experiential Learning			20
<b>TOTAL</b>			<b>20</b>

President, Prime Minister, Council of Ministers – Powers and Functions; Parliament and Supreme Court of India – Powers and Functions; State Executive; Governor, Chief Minister, Council of Ministers; Legislature and Judiciary: Powers and Functions; Electoral Process; Human Rights Commission – Structure, Powers and Functions.

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**AEX.102 EDUCATIONAL PSYCHOLOGY 1 (0+1)**

**Practicals**

- 1 Massed Vs Spaced learning
- 2 Transfer of learning
- 3 Intelligence
- 4 Verbal test of intelligence
- 5 Verbal reasoning
- 6 Abstract reasoning
- 7 Mechanical reasoning
- 8 Space relations
- 9 Language usage
- 10 Personality
- 11 Level of aspiration
- 12 Achievement motivation
- 13 Study habits
- 14 Self-image
- 15 Patterns of adjustment
- 16 Retroactive inhabitation

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**MAT.101 INTRODUCTION TO COMPUTER APPLICATIONS 2 (1+1)**

**Theory**

Number System – Decimal, Binary, Octal and Hexadecimal Number system Introduction to Computers, Anatomy of computers. Input and Output Devices, Units of Memory, Hardware, Software and Classification of Computers. Personal Computers, Types of Processors, booting of computer,

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

**Practicals**

- 1 Study of Computer Components and its shut down, practice of some fundamental DOS Commands Time, Date, DIR, COPY.
- 2 DOS – Commands VOL, LABEL, PATH, Practicing WINDOWS operating system.
- 3 Use of Mouse, Title Bar, Minimum, Maximum and Close Buttons, Scroll Bars, Menus and Tool Bars.
- 4 WINDOWS Explorer - Creating Folders, COPY and PASTE functions.
- 5 MSWORD - Creating a Document, Saving and Editing.
- 6 MSWORD - Use of options from Tool Bars, Format, Insert.
- 7 MSWORD - Creating a Table, Merging of Cells, Column and Row width.
- 8 MSEXCEL - Creating a spreadsheet, Alignment of rows, columns and cells using Format tool bar.

**NSS-101 NATIONAL SERVICE SCHEME 1 (0+1)**

**Practicals**

Introduction to National Service Scheme, objectives and motto of NSS programme planning and development. Kinds of activities in regular and special camping programmes. Aspects of NSS Programme – Institutional, rural and urban projects – village / slum adoption – organisational and administrative arrangements of NSS at National, State University and College levels.

Each student has to undergo a minimum of 240 hours of regular service in 4 consecutive semesters and attend one special camp of ten days duration in the following activities to complete the courses NSS-102, NSS-201 and NSS-202.

Adult education programmes of continuing education of school dropouts, coaching of students from economically weaker sections. Organisation of Youth clubs, discussions on eradication of social evils like casteism, regionalism, corruption, untouchability, etc. non-formal education of rural youth. Awareness programmes on drug abuse and AIDS – Voter awareness campaign.

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**NSS-102 NATIONAL SERVICE SCHEME 1 (0+1)**

**Practicals**

Environmental enrichment and conservation plantation of trees, their preservation and upkeep. Construction of rural roads, clearing of village ponds, popularisation of biogas plants, prevention of soil erosion. Programmes of work during emergencies and natural calamities like cyclones, floods and earth quake – assisting the authorities in distributions of rations, medicines and clothes – assisting health authorities in inoculation, supply of medicines, etc. Reconstruction of huts, relief and rescue work.

Health, family welfare and nutrition programmes, mass immunisation, blood donation, integrated child development, population education programmes aimed at creating awareness for improvement of the status of woman – production oriented programmes – teaching improved agricultural technologies, rodent control and pest management, weed control, soil testing,

guidance in animal husbandry and poultry farming, animal health checking programmes and small savings.

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**NCC-101 NATIONAL CADET COPRS-I 1 (0+1)**

**Practicals**

- 1 Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
  - 2 Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
  - 3 Sizing, numbering, forming in three ranks, open and close order march and dressing.
  - 4 Saluting at the halt, getting on parade, dismissing and falling out.
  - 5 Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
  - 6 Turning on the march and wheeling. Saluting on the march.
  - 7 Marking time, forward march and halt.
  - 8 Changing step, formation of squad and squad drill.
  - 9 Command and control, organization, badges of rank, honours and awards
  - 10 Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
  - 11 Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
  - 12 Leadership traits, types of leadership. Character/personality development.
  - 13 Civil defense organization, types of emergencies, fire fighting, protection,
  - 14 Maintenance of essential services, disaster management, aid during development projects.
  - 15 Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
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7. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
11. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game
12. Teaching of some of Asanas – demonstration, practice, correction and practice
13. Teaching of some more of Asanas – demonstration, practice, correction and practice
14. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
15. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
16. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
17. Teaching – Meaning, Scope and importance of Physical Education
18. Teaching – Definition, Type of Tournaments
19. Teaching – Physical Fitness and Health Education
20. Construction and laying out of the track and field

(\*The girls will have Tennikoit and Throw Ball)

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**PED.102                      PHYSICAL EDUCATION                      1(0+1)**

**Practicals**

1. Teaching of skills of Hockey – demonstration practice of the skills and correction.
2. Teaching of skills of Hockey – demonstration practice of the skills and correction. And involvement of skills in games situation
3. Teaching of advance skills of Hockey – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
4. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
5. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
6. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of different track events – demonstration practice of the skills and correction.
8. Teaching of different track events – demonstration practice of the skills and correction.
9. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
10. Teaching of different field events – demonstration practice of the skills and correction.
11. Teaching of different field events – demonstration practice of the skills and correction.
12. Teaching of different field events – demonstration practice of the skills and correction.
13. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
14. Teaching of different asanas – demonstration practice and correction.

compensation. Crop Insurance: advantages, limitations in application and estimation of crop yields. Agricultural cooperation: philosophy and principles. History of Indian cooperative movement: pre-independence and post independence periods, cooperation in different plan periods. Cooperative credit structure: short term [PACS and FSCS] and long term [PCARD]. Micro finance and SHGs. Successful co-operative systems in different states.

### **Practicals**

- 1 Exercises on time value of money-compounding and discounting
  - 2 Study of balance sheet
  - 3 Study of income statement and cash flow statement
  - 4 Estimation of credit needs and determination of unit costs
  - 5 Types of repayment plans
  - 6 Preparation of Project proposal for dairying
  - 7 Preparation of project proposal for poultry activity
  - 8 Preparation of project proposal for fisheries
  - 9 Preparation of project proposal for agro-based industries
  - 10 Project evaluation technique-NPV
  - 11 Project evaluation techniques-BCR and payback period
  - 12 Project evaluation technique-IRR
  - 13 Visit to and study of PACS
  - 14 Visit to and study of DCCB
  - 15 Visit to and study of PCARDB
  - 16 Study of Apex bank
  - 17 Visit to and study of RRBs
  - 18 Visit to and study of CBs
- 

## **AEC 202 PRODUCTION ECONOMICS AND FARM MANAGEMENT**

**2 (1+1)**

### **Theory**

Production Economics: meaning, definition, nature and scope. Basic concepts and terms. Production: factors of production: meaning and characteristics. Natural Resources: meaning and classification. Production functions: meaning and types. Factor-Product relationship; Laws of returns: increasing, constant and decreasing. Determination of optimum input and output. Factor-factor relationship. Product-product relationship. Types of enterprise relationships. Returns to scale: meaning and importance. Farm management: meaning, definition, nature and scope. Economic principles applied to the farm business. Types and systems of farming. Farm planning and budgeting. Risk and uncertainty.

### **Practicals**

- 1 Computation of different types of costs
- 2 Methods of computation of depreciation
- 3 Methods of computation of depreciation
- 4 Exercises on farm management principles-principle of variable proportions
- 5 Exercises on farm management principles-Principle of least cost combination of inputs
- 6 Exercises on farm management principles-principle of enterprises combination
- 7 Exercises on farm management principles-Principle of equi marginal returns (opportunity cost) and principle of comparative advantage
- 8 Analysis of net worth statement
- 9 Farm inventory analysis
- 10 Preparation of farm plans
- 11 Preparation of farm budgets
- 12 Study of physical farm records
- 13 Study of financial farm records

and their types, water lifting devices – pumps (shallow and deep well), capacity, power calculations. Land grading and levelling – methods, equipment including laser guided levelling machine. Water conveyance systems - open channel and underground pipeline and their design. Irrigation methods – drip and sprinkler irrigation systems and their design. Drainage of agricultural lands – surface and sub-surface drainage systems and their design. Farmstead – planning and layout of farm structures.

### Practicals

- 1 Use of survey instruments in the field
  - 2 Ranging, measurement of offsets and obstacles in chaining
  - 3 Use of field book, chain survey of a given area and plotting
  - 4 Calculation of field area by different methods
  - 5 Dumpy level and its temporary adjustments, entry of field book
  - 6 Survey for preparation of contour map using dumpy level
  - 7 Preparation of contour map
  - 8-10 Use of total survey station for leveling
  - 11 Study of leveling equipment including laser guided levelling machine
  - 12 Design of water conveyance system- open and pipeline system
  - 13 Design of sprinkler irrigation system
  - 14 Design of drip irrigation system
  - 15 Design of surface drainage system
  - 16 Design of subsurface drainage system
  - 17 Selection, installation, operation and trouble shooting in centrifugal pumps
  - 18 Planning and layout of farm structures
- 

## AEG. 201 FARM POWER AND MACHINERY 2 (1+1)

### Theory

Farm power in India - sources, IC engines, working principles, two stroke and four stroke cycle engines. IC engines - terminology, different systems of IC engines – valves, cooling, lubrication, ignition and fuel systems.

Tractors – types and control systems, steering, brake and hydraulic. Selection of tractor and cost of tractor operation. Tillage implements – primary and secondary tillage implements, implements for intercultural operation. Seed drills, paddy transplanters, plant protection equipment and harvesting equipment. Threshing – threshers for different crops. Care and maintenance of the various implements.

### Practicals

- 1 Study of workshop tools used in farm shops, care and maintenance
  - 2 Study of principal parts of diesel engine and specifications
  - 3 Study of working principles of four stroke and two stroke cycle engines.
  - 4 Study of valve system in engine
  - 5 Study of fuel supply and ignition system of petrol engine
  - 6 Study of fuel supply system of diesel engine and governors
  - 7 Study of cooling system of tractor
  - 8 Study of lubricating system of tractor
  - 9 Study of transmission system, clutch, gear box and differential.
  - 10 Study of hydraulic system
  - 11 Study of brake and steering system
  - 12 Hitching and unhitching of implements to tractor and methods of ploughing
  - 13 Study of M.B and disc ploughs and their adjustments
  - 14 Study of secondary tillage equipment – harrows and cultivators
  - 15 Study of seed drills, planters and calibration
  - 16 Study of plant protection equipment - sprayers and dusters
  - 17 Study of mowers, reapers and combines.
  - 18 Study of thresher, winnowers, their operations, care and maintenance
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- 8 Study of wind mill and constructional details.
- 9 Field visit to wind mill installation and calculation of water discharge and power.
- 10 Study of solar still and solar cookers.
- 11 Study of solar water heaters and dryers.
- 12 Study of solar photo voltaic cells for pumping of water and solar panel.
- 13 Study of solar lantern and solar street light
- 14 Study of bio- diesel production unit from jatropha plant
- 15 Field visit to ethanol production plants and sugarcane factory.
- 16 Study of shredders.
- 17 Study of briquette making machines.
- 18 Study of gasifire plants.

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## AGRICULTURAL ENTOMOLOGY

### AET. 101 GENERAL ENTOMOLOGY

3 (2+1)

#### Theory:

Classification of phylum Arthropoda up to classes. Relationship of class Hexapoda with other classes of Arthropoda. Factors responsible for dominance of insects. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation. Structure of head, thorax and abdomen. Structure and modifications of insect antennae, mouthparts and legs. Wing venation and modifications. Sound and light producing organs. Metamorphosis and diapause in insects. Types of egg, larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous and reproductive systems. Systematics- importance, history, development and binomial nomenclature. Definitions of Biotype, sub-species, species, genus, family and order. Classification of class Hexapoda up to Orders of agricultural importance. Odonata, Orthoptera- Acrididae, Blatteria, Mantodea Mantidae, Isoptera- Termitidae. Thysanoptera- Thripidae; Hemiptera- Pentatomidae, Coreidae, Pyrrhocoridae, Lygaeidae, Reduviidae, Miridae. Homoptera- Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Lophopidae and Pseudococcidae. Neuroptera- Chrysopidae and Hemirobiidae. Lepidoptera- Papilionidae, Lycaenidae, Nymphalidae, Hesperidae, Pieridae, Tortricidae, Yponomeutidae, Noctuidae, Sphingidae,

Pyralidae, Lymantridae, Bombycidae, Saturnidae, Gelechiidae and Arctiidae. Coleoptera- Coccinellidae, Chysomelidae, Cerambycidae, Scolytidae, Carabidae, Curculionidae, Bruchidae, Scarabaeidae, Dermestidae, Tenebrionidae and Meloidae. Hymenoptera- Tenthredinidae, Apidae, Trichogrammatidae, Eulophidae, Chalcididae, Formicidae, Vespidae, Ichneumonidae and Braconidae. Diptera- Culicidae, Muscidae, Cecidomyiidae, Tephritidae, Tachinidae, Agromyziidae, Anthomyiidae and Syrphidae.

#### Practicals

- 1 Distinguishing characteristics of classes of the phylum Arthropoda
- 2 Methods of collection and preservation of insects including immature stages
- 3 External morphology of Cockroach
- 4 Types of insect antennae and mouthparts
- 5 Modifications of legs, wings and wing coupling mechanisms.
- 6 Types of insect eggs, larvae and pupae
- 7 Study of Cockroach for digestive, excretory, circulatory and respiratory systems
- 8 Study of cockroach female and male reproductive and nervous systems
- 9 Characteristics of Odonata, Orthoptera and their families
- 10 Characteristics of Blatteria, Mantodea, Isoptera and their families
- 11 Characteristics of Hemiptera and their families
- 12 Characteristics of Homoptera and their families
- 13 Characteristics of Thysanoptera, Neuroptera and their families
- 14 Characteristics Lepidoptera (butterflies) and their families
- 15 Characteristics Lepidoptera (moths) and their families
- 16 Characteristics Coleoptera and their families
- 17 Characteristics Hymenoptera and their families
- 18 Characteristics Diptera and their families

**Note :** Each student should submit 40 adult insects representing different orders & 10 different immature insects at the time of practical examination.

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### Practicals

- 1 Pests of rice
- 2 Pests of sorghum, maize, wheat and ragi
- 3 Pests of pigeonpea, chickpea, blackgram, greengram, cowpea and soybean
- 4 Pests of groundnut, safflower, sunflower, castor, sesamum and mustard
- 5 Pests of cotton
- 6 Pests of sugarcane and tobacco
- 7 Pests of mango, guava, grapes and banana
- 8 Pests of citrus, sapota, pomegranate and ber
- 9 Pests of brinjal, tomato and potato
- 10 Pests of sweet potato, chilli, onion, garlic, bhendi and amaranthus
- 11 Pests of cruciferous vegetables
- 12 Pests of cucurbitaceous vegetables
- 13 Pests of coconut, arecanut, betelvine, coffee and tea
- 14 Pests of turmeric, ginger and curry leaf
- 15 Pests of cardamom, cashewnut, coriander and pepper
- 16 Pests of rose, chrysanthemum, crossandra, anthurim, gladiolus, tuberose, gerbera etc
- 17 Study of coleopteran stored grain pests
- 18 Study of lepidopteran and other stored grain pests

Note: Each student should collect 50 insect pests representing different crops and submit at the time of practical examination

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**AET. 302                      SERICULTURE                      1 (0+1)**

### Practicals

- 1 External morphology and host plants of mulberry and non-mulberry silkworms.
- 2 Study of silk glands, digestive system and reproductive systems of mulberry silkworm.
- 3 Study of different races of mulberry silkworm.
- 4 Study of mulberry varieties and nursery raising techniques.
- 5 Establishment of mulberry garden.

- 6 Management of mulberry garden.
- 7 Study of important pests and diseases of mulberry and their management.
- 8 Study of model rearing house, rearing appliances and disinfection.
- 9 Methods of transportation and incubation of eggs of mulberry silkworm.
- 10 Methods of rearing chawki silkworms.
- 11 Methods of rearing grownup mulberry silkworms.
- 12 Moulting and mounting of silkworms and their management.
- 13 Harvesting and marketing of mulberry silk cocoons.
- 14 Study of pests of mulberry silkworm and their management.
- 15 Study of diseases of mulberry silkworm and their management.
- 16 Grainage techniques of mulberry silkworm.
- 17 Mulberry silk reeling techniques.
- 18 Visits to sericulture units.

**Note:** Each student should rear one disease free laying from egg to egg.

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### AGRICULTURAL EXTENSION & EDUCATION

**AEX.201                      DIMENSIONS OF AGRICULTURAL                      1(1+0)**  
**EXTENSION**

### Theory

Education-Meaning, Definition, Types -Formal, Informal and Non-formal education and their Characteristics. Extension Education and Agricultural Extension-Meaning, Definition, Concepts, Objectives and Principles. Rural Development -Meaning, Definition, Concepts, Objectives, Importance and Problems in rural development. Rural Reconstruction efforts of pre-independence era. Community Development Programme -Meaning, Definition, Concepts, Philosophy, Principles, Objectives, Difference between Community Development and Extension Education, National Extension service. Panchayat Raj system - Meaning of Democratic Decentralization and Panchayat Raj, Three tiers of Panchayat Raj system, Powers, Functions and Organizational setup. Agricultural Development Programmes with reference to year of start, objectives & salient features - Intensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP), DPAP, National Agricultural Extension Programme

**AEX. 302 ENTREPRENEURSHIP DEVELOPMENT 2(1+1)  
AND COMMUNICATION SKILLS**

**Theory**

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalization and the emerging business / entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programme; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to agriculture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of agri inputs industry .Characteristics of Indian agricultural processing and export industry .Social Responsibility of Business. Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

**Practicals**

1. Learning communication skills: presentation skills, listening skills and writing skills
2. Study of entrepreneurial and managerial characteristics
3. Exercises on note taking, field diary and lab record keeping
4. Learning skills of indexing, footnote and bibliographic procedures

5. Exercises on reading and comprehension of general and technical articles
  6. Practicing of precise writing, summarizing and abstracting of articles
  7. Visit to government organizations/ SSI to study the ongoing schemes and measures taken for promotion of entrepreneurship
  8. Visit to agencies promoting contract farming and joint ventures
  9. SWOT analysis of various government schemes and programmes
  10. Experiencing public speaking and group discussion
  11. Exercises on organising seminars and conferences
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**AGRICULTURAL MICROBIOLOGY**

**AMB. 201 AGRICULTURAL MICROBIOLOGY 3 (2+1)**

**Theory:**

Microbes and their importance. History of Microbiology; Branches of Microbiology. Prokaryotes including archaea, eukaryotes; cell structure, function. Viruses: types and structure, bacteriophages, lytic and lysogenic cycles, viroids and prions. Growth and nutrition, factors affecting microbial growth. Metabolism in bacteria: ATP generation, chemoautotrophy, photoautotrophy, respiration and fermentation. Bacterial genetics: genetic recombination methods- transformation, transduction, conjugation; plasmids and episomes. Gene expression and genetic engineering, genetically modified organisms.

Foods as substrates for microorganisms: food spoilage, principles of food preservation, food infection and food poisoning. Fermented foods- tempeh, sauerkraut; microbes as food - single cell proteins (SCP), mushrooms. Microbiology of water- potable water, potability tests. Dairy microbiology: microbiology of milk and silage, fermented dairy products- curds, butter, cheese, etc. Industrial Microbiology: scope, microbes used in industries, types of fermentation; fermentation of beer, wine, vinegar,

12. Isolation and study of associative  $N_2$  fixing bacteria – *Azospirillum*.
13. Study of Azolla and BGA
14. Study of sulphur oxidizing bacteria and S oxidation in soil.
15. Study of sulphate reduction in soil and microbes associated.
- 16-17 Isolation of phosphate solubilizing microorganisms from soil and studying their P-solubilizing activity.
18. Study of VA mycorrhizal fungi in soil and crop plants.

**AST.101                      FUNDAMENTALS OF STATISTICS                      2(1+1)**

**Theory**

Introduction: Definition of Statistics and its use and limitations; Frequency distribution and Frequency curves; Measures of Central Tendency: Characteristics of Ideal Average, Arithmetic Mean; Median , Mode, Merits and Demerits of Arithmetic Mean; Measures of Dispersion: Standard Deviation, Variance and Coefficient of Variation; Probability: Definition and concept of probability; Normal Distribution and its properties; Introduction to Sampling: Random Sampling: the concept of Standard Error; Tests of significance- Types of Errors, Null Hypothesis; Level of significance and Degrees of Freedom, Steps involved in testing of hypothesis; Large Sample Test- SND test for Means, single Sample, Two Samples (all types); Small Sample Test for Means, Student's t-test for single Sample, Two Samples and Paired t test. F test; Chi-Square Test in 2x2 Contingency Table, Yates' Correction for continuity; Correlation: Types of Correlation and identification through Scatter Diagram, Computation of Correlation Coefficient 'r' and its testing. Linear Regression: of Y on X and X on Y. Inter-relation between 'r' and the regression coefficients, fitting of regression equations. Experimental Designs: Basic Designs, Completely Randomized Design (CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design(LSD), Layout and analysis, Split plot design layout and analysis.

**Practicals**

- 1 Construction of Frequency Distribution tables and frequency curves.
- 2 Computation of Arithmetic Mean for grouped and ungrouped data.
- 3 Computation of Median for grouped and ungrouped data.
- 4 Computation of Mode for grouped and ungrouped data.
- 5 Computation of Standard Deviation, Variance and Coefficient of Variation for grouped and ungrouped data.
- 6 Probability and Normal Distribution.
- 7 SND test for single sample mean and two sample means
- 8 Student 't' test for single sample mean and two sample means.
- 9 Paired 't' test and 'F' test
- 10 Chi-Square test for 2x2 contingency table with Yates Correction.
- 11 Computation of Correlation Coefficient.
- 12 Test of significance for Correlation Coefficient.
- 13 Fitting of regression equation of Y on X.
- 14 Fitting of regression equation of X on Y.
- 15 Analysis of Completely Randomized Design (CRD).
- 16 Analysis of Randomized Complete Block Design (RCBD).
- 17 Analysis of Latin Square Design (LSD).
- 18 Analysis of Split Plot Design

**AGRONOMY**

**AGR.101                      INTRODUCTORY AGRICULTURE,                      3(2+1)**  
**PRINCIPLES OF AGRONOMY AND**  
**AGRICULTURAL METEOROLOGY**

**Theory:**

Introduction and importance of agriculture, ancient agriculture, history of agricultural development in India and World. Agro-climatic zones of India and Karnataka. National and International Agricultural Research Institutes. Meaning and scope of agronomy, principles of agronomy. Factors affecting crop production: soil, climate and management, Soil

**AGR. 202 PRACTICAL CROP PRODUCTION I 1 (0+1)**

Crop planning, raising field crops in multiple cropping systems: Raising of crop/s on an area of minimum of five *gunthas* of land and carrying out various field operations such as seed bed preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, gross returns and net returns per student and per hectare.

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**AGR.203 PRACTICAL CROP PRODUCTION II 1 (0+1)**

Crop planning, raising field crops in multiple cropping systems: Raising of crop/s on an area of minimum of five *gunthas* of land and carrying out various field operations such as seed bed preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, gross returns and net returns per student and per hectare.

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**AGR 204 WEED MANAGEMENT 1 (0+1)**

Weeds: Introduction, harmful and beneficial effects, classification. Characteristics of weeds, crop-weed competition. Principles of weed management. Concepts of weed prevention, control, eradication and management. Methods of weed management: physical, cultural, chemical and biological methods. Integrated weed management. Herbicides: advantages and limitation of herbicide usage. Herbicide classification, formulations, mode of action, methods of application. Weed management in major field crops/ cropping systems. Study of obnoxious, parasitic and aquatic weeds and their management. Allelopathy, weed management in horticultural crops.

**Practicals**

- 1 Identification and classification of common weeds on the campus.
- 2 Biology of important weeds

- 3 Collection, identification and preservation of weeds.
  - 4 Weed prevention and cultural methods of weed management.
  - 5 Classification of herbicides.
  - 6 Study of herbicides
  - 7 Herbicide formulations and techniques of herbicide application (pre-emergence, pre-plant incorporation and post-emergence)
  - 8 Herbicide dose calculation
  - 9 Integrated weed management in cereals and forage crops
  - 10 Integrated weed management in commercial crops,
  - 11 Integrated weed management in oilseeds and pulses
  - 12 Integrated management of parasitic weeds
  - 13 Integrated management of obnoxious / problematic weeds.
  - 14 Integrated management of aquatic weeds
  - 15 Integrated management of vegetation in non-cropped area
  - 16 Biological control of weeds through insects.
  - 17 Biological control of weeds through mycoherbicides.
  - 18 Visit to AICRP on weed control and areas with severe weed infestation.
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**AGR.301 IRRIGATION WATER MANAGEMENT 2(1+1)**

**Theory**

Irrigation: definition and objectives. Water resources and irrigation development in India and Karnataka. Soil-plant-water relationships; soil water energy relations, methods of soil moisture estimation, evapo-transpiration and crop water requirement, effective root zone, moisture extraction pattern, moisture sensitive periods of crops, effective rainfall. Suitability of soil for irrigation, quality of irrigation water. Scheduling of irrigation. Methods of irrigation: surface, sub-surface, sprinkler and drip irrigation; Irrigation efficiency and water use efficiency, conjunctive use of water. Water requirement and water management in different crops (rice, wheat maize, groundnut, sugarcane, cotton etc.). Agricultural drainage.



Growth and Development : Definition , determinate and indeterminate growth , growth parameters and growth analysis and plant ideotype concept

Transpiration –significance, transpiration in relation to crop productivity , water use efficiency (WUE) in C<sub>3</sub>, C<sub>4</sub>, CAM plants.

Crop water relations –Physiological importance of water to plants, water potential and its components, measurement of water status in plants. Abiotic stresses – water, salt, heat, cold and ionic.

Nutriophysiology –definition and Mengel’s classification of plant nutrients – physiology of nutrient uptake- functions of plant nutrients – deficiency and toxicity symptoms of plant nutrients, foliar nutrition – hydroponics.

Plant growth regulators- occurrence , biosynthesis, mode of action of Auxins, Gibberellins, Cytokinins, ABA and Ethylene .Novel plant growth regulators, commercial application of plant growth regulators in agriculture.

Photoperiodism – Introduction , classification of plants in relation to photoperiodic requirement –phytochrome, cryptochrome, vernalisation and its significance.

Senescence and abscission – definition, classification, theories of mechanism and control of senescence – physiological and biochemical changes and their significance.

Post harvest physiology – Physiological maturity –morphological and physiological changes associated with physiological maturity in crop, harvestable maturity. Fruit ripening – metamorphic changes – climacteric and non climacteric fruits- hormonal regulation of fruit ripening (with ethrel, CCC, Polaris, Paclobutrazole).

Physiological basis of seed dormancy

Physiological disorders in crop plants like leaf reddening, bad boll opening, yellow leaf disease in arecanut

### Practicals

- 1 Preparation of solutions
- 2 Growth analysis measurement of growth parameters
- 3 Methods of measuring the water status in roots, stems and leaves;

- 4 Measurement of water potential by Chardakov’s method.
- 5 Measurement of absorption spectrum of chloroplastic pigments and florescence.
- 6 Measurement of leaf area by different methods
- 7 Measurement of stomatal frequency and stomatal index
- 8 Respirometer- Measurement of respiration by respirometer.
- 9 Leaf anatomy of C<sub>3</sub> and C<sub>4</sub> plants
- 10 Measurement of transpiration
- 11 Yield analysis
- 12 Demonstration of effect of ethrel on fruit ripening
- 13 Measurement of photosynthetic rate
- 14 Effect of cytokinins on chloroplast greening
- 15 Demonstration of nutrient deficiency symptoms by using Hogland’s solution
- 16 Demonstration of photoperiodic response in plants. Effect of plant growth regulators in inducing & breaking seed dormancy

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## GENETICS AND PLANT BREEDING

**GPB.101                      PRINCIPLES OF GENETICS                      3(2+1)**

### Theory

Study of chromosome structure, morphology, number and types, karyotype and idiogram. Mitosis and meiosis, their significance and differences between them. Crossing over and factors affecting it, mechanism of crossing over and cytological proof of crossing over. Numerical chromosomal aberrations ( polyploidy) and evolution of different crop species like cotton, wheat, tobacco, triticale and brassicas. Structural chromosomal aberrations.

Mendel’s laws of inheritance and exceptions to the laws; types of gene action( Intra and intergenic interaction). Multiple alleles, pleiotropism,

- 6 Study of male sterility systems in important crops
  - 7 Layout of experiments for conducting trials
  - 8 Use of Biometrics in plant breeding
  - 9 Use of Biometrics in plant breeding
  - 10 Use of Biometrics in plant breeding
  - 11 Estimation of heterosis and inbreeding depression
  - 12 Handling of segregating populations in self pollinated crops
  - 13 Maintainance of records and registers
  - 14 Induction of mutation and handling irradiated material
  - 15 Screening techniques for resistance to diseases
  - 16 Screening techniques for resistance to insects
  - 17 Screening techniques for resistance to abiotic stresses
  - 18 Visit to research stations
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**GPB. 301 BREEDING OF FIELD AND HORTICULTURE CROPS 3(2+1)**

**Theory**

Study of origin and distribution of crop species, phylogeny, breeding objectives and approaches in cereals, (rice, wheat, maize, sorghum, bajra and ragi), pulses (red gram, bengal gram, green gram, black gram and soybean), oilseeds ( groundnut, sesame, sunflower, safflower, castor and mustard), fibers ( cotton, jute), commercial crops (sugarcane, tobacco),vegetables (tomato, bhendi, chilli and important cucurbits), flower crops ( chrysanthemum, rose, galardia, gerbera and marigold), fruit crops ( aonla, guava, mango, banana and papaya) and forage crops

**Practicals**

1. Study of floral structure, floral biology of important crop plants viz.,  
Cereals
- 2 Millets
- 3 Pulses
- 4 Oilseeds
- 5 Fiber crops
- 6 Important commercial crops

- 7 Forage crops
  - 8 Vegetables
  - 9 Vegetables (Contd.)
  - 10 Flower crops
  - 11 Fruit crops
  - 12 Cataloguing of released varieties and hybrids of crop plants.
  - 13&14 Preparation of plant descriptors for crop plants ( cereals, millets, pulses, oilseeds, and fibre crops)
  - 15 Preparation of plant descriptors for crop plants ( commercial crops and horticultural crops)
  - 16&17 Visit to research stations and places of interest in relation to plant breeding activities of different crops.
  - 18 Visit to AICRP trials.
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**HORTICULTURE**

**HRT.101 FUNDAMENTALS OF HORTICULTURE AND FRUIT PRODUCTION 3 (2+1)**

**Theory**

Definition, importance and scope of horticulture. Branches of horticulture. Classification of horticultural crops. Orchard layout systems. Principles of establishment of orchards - selection of site, fencing and wind break. Planting and establishment. Systems of orcharding - high density orchard, multi-storeyed orchard and dry land orchard. Principles of training and pruning. Fruitfulness- factors influencing fruitfulness. Causes for unfruitfulness. Use of growth regulators in fruit production.

Introduction, origin, distribution, area, production, soil, climate, planting, spacing, nutrition, other cultural practices, harvesting and yield of fruits - Major: Mango, banana, citrus, grape, guava, sapota, apple, litchi, papaya; Minor: pineapple, annonaceous fruits, pomegranate, ber and fig.

**Practicals**

1. Study of garden tools and implements
2. Layout system in orchards.
3. Irrigation methods in orchards

**HRT.301 VEGETABLES AND ORNAMENTAL HORTICULTURE 3(2+1)**

**Theory**

Definition, importance(role of vegetables in nutrition, antioxidants, anti-carcinogenic compounds) and scope of vegetables; anti-nutritional factors. Classification of vegetables based on : Method of culture; Botany; Parts used; Season of growing; Tolerance to water logging; Light intensity requirement and Light duration. Vegetable production systems: Home garden; Market garden; Truck garden; Vegetable garden for processing; Protected cultivation; Floating garden; Vegetable farming for seed production.

Introduction, soil, climate, varieties, seed rate, nutrition, spacing, other cultural practices, physiological disorders, harvesting and yield of vegetables - Solanaceous: Potato, Tomato, Brinjal, Chilli, Sweet pepper; Cole crops: Cabbage, Cauliflower, Knol-khol; Fabaceae : Peas, Phaseolus vulgaris, Dolichos bean, Cluster bean; Bulb crops: Onion and garlic ; Root crops: Carrot, Radish, Beet root, Sweet Potato, Cassava; Stem modification crops: Colocasia, Elephant foot yam ; Malvaceous vegetable : Okra ; Leafy vegetables: Fenugreek, Coriander, Spinach beet (Palak), Amaranthus ; Perennial vegetables: Drumstick, Curryleaf, Coccinia ; Cucurbitaceous vegetables : Watermelon, Muskmelon, Cucumber, Ridgegourd, Bittergourd, Bottlegourd, Pumpkin.

Introduction to ornamental horticulture. Importance of floriculture. Problems and prospects of floriculture industry in India. Principles of landscape gardening. Types and styles of ornamental gardens. Garden components (Edges, Hedges, Paths, Arches, Pergolas, Lawn etc). Cultivation practices for commercial flowers -Rose, Chrysanthemum, Gaillardia, Marigold and Jasmine.

**Practicals**

1. Study of seed materials of different vegetables and flowers
2. Study of preparation of nursery beds and seed sowing, potting, depotting and repotting
3. Layout of kitchen garden

4. Study of botany, genotypes and cultural practices of solanaceous vegetables – tomato, brinjal, chilli and bell pepper, potato
5. Study of botany, genotypes and cultural practices of cole crops
6. Study of botany, genotypes and cultural practices of cucurbitaceous vegetables
7. Study of botany, genotypes and cultural practices of leguminous vegetables
8. Study of botany, genotypes and cultural practices of bulb vegetables
9. Study of botany, genotypes and cultural practices of root vegetables
10. Study of botany, genotypes and cultural practices of okra and tuberous vegetables.
11. Study of botany, genotypes and cultural practices of leafy vegetables and perennial vegetables
12. Study of river bed cultivation of vegetables
13. Garden features
14. Identification of ornamental plants (Annuals, trees and shrubs)
15. Identification of ornamental plants (climbers, house plants and palms)
16. Planning and layout of garden and lawn
17. Study of botany, genotypes and cultural practices of Rose, Chrysanthemum, Gaillardia, Marigold and Jasmine
18. Visit to ornamental gardens or hi tech horticulture units

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**HRT.302 POST-HARVEST MANAGEMENT AND VALUE ADDITION TO FRUITS AND VEGETABLES 2 (1+1)**

**Theory**

Post-harvest technology – definition and importance. Causes of perishability ; Ripening and senescence.

Fresh form – Factors influencing post-harvest deterioration – Pre-harvest factors, Harvesting and handling techniques, Conditions during storage, Conditions during transport: Causes of post-harvest losses –

production of compounds of industrial and food value, phosphate solubilization. Expression of eukaryotic genes in prokaryotes and the production of insulin, growth hormone etc.

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## PLANT PATHOLOGY

### **PAT.201 INTRODUCTORY PLANT PATHOLOGY 2(1+1)**

#### **Theory**

Introduction, Important Plant Pathogenic organisms, different groups - fungi, bacteria, fastidious vascular bacteria, viruses, viroids, phytoplasmas, spiroplasmas, nematodes, algae, protozoa, phanerogamic parasites and abiotic factors with examples of diseases caused by them. Definition and objectives of Plant Pathology. History of Plant Pathology. Terms and concepts in Plant Pathology. Outline of classification of various groups of plant pathogens. Prokaryotes: classification of prokaryotes according to Bergey's Manual of Systematic Bacteriology. General Characters of fungi, classification of fungi. Key to divisions and sub divisions. Characters of Plant viruses and their classification; characters of plant nematodes and their classification. Importance of Seed Pathology and Post-harvest Pathology.

#### **Practicals**

- 1 Study of microscopes.
- 2 Collection and preservation of diseased specimens.
- 3 Study of symptoms and diagnosis of plant diseases.
- 4 Morphological characters of fungi.
- 5 Morphological characters of bacteria.
- 6 Morphological characters of virus, purification of virus and phytoplasma
- 7 Morphological characters of plant parasitic nematodes and extraction of nematodes.
- 8 Preparation of culture media.

- 9 Methods of sterilization and disinfection.
  - 10 Isolation techniques for fungi and bacteria.
  - 11 Methods of inoculation and proving Koch's postulates.
  - 12 Seed health testing methods.
  - 13 Study of plant protection chemicals.
  - 14 *In vitro* evaluation of chemicals and preparation of fungicide solution.
  - 15 Isolation and *In vitro* evaluation of biocontrol agents
  - 16 Methods of application of plant protection chemicals
  - 17 Use of plant protection appliances
  - 18 Study of post harvest diseases
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### **PAT.202 PRINCIPLES OF PLANT DISEASE MANAGEMENT 2 (2+0)**

Phenomenon of infection – pre penetration, penetration and post - penetration. Pathogenesis – Role of enzymes, toxins, growth regulators and polysaccharides. Plant disease epidemiology, assessment of plant disease and yield loss. Plant Disease Forecasting – Remote sensing, Computer application in forecasting. Defense mechanism in plants – Structural and Bio-chemical (pre and post infectional). Survival and Dispersal of Plant Pathogens. General principles of plant disease management: Exclusion: Plant Quarantine, inspection and certification, Impact of WTO on plant protection. Eradication: Cultural methods – Roguing, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation, soil amendments, time of sowing, adjustment of seed rate and plant density, irrigation and drainage. Protection: Physical and Chemical methods: different fungicides, applications of fungicides, antibiotics, AVP'S. Biological control: Role and mechanisms of bio control agents. Immunization: Cross protection, breeding for disease resistance, applications of biotechnology in plant disease management. Integrated plant disease management (IDM) options – Concept, advantages and importance.

- 12 Study of diseases of coriander and leafy vegetables.
- 13 Study of diseases of plantation crops.
- 14 Study of diseases of plantation crops (contd..)
- 15 Study of diseases of spices.
- 16 Study of diseases of ornamental plants.
- 17 Study of diseases of medicinal and aromatic plants.
- 18 Field visits.

**Note :** Students should submit 50 well pressed and mounted diseased specimens

## **SEED SCIENCE & TECHNOLOGY**

### **SST.101 PRINCIPLES OF SEED PRODUCTION AND CERTIFICATION 3(2+1)**

#### **Theory**

Introduction, seed and its importance. Seed quality - characteristics of good quality seeds, factors affecting seed quality and its maintenance. History and development of seed industry, national seed project, new seed policy, seed programmes- types, planning and execution.

Different classes of seed, generation system of seed multiplication and agencies involved in production and certification.

Principles of seed production- genetic, agronomic and economic principles, maintenance of genetic purity during seed production, deterioration of crop varieties – factors and their control, requirements of hybrid seed production and types of hybrids. Planning for certified, foundation and breeder seed production.

Seed production- foundation and certified seed production in maize (varieties, hybrids, synthetics and composites); rice (varieties and hybrids); sorghum and bajra (varieties and hybrids); cotton and sunflower (varieties and hybrids); castor (varieties and hybrids); tomato and brinjal (varieties and hybrids); chilli and bhendi (varieties and hybrids); onion and ridge gourd (varieties and hybrids).

Seed dormancy – definition, types, advantages and disadvantages, causes and measures for breaking seed dormancy. Induction of seed dormancy.

Seed certification – principles, objectives, phases and procedures. Duties and powers of Seed Inspectors and Seed Analyst. Field inspection, field counts and field and seed standards. Varietal Identification through Grow-Out Test and Electrophoresis.

Harvesting of seed crops. Post-harvest handling of seed produce.

Seed Drying – importance, principles and methods. Psychrometric chart and its use in seed drying process.

Seed processing – objectives and advantages. Air screen cleaner and its working principles. Different upgrading equipments and their use.

Seed treatment- Importance and types. Equipments used for seed treatment (slurry and mist-O-matic treater).

Seed testing – objectives, sampling procedures, testing for moisture, physical purity, germination, viability, vigour, seed health and heterogeneity.

Seed packaging – principles, procedures and types of containers.

Seed storage - general principles, stages, factors affecting seed longevity, conditions required for safe storage, measures for humidity, moisture and temperature control.

Seed marketing – organizations, structures, sales generation activities, promotional media, factors affecting seed marketing.

Seeds Act (1966) and Seeds Rules (1968) and their amendments, Seed Act Enforcement, Seed (Control) Order (1983), Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories.

#### **Practicals**

1. Identification of seeds
2. Study of seed structure in monocots and dicots
3. Seed sampling and testing equipments
4. Seed sampling procedure

of acid and acid sulfate soils and their reclamation ; Salt affected soils – sources of salts in soil, soil salinity and alkalinity, classification and characteristics of saline, saline-alkali and alkali soils, Reclamation of salt affected soils – mechanical, chemical and biological methods ; Calcareous soils and their management; Irrigation water – quality parameters and use of saline water in agriculture ; waterlogged soils – causes, problems and their management.

### Practicals

- 1 Determination of soil crust strength
- 2 – 3 Determination of soil permeability and hydraulic conductivity
- 4 Determination of reserve acidity of acid soils
- 5 Determination of lime requirement of acid soils
- 6 Determination of salt content (EC) of salt affected soils
- 7 – 8 Determination of water soluble cations of salt affected soils (Na, K, Ca & Mg)
- 9 –10 Determination of water soluble anions of salt affected soils ( $\text{CO}_3$ ,  $\text{HCO}_3$ , Cl &  $\text{SO}_4$ )
- 11-12 Determination of exchangeable Na, Ca and Mg in soils and computation of SAR
- 13–14 Determination of gypsum requirement of alkali soils.
- 15–18 Determination of quality parameters of irrigation waters (pH, EC, SAR, RSC etc.,).

## SAC 301 SOIL FERTILITY, FERTILIZERS AND MANURES 3 (2+1)

### Theory

Soil fertility – definition and factors affecting soil fertility ; Nutrient elements in plant nutrition – sources and classification, forms availability and mechanisms of transport to plant roots ; Factors controlling availability of plant nutrients in soil; Manufacturing processes and properties of commonly used fertilizers viz., urea, ammonium sulphate, super phosphate, DAP, muriate of potash and sulfate of potash. Complex, mixed and liquid fertilizers and their importance. Organic manures, classification and their

significance in soil fertility and soil health. Soil fertility evaluation – different approaches and methods; Soil testing methods and ratings, Plant analysis-principles, methods and critical nutrients concentration in plants; STCR and DRIS approaches for making fertilizer recommendations.

### Practicals

- 1 Soil sampling for fertility evaluation and preparation of soil sample for analysis
- 2 Determination of Organic Carbon in soils
- 3 Determination of available Nitrogen in soils
- 4 Determination of available Phosphorus in soils
- 5 Determination of available Potassium in soils
- 6 Determination of available Sulphur in soils
- 7 Determination of DTPA-extractable Micronutrients
- 8 Plant sampling and preparation of plant sample for analysis
- 9 Determination of Nitrogen in plant samples
- 10 Wet ashing of plant samples for determination of nutrients (Except N)
- 11 Determination of Phosphorus in plant samples
- 12 Determination of Potassium in the plant samples
- 13 Determination of Micronutrients (Zn, Fe, Cu and Mn) in plant samples
- 14 Rapid tissue testing for major plant nutrients
- 15 Qualitative tests for fertilizers and manures.
- 16 Estimation of Nitrogen content in nitrogenous fertilizers ( urea, ammonium sulphate and DAP )
- 17 Estimation of water soluble phosphorus in phosphatic -fertilisers (super phosphate and DAP)
- 18 Determination of Potassium in potassic fertilizers (muriate of potash and sulphate of potash )

## FOOD SCIENCE AND NUTRITION

### FSN 101 PRINCIPLES OF FOOD SCIENCE AND NUTRITION 1(1+0)

Relationship between Agriculture, Food and Nutrition. Importance in improving the food habits and nutrition situation of an individual, community and nation. Common terminologies used in Human Nutrition, Food and Health. Food and its functions, classification and nutritional value. Water, protein, fat, carbohydrate, vitamins and minerals – classification, function, sources and Recommended Dietary Allowance (RDA). Major macro and micro nutrient deficiencies. Importance of balanced diet and its formulation using RDA, nutrient computations. Importance of Supplementary foods. Importance of Food Groups. Methodology of dietary and nutritional survey. Nutrition related disorders. Food and nutritional Programmes operating at Community, National and International levels. Objectives of National Nutrition Policies aimed at improving nutritional status. Home scale methods of Food Preservation. Importance of Nutrition Education.

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### FOR 101 SILVICULTURE AND AGROFORESTRY 1(0+1)

#### Practicals

- 1 Status and scope of forest in India. Terminologies used in forestry. Biosphere and its effect on ecosystem.
- 2&3 Study of locality factors, forest succession, forest types, distribution, classification and characteristics of prominent Indian forest types.
- 4 Collection, identification and preservation of different tree species.
- 5 Forest nursery, establishment and operations
- 6 Collection and identification of tree seeds. Germination processes
- 7 Establishment of plantations, afforestation and deforestation
- 8 Management of plantations.
- 9 & 10 Study of Non – Timber Forest Products (NTFPs).

- 11&12 Visit to nearby forest types (seed orchard, Clonal orchard etc).
  - 13& 14 St Study of agroforestry systems, classification of agroforestry systems and Tree Crop Interactions.
  - 15 Visit to nearby agroforestry systems.
  - 16 Growth measurement of trees and stands.
  - 17&18 Visit to nearby energy plantations and forest based industries.
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## ENVIRONMENTAL SCIENCE

### ENS.301 ENVIRONMENTAL SCIENCE 2 (1+1)

#### Theory

Scope and importance of environmental studies, components of environment, definitions and their inter-dependence. Environment and ecology: Ecology definition, concept of ecosystem and types. Forest, water, agro ecosystem etc and their structure and functions. Biodiversity: Definition, importance and types. Threats to biodiversity and its conservation. Environmental pollution: Definition– the climate, present, past and future projections. Air pollution: Causes – types of air pollutants and their sources (Industrial, Vehicular, Agriculture, pollen etc), their effects – climate change. Effects on crops (Temperature, Increased CO<sub>2</sub>, Ozone, UV and other radiation). Air pollution and its effect on agro-systems productivity and implications, plants response to air pollutants. Global warming – causes, scales and characteristics, sea level rise , role of plants in pollution prevention and mitigation. Water pollution: causes – types of water pollutants and their sources (point sources–industries and domestic effluents, non-point sources agricultural ecosystem). Effects on ground/ surface waters, eutrophication of lakes and ponds, fauna and flora and health. Marine pollution. Impact of polluted water on crops and soil (physical, chemical and biological properties). Methods to control water pollution. Soil pollution: causes, types of soil pollutants, role of fertilizers, pesticides, solid wastes, heavy metals, organics and irrigation management. Effects on soil health, productivity and quality of produce. Measures to control soil pollution - using bio-remediation including phyto-remediation. Management of solid waste–composting, rapid composting, enrichment, concept of 3 R's

(Reduce, Recycle and Reuse). Pesticide pollution – air, water and soil and its impact on crops. An introduction to thermal, nuclear and noise pollution – causes, effects and control. The Environment Protection Acts – The Air Act, The Water Act, The Wild Life Protection Act, Forest Conservation Act, Environment Management Act and Bio-safety Acts etc. Role of I.T. in environment management.

### **Practicals**

1. Visit to local polluted sites and collection of soil and water samples.
2. Visit to polluting industries and collection of pollutant samples.
3. Determination of pH & EC of Polluted and Non-polluted samples (water/ sewage).
4. Determination of Dissolved Oxygen in Polluted samples.
5. Effects of Polluted water, Effluents and Soil on Seed Germination and Seedling Vigor.
6. Determination of BOD and COD of Polluted samples
7. Determination of Total Dissolved Solids (TDS) in Effluent samples.
8. Estimation of Nitrate contamination in Groundwater.
9. Analysis of Temporary and Total Hardness of Water samples.
- 10&11. Determination of Phosphates, Sulphates, fluorides and Chlorides in polluted water
12. Estimation of Particulate Matter/ Dust in Air.
13. Effect of dust on physiological traits of crops (transpiration, chlorophyll content etc.).
14. Determination of Noise Pollution using Sound Level meter.
15. Effect of photo-radiation / elevated CO<sub>2</sub> levels on growth of crops.
16. Microbial population (Facultative pathogens) of polluted air and water.
17. Microbiological (Facultative pathogens) analysis of sewage and industrial effluents.
18. Pesticide residue analysis – soil / grain / water / air
19. Response of plants to air pollution- stomatal conductance, photosynthesis

# Our Constituent Colleges



College of Agriculture, Dharwad



College of Agriculture, Raichur



College of Agriculture, Bijapur



College of Agriculture, Bheemarayana Gudi