III Semester		
AGRO 5211	Crop Production Technology – I *(Kharif Crops)*	2 (1+1)
APB 5211	Fundamentals of Plant Breeding	3 (2+1)
AEC 5211	Agricultural Finance and Cooperation	3 (2+1)
ASTAT 5211	Agri-Informatics	2 (1+1)
AENGG 5211	Farm Machinery and Power	2 (1+1)
AHVG 5211	Production Technology for Vegetables and Spices	2 (1+1)
AGRO-5212	Weed Management	3 (2+1)
AVET 5211	Livestock and Poultry Management	4 (3+1)
AENG 5211	Comprehension & Communication Skills in English	2 (1+1)
ABT 5211	Food Safety and Standards	3 (2+1)
Total		**26 (16+10)**

AGRO 5211	Crop Production Technology – I *(Kharif Crops)*	2 (1+1)

Theory

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops. Cereals – rice, maize, sorghum, pearl millet and finger millet, pulses-pigeonpea, mungbean and urdbean; oilseeds- groundnut, and soybean; fibre crops- cotton & Jute; forage crops-sorghum, cowpea, cluster bean and napier.

Practical

Rice nursery preparation, transplanting of Rice, sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of kharif season crops, study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

Theory

S.No.	Lecture	Periods
1	Origin, geographical distribution, economic importance, soil and climatic requirements	2
2	Varieties	1
3	Cultural practices and yield of *Kharif* crops. Cereals – rice, maize, sorghum, pearl millet and finger millet	2
4	Cultural practices and yield of *Kharif* crops -pulses-pigeonpea, mungbean and urdbean	2
5	Cultural practices and yield of *Kharif* crops -oilseeds- groundnut, and soybean	2
6	Cultural practices and yield of *Kharif* crops -fibre crops- cotton & Jute	1
7	Cultural practices and yield of *Kharif* crops forage crops-sorghum, cowpea, cluster bean and napier	2

Practical

S.No.	Lecture	Periods
1	Rice nursery preparation	1
2	Transplanting of Rice	1
3	Sowing of soybean, pigeonpea and mungbean. Maize, groundnut and cotton	1
4	Effect of seed size on germination and seedling vigour of kharif season crops	1
5	Effect of sowing depth on germination of kharif crops	1
6	Identification of weeds in kharif season crops	2
7	Top dressing and foliar feeding of nutrients	1
8	Study of yield contributing characters and yield calculation of kharif season crops	1
9	Study of crop varieties and important agronomic experiments at experimental farm	1
10	Study of forage experiments, morphological description of kharif season crop	1
11	Visit to research centres of related crops	1

APB 5211	Fundamentals of Plant Breeding	3 (2+1)

Theory

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility- genetic consequences, cultivar options. Domestication, Acclimatization and Introduction; Centers of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept. Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes- Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops, Clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations. Study of male sterility system. Handling of segregation populations. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.

Theory

1 Historical development, concept, nature and role of plant breeding, major achievements and future prospects-2
2 Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male sterility- genetic consequences, cultivar options-2
3 Domestication, Acclimatization and Introduction
4 Centres of origin/diversity, components of Genetic variation
5 Heritability and genetic advance
6 Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population-2
7 Multiline concept.
8 Concepts of population genetics and Hardy-Weinberg Law
9 Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes- Ear to row method, Modified Ear to Row, recurrent selection schemes-2
10 Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties-2
11 Breeding methods in asexually propagated crops, clonal selection and hybridization

12 Maintenance of breeding records and data collection; Wide hybridization and pre-breeding-2
13 Polyploidy in relation to plant breeding
14 mutation breeding-methods and uses
15 Breeding for important biotic and abiotic stresses
16 Biotechnological tools-DNA markers and marker assisted selection.
17 Participatory plant breeding
18 Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

1 Plant Breeder's kit
2 Study of germplasm of various crops.
3 Study of floral structure of self-pollinated and cross pollinated crops-2
4 Emasculation and hybridization techniques in self & cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations-2.
5 Study of male sterility system. Handling of segregation populations.
6 Methods of calculating mean, range, variance, standard deviation, heritability-2
7 Designs used in plant breeding experiments, analysis of Randomized Block Design-2.
8 To work out the mode of pollination in a given crop and extent of natural out-crossing, prediction of performance of double cross hybrids.

Suggested Reading:

R.W. Allard. *Principles of plant breeding.* John Wiley & Sons, New York.

V.L. Chopra. *Plant breeding: Theory and Practice.* Oxford & IBH Publishing CO. Pvt. Ltd., New Delhi.

Phundan Singh. *Essentials of plant breeding.* Kalyani Publishers

J.R. Sharma. *Principles and practices of plant breeding.* Tata McGraw Publishing Company Ltd., New Delhi

B.D. Singh. *Plant breeding : principles and methods.* Kalyani Publishers, Ludhiana.

R.C. Chaudhary. *Plant Breeding*

Hays and Garber. *Breeding crop plants.* Mc Graw Hill Publications, New York

G K Kallo. *Breeding of vegetables.* Panima publishers, New Delhi

W.R. Fehr. *Principles of cultivar development: theory and technique (Vol. 1).* Macmillan Publishing Company, New York.

D.S. Falconer. *Introduction to quantitative genetics.* Longman Scientific & Technical, Longman Group, UK, Ltd., England.

R.K. Singh and B.D. Chaudhary. *Biometrical methods in quantitative genetic analysis.* Kalyani Publishers, Ludhiana.

K. Mather and J.L Jinks. *Introduction to Biometrical genetics.* Chapman and Hall, London

B D Singh. *Fundamental of Plant breeding.* Kalyani. India.

Phundan Singh. *Essentials of plant breeding.* Kalyani. India

G. S. Chahal and S.S. Gosal. 2002. *Principles and Procedures of Plant Breeding.* Narosa Publishing House, New Delhi.

Poehlman, J.M. and Borthakar, D. 1995. *Breeding Asian Field Crops.* Oxford& IBH Publishing Co., New Delhi

AEC 5211	Agricultural Finance and Cooperation	3 (2+1)

Theory

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, element need, classification. Credit analysis: 3 R's, and $5C's$ and $7P's$ of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Balance Sheet and Income Statement. SWOT analysis.

Agricultural Cooperation – Meaning and definition objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- in five year plans credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, warehousing; role of ICA, NCUI, NCDC, NAFED.

Practicals

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business –Maximum credit limit. Preparation and analysis of balance sheet –income statement. Appraisal of a loan proposal. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products.

Theory

1 Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture-2
2 Agricultural credit: meaning, definition, need, classification-2
3 Credit analysis: 3 R's, and 5 C's and 7 P's of credits-2
4 Sources of agricultural finance: institutional and non-institutional sources, commercial banks, nationalization of commercial banks, Micro financing including KCC-3
5 Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India-3
6 Cost of credit.
7 Balance Sheet and Income Statement-2
8 SWOT analysis-2
9 Agricultural Cooperation – Meaning, objectives, principles of cooperation, significance of cooperatives in Indian agriculture-3
10 Agricultural Cooperation in India- in five year plans credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, warehousing; role of ICA, NCUI, NCDC, NAFED-4

Practicals

1 Determination of most profitable level of capital use.
2 Optimum allocation of limited amount of capital among different enterprise
3 Analysis of progress and performance of cooperatives using published data
4 Analysis of progress and performance of commercial banks and RRBs using published data-2
5 Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures.
6 Estimation of credit requirement of farm business – Maximum Credit Limit
7 Preparation and analysis of balance sheet
8 Preparation and analysis of income statement
9 Appraisal of a loan proposal
10 Techno-economic parameters for preparation of projects.
11 Preparation of Bankable projects for various agricultural products and its value added products.

ASTAT 5211	Agri-Informatics	2 (1+1)

Theory

S.No.	Topics	No. of Lectures
1.	Introduction to Computers and Operating System: Parts of Computers, Generation of computers Types of computers, DOS and Windows	01
2.	Applications of MS-Office: Document Creation and Editing in MS-Word. Data Handling in MS-Excel, Data presentation, interpretation and graph creation (Bar, Line, Pie diagrams and Histogram). MS-Powerpoint presentation.	02
3.	Statistical Analysis: Mean, Standard Deviation, Correlation and Regression using Mathematical Expressions in Excel. .	01
4.	Database in Agriculture: Concepts, types and uses of database in Agriculture, Use of DBMS (MS-Access).	01
5.	World Wide Web (WWW):: Elementary Concepts, Internet Explorer (IE), Search Engine (Google), Email.	01
6.	Introduction to computer programming languages: Standard Input/Output Operation in BASIC, BASIC language (programming codes for only calculating Mean and Standard Deviation).	02
7.	e-Agriculture and ICT: Concepts and applications, Use of ICT in Agriculture. Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc; Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.	04
	Total	**12**

Practical

S.No.	Topics	No. of Lectures
1.	Introduction to Computers and Operating System: Display of Computer Components, accessories, Creating Files & Folders, File Management using DOS and Windows OS.	01
2.	Applications of MS-Office: Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, creating graphs (Bar, Line, Pie diagrams and Histogram), analysis of scientific data.	02
3.	Statistical Analysis: Use of statistical tools and writing mathematical expressions using MS-Excel, Calculation of Mean, Standard Deviation, Correlation and Regression using Mathematical Expressions in Excel.	01
4.	Database in Agriculture: MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system.	01
5.	World Wide Web (WWW): Display of Introductory Concepts in Internet Explorer (IE), Search Engine (Google), Creation of Email.	01
6.	Introduction to computer programming languages: Practicals on Standard Input/Output Operation in BASIC, BASIC language (programming codes for only calculating Mean and Standard Deviation).	02
7.	e-Agriculture and ICT: Practical Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Display of Introductory Geospatial Technology using a GIS software system for generating valuable information for Agriculture. Practical Hands on Decision Support System in Agriculture. Preparation of contingent crop planning using ICT.	04
	Total	**12**

Suggested Readings

Gurvinder Singh, Rachhpal Singh & Saluja KK. 2003. *Fundamentals of Computer Programming and Information Technology.* Kalyani Publishers.

Harshawardhan P. Bal. 2003. *Perl Programming for Bioinformatics.* Tata McGraw-Hill Education.

Kumar A 2015. *Computer Basics with Office Automation.* IK International Publishing House Pvt Ltd.

Rajaraman V & Adabala N. 2015. *Fundamentals of Computers.* PHI.

AENGG 5211	Farm Machinery and Power	2 (1+1)

Theory

Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system of a tractor, Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor , Tractor types, Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations, Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

Practicals

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow . Familiarization with seed-cum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery.

Theory

No.	Title	No of lectures
1	Status of Farm Power in India, Sources of Farm Power ,	1
2	I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components of I.C. engine,	1
3	I.C. engine terminology and solved problems,	1
4	Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system of a tractor,	1
5	Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor ,	1
6	Tractor types, Cost analysis of tractor power and attached implement,	2
7	Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations,	2
8	Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples,	1
9	Familiarization with Plant Protection equipment,	1
10	Familiarization with harvesting and threshing equipment.	1

Practical details

No.	Title of practical
1	Study of different components of I.C. engine.
2	To study about air cleaning and cooling system of engine
3	To familiarize with different systems of tractor
4	Familiarization with operation of tractor driving
5	Familiarization with operation of power tiller
6	To study about different primary tillage implement- M B Plough and disc plough
7	To study about different secondary tillage implement- Disc harrow, cultivator etc
8	Familiarization with different parts of seed cum-fertilizer drills and planter and its calibration
9	Familiarization with different types of sprayers and dusters
10	Familiarization with different inter-cultivation equipment
11	Familiarization with harvesting machinery such as sickle, reaper
12	Familiarization with pedal and motor operated thresher Study about combine harvester

AHVG 5211	Production Technology for Vegetables and Spices	2 (1+1)

Theory

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Root crops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

Theory

1 Importance of vegetables & spices in human nutrition and national economy-2
2 kitchen gardening,
3 brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol;-5
4 Bulb crops such as Onion, Garlic;
5 Root crops such as Carrot, Raddish, Beetroot;
6 Tuber crops such as Potato;

7 Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

Practical

1 Identification of vegetables & spice crops and their seeds-2
2 Nursery raising-2
3 Direct seed sowing and transplanting-2
4 Study of morphological characters of different vegetables & spices-2
5 Fertilizers applications-2.
6 Harvesting & preparation for market. Economics of vegetables and spices cultivation-2

AGRO 52	Weed Management	3(2+1)

Theory

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application. Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agro-chemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

Theory

1. Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. 2
2. Classification, reproduction and dissemination of weeds.2
3. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. 3
4. Allelopathy and its application for weed management. 3
5. Bio-herbicides and their application in agriculture. 3
6. Concept of herbicide mixture and utility in agriculture.3
7. Herbicide compatibility with agro-chemicals and their application.3
8. Integration of herbicides with non chemical methods of weed management.3
9. Herbicide Resistance and its management.2

Practical

1. Techniques of weed preservation. 2
2. Weed identification and their losses study. 2
3. Biology of important weeds. 2
4. Study of herbicide formulations and mixture of herbicide. 2
5. Herbicide and agro-chemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. 2
6. Calculations of herbicide doses and weed control efficiency and weed index. 2

AVET 5211	Livestock and Poultry Management	4 (3+1)

Theory

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers.

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry.

Digestion in livestock and poultry. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Theory

1 Role of livestock in the national economy.-2
2 Reproduction in farm animals and poultry. -2
3 Housing principles, space requirements for different species of livestock and poultry-2
4 Management of calves, growing heifers and milch animals. -2
5 Management of sheep, goat and swine. -2
6 Incubation, hatching and brooding. -2
7 Management of growers and layers.-2
8 Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.-2
9 Improvement of farm animals and poultry.-2
10 Digestion in livestock and poultry. -2
11 Classification of feedstuffs. -2
12 Proximate principles of feed. -2
13 Nutrients and their functions. -2
14 Feed ingredients for ration for livestock and poultry. -2
15 Feed supplements and feed additives. -2
16 Feeding of livestock and poultry.-2
17 Introduction of livestock and poultry diseases. -2
18 Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.-2

Practical

1 External body parts of cattle, buffalo, sheep, goat, swine and poultry.
2 Handling and restraining of livestock.
3 Identification methods of farm animals and poultry.
4 Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records.
5 Judging of cattle, buffalo and poultry.
6 Culling of livestock and poultry. Planning and layout of housing for different types of livestock.
7 Computation of rations for livestock. Formulation of concentrate mixtures.
8 Clean milk production, milking methods.
9 Hatchery operations, incubation and hatching equipments.
10 Management of chicks, growers and layers.
11 Debeaking, dusting and vaccination.
12 Economics of cattle, buffalo, sheep, goat, swine and poultry production.

AENG 5211	Comprehension & Communication Skills in English	2 (1+1)

Theory

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

Practical

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

Theory:

Text for Comprehension

1. **War Minus Shooting - The Sporting Spirit (George Orwell) -3**
   - (a) Reading comprehension
   - (b) Vocabulary – Synonyms, Antonyms, and often confused words
   - (c) Exercises to help the students in the enrichment of vocabulary based TOEFL and GRE and other competitive examinations.
2. **A Dilemma - A Layman Looks at Science (Raymond B. Fosdick) -2**
   - (a) Reading comprehension
   - (b) Vocabulary - Homonyms and Homophones
   - (c) Exercises on Figurative Language & Idiomatic Language (e.g. dust and ashes, doorstep of doom, boundaries of knowledge, apple of one's eye, in a fix, etc).
3. **You and Your English - Spoken English and Broken English (G.B. Show) -2**
   - (a) Reading comprehension
   - (b) Language study, Functional Grammar, Agreement of Verb with subject

Grammar:

4. Functional Grammar-2

- (a) Articles
- (b) Prepositions
- (c) Verb
- (d) Subject-verb Agreement
- (e) Direct and Indirect Narration

Text for Communication Skills

5. Writing skills -3

(a) Letter writing - Mechanics of good letter, Effective Business correspondence, Personal correspondence.

(b) Report writing - Reports of events, meetings, experiments, business, etc.

(c) Paragraph writing.

(d) Precis writing

(e) Preparation of Curriculum vitae and Job applications.

(f) Interviews: Kinds, Importance and Process

Practical:

1. **Listening Comprehension:** Listening to short talks, lectures, speeches (scientific, commercial and general in nature)
2. **Communication:** Spoken English, oral communication, stress and intonation, conversation practices -2
3. **Oral Presentation of Reports:** Seminars and conferences, features of oral presentation, regulating speech, physical appearance, body language posture, eye contact, voice, audience, preparation of visual aids (Practical: One presentation by individual on the given topic related to agriculture like W.T.O, Developing new technologies in Agriculture, Bio fertilizers etc.;)-3
4. **Conversation Practices**: rate of speech, clarity of voice, speaking and listening politeness
5. **Reading skills:** reading dialogues, rapid reading, intensive reading, improving reading skills
6. **Meetings:** purpose, procedure participation, chairmanship, physical arrangements, recording minutes of meeting; Practice of Presentation by using power point and LCD projector-2
7. **Mock interviews**: testing initiative, team spirit, leadership, intellectual ability
8. Group Discussions and Debates on current topics;

Recommended book:

1. 'Current English for Colleges', By N. Krishnaswamy & T. Sriraman, MacMillan India Limited, Madras, 1995.

References:

1. 'Strengthen your Writing', By - V.R. Narayan Swami, Orient Longman Publication.
2. 'Business Communication and Report writing', By - G.S.R.K. Babu Rao, Himalaya Publishing House, Mumbai.
3. 'Write to Communicate', By - Geeta Nagraj, Foundation Books, New Delhi.
4. 'Improve your writing', By - V.N. Arora & Laxmi Chandra, Oxford University Press.
5. 'Creative English for Communication', By - N. Krishna Swami & N.T. Sriraman, MacMillan India Limited.
6. 'Developing Communication Skill', By - Krishna Mohan & Meena Banerji, MacMillan India Limited.

ABT 5211	Food Safety and Standards	3(2+1)

Theory

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Practical

Water quality analysis physico-chemical and microbiological. Preparation of different types of media. Microbiological Examination of different food samples. Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

Theory

1. Food Safety – Definition, Importance, Scope and Factors affecting Food Safety-2
2. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards-2
3. Management of hazards - Need.
4. Control of parameters.
5. Temperature control.
6. Food storage.
7. Product design.
8. Hygiene and Sanitation in Food Service Establishments- Introduction.
9. Sources of contamination and their control. Waste Disposal.
10. Pest and Rodent Control. Personnel Hygiene.
11. Food Safety Measures. Food Safety Management Tools- Basic concepts.
12. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series.
13. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis.
14. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene-2
15. Food laws and Standards- Indian Food Regulatory Regime, FSSA.
16. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens-2
17. Packaging, Product labeling and Nutritional labeling.
18. Genetically modified foods\ transgenics. Organic foods.
19. Newer approaches to food safety.
20. Recent Outbreaks. Indian and International Standards for food products.

Practical

1. Water quality analysis physico-chemical and microbiological-2
2. Preparation of different types of media.
3. Microbiological Examination of different food samples-2
4. Assessment of surface sanitation by swab/rinse method-2
5. Assessment of personal hygiene.
6. Biochemical tests for identification of bacteria.
7. Scheme for the detection of food borne pathogens.
8. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000-2