ADOPTION OF 4th DEANS COMMITTEE RECOMMENDATION IN IGKV, RAIPUR w. e .f. ACADEMIC SESSION 2008-09 (EMR- 30th July 2008 , 69th BOM 4th August 2008 and 62nd ACM- 12th September 2008)

DISTRIBUTION OF COURSES FOR B.Sc. (Ag.)

FIRST YEAR

1st Semester

Sl. No.	Course Number	Course Name	Credits		
			TC	T	P
1.	AGRO 111	Introductory Agriculture	1	1	0
2.	AGRO 112	Principles of Agronomy	2	1	1
3.	AMET 111	Agricultural Meteorology	2	1	1
4.	AHORT 111	Production Technology of Vegetables and Flowers	3	2	1
5.	ASOIL 111	Fundamentals to Soil Science	3	2	1
6.	AENT 111	Insect Morphology and Systematics	3	2	1
7.	AEC 111	Principles of Agricultural Economics	2	2	0
8.	AEXT 111	Fundamental of Rural Sociology and Edu. Psychology	2	1	1
9.	APHE 111	Physical Education / NSS / NCC	1	0	1 NC
			18	**12**	**6**

2nd Semester

1.	APB 121	Principles of Genetics	3	2	1
2.	AGRO 121	Field Crops - II	3	2	1
3.	APP 121	Plant Pathogens and Principles of Plant Pathology	3	2	1
4.	ASOIL 121	Biochemistry	3	2	1
5.	AENGG 121	Fundamentals of Soil and Water Conservation Engineering	3	2	1
6.	AHORT 121	Production Technology of Fruit Crops	3	2	1
7.	AEXT 121	Dimensions of Agricultural Extension	2	1	1
8.	AENG 121	Comprehension and Communication Skill in English (* Tutorial)	2	1	1*
			22	**14**	**8**

COURSE TITLE	**:**	**INTRODUCTORY AGRICULTURE**
COURSE No	:	AGRO-111
CREDIT HOURS	:	1 (1+0)
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Theory:

Art, Science and business of crop production, Basic elements of crop production. History of Agricultural development; Ancient Indian Agriculture in Civilization Era, Chronological Agricultural Technology development in India. Different agricultural related revolutions in India (green, yellow, blue, white, silver etc). Present and past basic statistical data of area, production, productivity, fertilizer consumption, livestock, irrigation in India and Chhattisgarh. Cropping system and soil groups formed in different parts of the country as defined by ICAR.

Innovation in agriculture: definition and concept; hitech agriculture, precision farming, sustainable agriculture, contract farming, crop modeling, GIS and Remote sensing technology.

Women in Agriculture: multifaceted roles and tasks, work stress factors, nutritional and rural life standards, role in house hold design making, drudgery reduction for farm women, women friendly agricultural technology, empowerment of women, group dynamics for farm women and rural women.

References:

1. Reddy, S.R. 1999. Priciples of Agronomy. Kalyani Publication Ludhiana.
2. Randhawa, M.S. 1983, History of Agriculature in India, ICAR, New Delhi, Vol.: I, II & III.
3. Chandra, S. 1996. Women in Agriculture. ICAR, PAU, Ludhiana.
4. Jayanthi, C., Devasenapathy, P. and Vennila, C. 2008. Farming System : Principles & Practices. Satish Serial Publishing House.

COURSE TITLE	**:**	**PRINCIPLES OF AGRONOMY**
COURSE No	:	AGRO-112
CREDIT HOURS	:	2 (1+1)
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Theory:

Agronomy – Definition, scope and importance, its relationship with other sciences, historical sketch of agronomy. Agro-climatic zones of India and Chhattisgarh State. National and International Agricultural Research Organizations in India. Classification of Crops. Factors affecting crop production. Essential plant nutrients their role in crop growth. Manures and fertilizers- classification and nutrient content. Tillage- objectives, classification and function of tillage implements. Crop stand establishment- seed bed preparation and seeding methods. Planting geometry and its effect on growth and yield. Cropping system- different types of cropping system: intercropping, mixed cropping, intensive cropping, relay cropping, Alley cropping etc., definition and advantages with examples. Crop Rotation - objectives types and advantage. Harvesting and post harvest operation.

Practical :

1. Identification of Field Crops and preparation of crop herbarium,
2. Study of tillage implements and operations,
3. Practice of field preparation,
4. Study of seeding equipments,
5. Different methods of sowing,
6. Identification of manures, fertilizers and green manure crops,
7. Calculation of seed rate and fertilizers,
8. Study of inter-culture implements and practice,
9. Practice of methods of fertilizer application and
10. Participation in ongoing field operations.

References:

1. Hand book of Agriculture: ICAR.
2. Priniples & Practices of Agronomy – S.S. Singh.
3. Introduction to Agronomy and Soil & Water management – V.G. Vaidya & H.R. Sahasrabudhe.
4. Nature and Properties of Soils – N.C. Brady.
5. Prarambhik Sasya Vigyan: Nandeha, K. L.

COURSE TITLE	**:**	**AGRICULTURAL METEOROLOGY**
COURSE NO	:	AMET-111
CREDIT HOURS	:	2 (1+1)
YEAR/SEMESTER	:	1ST YEAR/1ST SEMESTER

Theory:

Agricultural Meteorology: Definition, Scope and practical utility. Study of atmosphere, its composition and properties. Weather and climate, micro climate, weather elements and their impact on agriculture, earth's atmosphere, composition and structure, solar radiation, nature and properties, solar constant and energy balance, Atmospheric temperature, factors affecting horizontal and vertical distribution of temperature variations and global warming. Air pressure variations; Wind: factors affecting it. Cyclone and anti cyclones, general circulation, atmospheric humidity, vapour pressure and saturation vapour pressure. Process of condensation, formation of dew, fog, mist, snow, rain and hail. Formation and classification of clouds, Introduction to monsoon, Basics, types and importance of weather forecasting. Weather hazards. Agro-climatic classification and requirement of crops- Rice, Soybean, Maize, Sorghum, Sugarcane, Groundnut, Cotton, Wheat and Vegetables. Climatic water balance-Water balance equation its application in agriculture, Agroclimatic indices-Aridity, humidity and moisture index and index of moisture adequacy.

Practical :

Site selection for Agromet observatory; Description, exposure, installation, operation and measurement from various meteorological equipments. Measurement of temperature; rainfall; evaporation (atmospheric/soil); atmospheric pressure; sunshine duration and solar radiation; wind direction and speed and relative humidity; Study of weather forecasting and synoptic charts.

Reference:

1. Environment & Plant Ecology - J.B. Etherington
2. Plant & Environment - R.F. Deubenmire
3. Agricultural Meteorology - H.S. Mavi
4. Agricultural Meteorology - G.S.L.H.V. Prasad Rao
5. Agricultural Meteorology - S.R. Reddy and D.S. Reddy
6 Climatology - D.S. Lal

COURSE TITLE	**:**	**PRODUCTION TECHNOLOGY OF VEGETABLES AND FLOWERS**
COURSE No	:	AHORT-111
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Theory:

Importance of Olericulture, vegetable gardens, vegetable classification. Origin, area, production, varieties, package of practices for fruit vegetables –, tomato, brinjal, chillies, and okra; Cucurbitaceous vegetables cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd and melons, Cole crops – cabbage, cauliflower and knol-khol. Bulb crops – onion and garlic. Beans and peas – French beans, cluster beans, dolichos beans, peas and cowpea. Tuber crops – potato, sweet potato, tapioca, colocasia, yams; Root crops – carrot, radish, turnip and beet root; Leafy vegetables – amaranthus, palak, gogu; Perennial vegetables – drumstick, coccinia and curry leaf. Importance of ornamental gardens. Planning of ornamental gardens. Types and styles of ornamental gardens. Use of trees, shrubs, climbers, palms, houseplants and seasonal flowers in the gardens. Package of practices for rose, jasmine, chrysanthemum, crossandra, marigold and tuberose.

Practical: 1 Planning and layout of kitchen garden; 2 Identification of important vegetable seeds and plants; Raising of vegetable nurseries; Identification of ornamental plants (trees ,shrubs, climbers, house plants, palms etc.,) and development of garden features; Transplanting of vegetable seedlings in main field; Layout of lawns and maintenance; Seed extraction in tomato and brinjal; Depotting, repotting and maintenance of house plants; Visit to commercial vegetable farms; Training and pruning of rose (standards, hybrid 'T' roses scented roses) and chrysanthemum (pinching and disbudding); Planning and layout of gardens and garden designs for public and private areas; Intercultural operations in vegetable plots; Seed production in vegetable crops; Harvesting indices of different vegetable crops; Grading and packing of vegetables; Prolonging the shelf life of cut flowers.

Reference:

1. "Vegetable Crops" – Bose, T.K., M.G.Som and J.Kabir, Naya Prokash, Calcutta,
2. "Introductory Ornamental Horticulture" – Arora, J.S. 1998, *Kalyani Publishers, Ludhiana.*
3. "Commercial Flowers" – Bose,T.K. and L.P.Yadav (Eds) 1988. *Naya Prokash Calcutta.*
4. "Ornamental Horticulture" – Swarup,V. 1997. *Mac Millan, Indian Ltd. Delhi*.
5. "Progressive Floriculture" – Yadav,I.S. and M.L.Choudhary, 1997. *The House of Sarpan, Bangalore.*
6. "Udyan Vigyan" – Dr.Shyam Sundar Shrivastava, *Central Book House, Raipur. (in Hindi)*

7. "Floriculture in India" – G.S.Randhawa and A.Mukhopadhyam, *Allied Publishers Limited, New Delhi.*

8. "Vegetable Production in India" – Dr.V.S.Chauhan, *Ram Prasad and Sons, Agra.*

9. "Text Book of Vegetables, Tuber Crops and Spices" – S.Thamburaj, *N. Singh, ICAR, New Delhi.*

10. "Vegetable Production in India" – S.P.Singh, *Agrotech Publishing Academy, Udaipur.*

11. "Principles of Vegetable Production" – S.P.Singh, *Agrotech Publishing Academy Udaipur.*

12. "A Guide Book on Vegetable Science" – D.Sharma and N.Rai, *Researcho Publishing, New Delhi.*

13. "Technology for Vegetable Production and Improvement" – P.Hazra & M.G.Som, *Naya Prokash, Calcutta.*

14. "Aadhunik Shak Evam Pushp Utpadan" – G.S.Saini, *Rama Publishing House Meerut. (in Hindi)*

15. "Unnat Sabji Utpadan Evam Paudh Sanrakshan" – Dr. Prabhakar Singh and Dr. S.M.Kumar. *(in Hindi)*

16. *"*Seed production technology of vegetables*"* – Prabhakar Singh and B.S.Asati, *Daya Publishing House, New Delhi.*

COURSE TITLE	**:**	**FUNDAMENTALS TO SOIL SCIENCE**
COURSE No	:	ASOIL-111
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Theory:

Soil: Pedological and edaphological concepts, Origin of the earth, Earth's crust; Composition: Rocks and minerals Weathering, Soil formation factors and processes Components of soils; Soil profile, Soil physical properties, Soil texture, Particle size distribution system, Soil structure classification and its significance, Soil aggregates, Soil consistency and its types, Bulk density and particle density of soils & porosity, their significance in agriculture, Soil Colour,– definition, its significance, value, hue and chroma, use of Munsell colour chart. Elementary knowledge of soil classification soil orders and characteristics of soils of Chhattisgarh, land capability classification, ; Soil water, forms, hygroscopic, capillary and gravitational, soil moisture constants- hygroscopic coefficient, wilting point, field capacity, moisture equivalent, maximum water holding capacity, PF scale, energy concepts, Soil moisture measurement methods, saturated and unsaturated water movement Elementary idea of Infiltration, percolation, permeability, Drainage, runoff and its role in crop production, Soil temperature, Soil air, and its role on plant growth; Soil colloids, Properties, nature, types and significance; Layer silicate clays, and sources of charges, Ion exchange, CEC & AEC Factors influencing ion exchange and its Significance. Soil organic matter, sources of soil organic matter, Decomposition of organic matter, formation of Humus, Fractionation of organic matter, Carbon cycle, C: N ratio. Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Practical:

1. Collection and processing of soil for analysis
2. Study of a soil profile
3. Identification of rocks and minerals.
4. Determination of soil bulk density and particle density,
5. Soil Aggregate analysis by wet sieving method,
6. Determination of Soil strength by cone penitrometer
7. Determination of Soil moisture by Gravimetric & Volumetric method
8. Determination of Soil moisture constants – Field capacity, water holding capacity & wilting point
9. Determination of Infiltration rate by double ring in filtrometer,
10. Determination of soil texture by International pipette method
11. Preparation of primary and secondary standard solutions.
12. Determination of soil Organic carbon,
13. Determination of soil pH, EC,
14. Determination of soil CEC, soluble cations and anions

Reference:

1. Nature and Properties of Soils by Brady
2. Mrida Vigyan ke Moolbhut Siddhant by Dr Vinay Singh Published by Bharati Bhandar Meerut.
3. Soil Physics by Ghildyal & Tripathi, Published by Wiley and Eatern LTD, New Delhi.
4. Mrida Vigyan By NL Sharma and TB Singh Rama Publishin House Baduot Merrut
5. Soil Physics by LD Baver et al, Published by Wiley and Eatern LTD, New Delhi..

COURSE TITLE	**:**	**INSECT MORPHOLOGY AND SYSTEMATICS**
COURSE NO.	:	AENT-111
CREDIT HOURS	:	3 (2+1)
YEAR/ SEMESTER	:	1st YEAR/ 1st SEMESTER

Theory:

History of Entomology in India. Factors for insect abundance. Classification of phylum Arhropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts and legs. Wing venation, modifications and wing coupling apparatus. Structure-male and female genitalia. Sensory organs. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system in insect. Types of reproduction in insects. Systematics: Taxonomy-importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders. Orthoptera-Acrididae, Dictyoptera- Mantidae, Odonata, Isoptera- Termitidae, Thysanoptera-Thripidae, Hemiptera- Pentatomidae, Coreidae, Reduviidae, Pyrrhocoridae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Neuroptera- Chrysopidae Lepidoptera-Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae,Coleoptera-Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae, Hymenoptera-Tenthridinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Diptera-Cecidomyiidae, Trypetidae, Tachinidae, Agromyzidae.

Practical : Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venations, types of wings and wing coupling apparatus Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Study of characters of Orders- Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Reference:

1. Krishi keet Shastra- J.P. Sharma.
2. Imm's General Text Book of Entomology by Richards, D.W. and Davis, E.C.
3. Agricultural Entomology for Indian Students by Khanna, S.S.
4. Agricultural Entomology by Mathur and Upadhayay.
5. General and Applied Entomology by B.V. David and T.N. Ananthakrishnan.
6. Introduction to General and Applied Entomology By B.V. Awasthi.
7. Principles of Insect Morphology by R. E. Snodgrass.
8. Insect structure and Function by R.F. Chapman.
9. Essentials of Agricultural Entomology by G.S. Dhariwal.
10. Destructive and useful insects-their habit and control by C.L. Metcaff & W.P. Flint.
11. A Text Book of Agricultural Entomology by H.S. Pruthi.

COURSE TITLE	**:**	**PRINCIPLES OF AGRICULTURAL ECONOMICS**
COURSE No	:	AEC-111
CREDIT HOURS	:	2 (2+0)
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Theory :

Economics: Meaning, Definition, Subject matter, Divisions of Economics, Importance of Economics; Agricultural Economics: Meaning, Definition; Basic Concepts: Goods, Service, Utility, Value, Price, Wealth, Welfare. Wants: Meaning, Characteristics, Classifications of Wants, Importance. Theory of consumption: Law of Diminishing Marginal utility, Meaning, Definition, Assumption, Limitations, Importance. Consumer's surplus: Meaning, Definition, Importance. Demand: Meaning, Definition, Kinds of Demand, Demand schedule, Demand Curve, Law of Demand, Extension and Contraction Vs Increase and Decrease in Demand. Elasticity of Demand: Types of Elasticity of Demand, Degrees of price elasticity of Demand, Methods of Measuring Elasticity, Factors influencing elasticity of Demand, Importance of Elasticity of Demand. Welfare Economics: Meaning, Pareto's optimality. National Income: Concepts, Measurement. Public Finance: Meaning, Principles. Public Resource: Meaning, Services Tax, Meaning, Classification of Taxes: Cannons of Taxation, Public expenditure: Meaning, Principles. Inflation: Meaning, Definition, Kinds of inflation.

References:

1. Dewett, K.K. 2007. Modern Economic Theory, B.Chand & Co., New Delhi.
2. Subba Reddy S., Raghu Ram P., Neelkanta Sastry,T.V., Bhavani Devi I. 2007
3. Agricultural Economics. Agricultural Economics, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
4. Singh, Rajpal, 2007. Krishi Artha Shastra **(Hindi)** V.K. Prakashan, Badaut .
5. Randall, Allan. 1981. Resource Economics - An Economic Approach to Natural Resources and Environmental Policy, Grid Publishing, Inc. Columbus, Ohio.
6. Howe, Charles W. 1979. Natural Resource Economics- Issues, Analysis and Policy, John Wiley & Sons, New York.
7. John, M. Kerr, D.K. Marothia, K. Singh, C. Ramasamy and W.E. Bentley (editors) (1997). Natural Resource Economics: Theory and Application in India, Oxford & IBH, New Delhi.
8. Lipsey Richard G. 1963. A Introduction to Positive Economics, William Clowes and Sons, Limited, London.

COURSE TITLE : FUNDAMENTAL OF RURAL SOCIOLOGY AND EDU. PSYCHOLOGY

COURSE No : AEXT-111

CREDIT HOURS : 2 (1+1)

YEAR/SEMESTER : 1st YEAR / 1st SEMESTER

Theory:

Extension Education and Agricultural Extension – Meaning, Definition, Scope and Importance. Sociology and Rural Sociology, Meaning, Definition, Scope, Importance of Rural Sociology in Agricultural Extension and Interrelationship between Rural Sociology & Agricultural Extension. Indian Rural Society, Important characteristics, Differences and Relationship between Rural and Urban societies. Social Groups – Meaning, Definition, Classification, Factors considered in formation and organization of groups, Motivation in group formation and Role of Social groups in Agricultural Extension. Social Stratification – Meaning, Definition, Functions, Basis for stratification, Forms of Social stratification – Characteristics and – Differences between Class & Caste System. Cultural concepts – Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions – Meaning, Definition and their Role in Agricultural Extension. Social Values and Attitudes – Meaning, Definition, Types and Role of Social Values and Attitudes in Agricultural Extension. Social Institutions – Meaning, Definition, Major institutions in Rural society, Functions and their Role in Agricultural Extension. Social Organizations – Meaning, Definition, Types of organizations and Role of Social organizations in Agricultural Extension. Social Control – Meaning, Definition, Need of social control and Means of Social control. Social change – Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change. Leadership – Meaning, Definition, Classification, Roles of a leader, Different methods of Selection of Professional and Lay leaders. Training of Leaders – Meaning, Definition, Methods of training, Advantages and Limitations in use of local leaders in Agricultural Extension. Psychology and Educational Psychology – Meaning, Definition, Scope and Importance of Educational Psychology in Agricultural Extension. Intelligence – Meaning, Definition, Types, Factors affecting intelligence and Importance of intelligence in Agricultural Extension. Personality – Meaning, Definition, Types, Factors influencing the Personality and Role of personality in Agricultural Extension. Teaching – Learning process – Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Principles of learning and their implication for teaching.

Reference :

1. Chitambar, J.B. "Introductory Rural Sociology", Wiley Eastern Limited, 4835/24, Ansari Road, Dariyaganj, New Delhi-110002.
2. "Gramin Samaj Shastra" (Hindi) Dharmvir Mahajan and Kamlesh, Mahajan, Shiksha, Sahitva, Prakashan, 312/313, Chahshir, Meruth-2.
3. Educational Psychology, Mathur S.S., Vinod Pustak Madir, Agra.
4. "Exstension and Rural Welfare" Daham, O.P. and Bhatnagar Ram Prasad & sons, Agra.

5. “Indian Social System” Singh K. Prakashan Kendra, Railway Crossing, Sitapur Road, Lucknow 226620.
6. Rural Sociology and Psychology” Tyagi, B.D. Rama Publishing House, Badoth (Maroth).
7. Desai, A.R., “RuralSociology in India” 5’th edition, Popular Prakashan, 35-C, Pt. Madan Mohan Malviya Road, Tardeo, Bombay 400034.
8. Mathur, S.S., Educational Psychology, vinod Pustak Mandir, Agra.
9. Dahama, O.P., “Extension and Rural Welfare” Ram Prasad and Sons, Agra. Shanker Rao C.N., “Sociology”, S. Chand and Co. Ltd., Ram Nagar, New Delhi-110055.

COURSE TITLE	**:**	**PHYSICAL EDUCATION/NSS/NCC**
COURSE No	:	APHE 111
CREDIT HOURS	:	1 (0+1) NC
YEAR/SEMESTER	:	1st YEAR / 1st SEMESTER

Practical : NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness, highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition. NCC: Introduction to NCC, defence services, system of NCC training, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine, introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self defence, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defence, leadership and NCC song. Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules are regulations of important games, skill development in any one of the games – football, hockey, cricket, volleyball, ball badminton, throw ball, tennikoit. Participation in one of the indoor games – shuttle badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events – broad jump, high jump, triple jump, javelin throw, discuss throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-to-day activities. First-aid training, coaching for major games and indoor games. Asans and indigenous

ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience.

Note: Warming up and conditioning exercises are compulsory before the commencement of each class.

COURSE TITLE	**:**	**PRINCIPLES OF GENETICS**
COURSE NO	:	APB-121
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR/2nd SEMESTER

Theory:

Mendel's laws of inheritance and exceptions to the laws; Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Quantitative traits, Qualitative traits and differences between them; Multiple factor hypothesis; Cytoplasmic inheritance, it's characteristic features and difference between chromosomal and cytoplasmic inheritance; Mutation and it's characteristic features; Methods of inducing mutations and C *l* B technique. Gene expression and differential gene activation; Lac operon and Fine structure of Gene; Ultra structure of cell and cell organelles and their functions; Study of chromosome structure, morphology, number and types, Karyotype and Idiogram; Mitosis and meiosis, their significance and differences between them; DNA and it's structure, function, types, modes of replication and repair. RNA and its structure, function and types; Transcription, Translation, Genetic code and outline of protein synthesis; Crossing over and factors affecting it; Mechanism of crossing over and Cytological proof of crossing over; Linkage, Types of linkage and estimation of linkage; Numerical chromosomal aberrations (Polyploidy) and evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas; Structural chromosomal aberrations.

Practical:

1. Microscopy (Light microscopes and electron microscopes.
2. Preparation and use of fixatives and stains for light microscopy.
3. Preparation of micro slides and identification of various stages of mitosis.
4. Preparation of micro slides and identification of various stages of meiosis.
5. Monohybrid ratio and its modifications; Dihybrid ratio and its modifications; Trihybrid ratio.
6. Chi-square analysis and Interaction of factors; Epistatic factors, Supplementary factors and Duplicate factors; Complementary factors, Additive factors and Inhibitory factors.
7. Linkage – Two point test cross; Linkage – Three point test cross.
8. Induction of Polyploidy using colchicines.
9. Induction of chromosomal aberrations using chemicals.

References:

1. Genetics by P.K.Gupta, Rastogi Publication Meerut.
2. Fundamentals of Genetics by B.D. Singh, Kalyani Publishers, Ludhiana.

3. Cytogenetics and plant breeding by Chandrasekharan, S.N. and Parthasarthy, P. Vardachary & Co, 8, Linghi chatty street, Madras.
4. Genetics by stick Berger, H.W., McMillan Co. New York.
5. आनुवांशिकीय के आधार– बी.डी. सिंहए कल्याणजी पब्लिशर्स, लुधियाना।
6. अनुवांशिकीय के सिद्धांत एवं पादप अभिजनन– ब्रम्हसिंह, कुक्का पब्लिशिंग हाऊस, बड़ौत (मेरठ)।
7. अनुवांशिकीय के प्रारम्भिक सिद्धांत– डॉ. छबिनाथ चौबे, अनुवाद एवं प्रकाशन निदेशालय, गोबिन्द बल्लभ पन्त कृ ा एवं प्रौद्योगिक विश्वविद्यालय, पन्तनगर (नैनीताल)।

COURSE TITLE	**:**	**FIELD CROPS- II**
COURSE No	:	AGRO-121
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR / 2nd SEMESTER

Theory:

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *rabi* crops; Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean, lathyrus; Oilseeds: rapeseed and mustard, sunflower, safflower and linseed; Sugar crops: sugarcane and sugarbeet, Medicinal and aromatic crops such as mentha, lemon grass, citronella, palma rosa, isabgol and safed musli; Commercial crops: potato and tobacco, Forage crops: berseem, lucerne and oat.

Practical:

1. Seed bed preparation and sowing of *Rabi* crops
2. Effect of sowing depth on germination of different *Rabi* crops.
3. Identification of weeds in *Rabi* crops.
4. Calculation of fertilizer requirement and their application in *Rabi* crops.
5. Study of growth and yield contributing characters and yield estimation.
6. Study of crop varieties and important agronomic experiments.
7. Working out cost of cultivation of important Rabi crops.
8. Rabi crops distribution in the state and the region.
9. Important agronomic experiments of rabi crops and visit to research stations related to rabi crops and sugar mills.

References:

1. Bharat ki Fasle – Chhidda Singh and Om Prakash.
2. Bharat ki Pramukh Fasle – Kalicharan Sharma.
3. Kharif and Rabi ki Fasle – Om Prakash.
4. Sasya Vigyan – Jagannath Singh.
5. Hand Book of Agriculture: ICAR.
6. Scientific crop production: C. Thakur.
7. Field Crops: Y.M. Iyer.
8. Cereal Crops: W.H. Leonard and J.H. Martin

COURSE TITLE : PLANT PATHOGENS AND PRINCIPLES OF PLANT PATHOLOGY

COURSE No : APP-121

CREDIT HOURS : 3 (2+1)

YEAR/SEMESTER : 1st YEAR / 2nd SEMESTER

Theory :

Introduction, Important plant pathogenic organisms, different groups, fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viriods, algae, protozoa and phanerogamic parasites with examples of diseases caused by them. General Characters of fungi, Definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction in fungi (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature. Classification of fungi and bacteria. Key to divisions and sub-divisions. Introduction: Definition and objectives of Plant Pathology. History of Plant Pathology. Terms and concepts in Plant Pathology. Survival and Dispersal of Plant Pathogens. Phenomenon of infection – pre-penetration, penetration and post penetration. Pathogenesis. Defense mechanism in plants– Structural and Bio-chemical (pre and post-infection). Plant disease epidemiology. Plant Disease Forecasting – Remote sensing – General principles of plant diseases management –Importance, general Principles – Avoidance, exclusion, protection – Plant Quarantine and Inspection – Quarantine Rules and Regulations. Cultural methods – Rouging, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation, hot weather ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage. Role and mechanisms of biological control and PGPR. Physical Methods – Heat and Chemical methods – Methods of application of fungicides. Host plant resistance. Integrated plant disease management (IDM) – Concept, advantages and importance.

Practical:

Acquaintance to plant pathology laboratory and equipments; Preparation of culture media for *fungi* and *bacteria;* Isolation techniques, preservation of disease samples; Study of *Pythium, Phytophthora* and *Albugo;* Study of *Sclerospora, Peronosclerospora, Pseudoperonospora, Peronospora, Plasmopara* and *Bremia;* Study of genera *Mucor and Rhizopus.* Study of *Oidium, , Erysiphe, Phyllactinia, Uncinula and Podosphaera;* Study of *Puccinia* (different stages), *Uromyces,;* Study of *Sphacelotheca, Ustilago and Tolyposporium;* Study of *Agaricus, Pleurotus and Ganoderma;* Study of *Septoria, Colletotrichum, Pestalotiopsis and Pyricularia;* Study of *Aspergillus, Penicillium, Trichoderma, and Fusarium;* Study of *Helminthosporium, Drechslera, Alternaria, Stemphyllium, Cercospora, , Rhizoctonia and Sclerotium;* Demonstration of Koch's postulates; Study of different groups of fungicides and antibiotics; Preparation of fungicides – Bordeaux mixture, Bordeaux paste, Chestnut compound; Methods of application of fungicides – seed, soil and foliar; Bio-assay of fungicides – poisoned food technique, inhibition zone technique and slide germination technique; Bio-control of plant pathogens – dual culture technique, seed treatment.

References:

1. Introduction to principles of Plant Pathology - R.S. Singh.
2. Pod Rog Vigyan - B.P. Singh.
3. Plant Pathology - G.N. Agrios
4. Plant Pathology - R.S. Mehrotra
5. Plant Pathology - P.D. Sharma

COURSE TITLE	**:**	**BIOCHEMISTRY**
COURSE No	:	ASOIL-121
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR / 2nd SEMESTER

Theory:

Biochemistry –Introduction and importance . Plant Cell: Structure, cell components and biochemical function . Bio-molecules – introduction and applications: Amino acids, peptides and proteins –Plant proteins and their quality. Enzymes –Factors affecting the activity, classification, Immobilistion and other industrial applications. Lipids– Deffination, classification, properties and their industrial application in soaps, detergents, paints, Varnishes, lubricants, adhesives, plastics, nylon, Bio-diesel, Biodegradable plastics etc. Carbohydrates; Deffination, classification, properties. Nucleotides and Nucleic acids. Metabolic energy and its generation – Metabolism – Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation. General reactions of amino acid degradation. Biosynthesis – carbohydrates, Lipids, Proteins. and Nucleic acids. Introduction of Terpenoids, Alkaloids, Phenolics and their applications in food and pharmaceutical industries.

Practical: Models of sugars, sucrose, starch and amino acid**.** Qualitative determination of carbohydrates, protein, lipids, reducing and non-reducing sugars. Paper electrophoresis for the separation of plant pigments; Protein denaturation – heat, pH, precipitation of proteins with heavy metals, Protein estimation by Kjeldahl method; enzyme immobilization; Characterization of lipids by T.L.C.; Extraction of oil from oil seeds; Estimation of fatty acids by G.L.C. Quantitative determination of sugars; Paper chromatography for the separation of sugars; Determination of phenols.

Reference:

1. Outline of Biochemistry : E.E. Conn and P.K. Stumpf.
2. Essential Biochemistry : M.C. Pant.
3. Introduction to Biochemistry : Mertz.
4. Padap Rasayan Shastra : M.M. Rai
5. Chemistry of natural products: Agrawal.
6. जीव रसायन : विनय सिंह
7. जैव रसायन : टी,बी, सिंह

COURSE TITLE	**:**	**FUNDAMENTALS OF SOIL AND WATER CONSERVATION ENGINEERING**
COURSE No	:	AENGG-121
CREDIT HOURS	:	3 (2+1)
YEAR/SEMESTER	:	1st YEAR / 2nd SEMESTER

Theory:

Surveying: survey equipment, chain survey, cross staff survey, plotting procedure, calculations of area of regular and irregular fields. Levelling – levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Irrigation, classification of projects, flow irrigation and lift irrigation. Water source, Water lifting devices – pumps (shallow and deep well), capacity, power calculations. Irrigation water measurement – weirs, flumes and orifices and methods of water measurement and instruments. Water conveyance systems, open channel and underground pipeline. Irrigation methods – drip and sprinkle irrigation systems. Soil and water conservation – soil erosion, types and engineering control measures.

Practical: Acquaintance with chain survey equipment; Ranging and measurement of offsets; Chain triangulation; Cross staff survey; Plotting of chain triangulation; Plotting of cross staff survey; Levelling equipment – dumpy level, levelling staff, temporary adjustments and staff reading; Differential leveling; Profile leveling; Contour survey – grid method; Plotting of contours; Study of centrifugal pumping system and irrigation water measuring devices; Study of different components of sprinkler irrigation systems; Study of different components of drip and sprinkler irrigation systems; Uniformity of water application in drip and sprinkler systems; Study of soil and water conservation measures.

Reference:

1. Agor, R. 1998. Surveying and leveling, Khanna Publishers, New Delhi.
2. Kanetkar, T.P. and Kulkarani, S.P. 1965. Surveying and leveling A.V. Griha Prakashan, Pune-4.
3. Kochher, C.L. 1986. A test book of surveying, Vol. I & II, Katson Publishing House, Ludhiana.
4. Michael, A.M. 1997. Irrigation Theory and Practice, Vikash Publisher, New Delhi.
5. Dhruvanarayan, V.V. 1993. Soil Conservation Research in India, Publication and Information Division, ICAR, New Delhi.
6. Israelson, O.W. and Hensen, V.E. 1962. Irrigation Principles & Practices, John Wiley and Sons, Inc., New York.
7. Tideman, E.M. 1999. Watershed Management: Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.
8. Michael, A.M. and Ojha, T.P. 2004. Principals of Agricultural Engineering, Vol. II, Jain Brothers, New Delhi.

COURSE TITLE : PRODUCTION TECHNOLOGY OF FRUIT CROPS
COURSE No : AHORT-121
CREDIT HOURS : 3 (2+1)
YEAR/SEMESTER : 1st YEAR / 2nd SEMESTER

Theory:
Definition and importance of horticulture. Divisions of horticulture. Climatic zones of horticulture crops. Area and production of different fruit crops. Selection of site, fencing, and wind break, planting systems, high density planting, planning and establishment. Propagation methods and use of rootstocks. Methods of training and pruning. Use of growth regulators in fruit production. Package of practices for the cultivation of major fruits – mango, banana, citrus, grape, guava, sapota, apple, litchi. Papaya, Minor fruits – pineapple, annonaceous fruits, pomegranate, ber, fig, phalsa, jack, pear, plum, peaches and cherry.

Practical: Study of horticultural tools and implements and their uses; Containers, potting mixture, potting, depotting and repotting; Plant propagation, seed propagation, scarification, and stratification; Propagation by cuttings (soft wood, hard wood and semi-hardwood) layering (simple layering, Air layering, stooping in guava); Layout and planting systems (Traditional system and high density planting methods); Methods of pruning and training; Training of ber, grape and pomegranate; Pruning of ber, grape, phalsa, fig, apple, pear, peach; Description and identification of varieties of mango, guava, grape, papaya, apple and sapota; Description and identification of varieties of banana, citrus, (lime lemon, sweet orange, mandarin, grape fruit) pomegranate, ber, pear and cherries; Irrigation methods in fruit crops including drip – Micro irrigation methods of establishment of orchard; Methods of Fertilizer application methods in fruit crops including fertigation technology; Visit to local commercial orchards; Preparation of growth regulators, powder, solution and lanolin paste for propagation; Application of growth regulators for improving fruit set, fruit size, quality, delaying ripening and hastening ripening.

Reference:

1. "Commercial Fruits" – Dr. S.P. Singh, Kalyani Publishers, Ludhiana
2. "Phalvriksha Pravardhan : Phaldar Ped Lagane Ki Bagwani" – Dr.Ram Kripal Pathak, I.C.A.R., New Delhi. *(in Hindi)*
3. "Udyan Vigyan" – Shyam Sundar Shrivastava, Central Book House, Sadar Bazar, Raipur. *(in Hindi)*
4. "Fruit Physiology and Production" – Amar Singh, Kalyani Publishers, Ludhiana.
5. "Hand Book of Horticulture" – Dr. K.L. Chadha, I.C.A.R., New Delhi.
6. "Phal Utpadan : Siddhant Evam Praudyogiki" – Dr. Prabhakar Singh Evam Dr. Shailendra Agrawal, Gautam Publishers and Distributers, Vishal Nagar, Raipur. *(in Hindi)*
7. "Fruit Culture in India" – Dr. Shyam Singh, Dr. S. Krishnamurthi and Dr. S. L. Katyal, I.C.A.R., New Delhi.
8. "Bharat me Phalotpadan" – K.N. Dubey, *Rama Publishing House, Meerut*. *(in Hindi)*

COURSE TITLE : DIMENSIONS OF AGRICULTURAL EXTENSION
COURSE No : AEXT-121
CREDIT HOURS : 2 (1+1)
YEAR/SEMESTER : 1st YEAR / 2nd SEMESTER

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. Developmental programmes of pre-independence era – Sriniketan, Marthandam, Gurgaon experiment and Gandhian constructive proprogramme. Development programmes of Post independence era, Firka Development, Etawah – Pilot project and Nilokheri Experiment. Community Development Programme – Meaning, Definition, Concepts, Philosophy, Principles, Objectives, Differences 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 & sailent features – Intensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP), Institution Village Linkage Programme (IVLP), Watershed Development Programme (WDP), National Agricultural Technology Project (NATP), ATMA, ATIC. Social Justice and Poverty alleviation programmes – Integrated Tribal Development Agency (ITDA), Integrated Rural Development Programme (IRDP), Swarna Jayanthi Gram Swarojgar Yojana (SGSY), Prime Minsiter Employment Yojana (CMEY). New trends in extension, privatization. Women Development programmes – Development of Women and Children in Rural Areas (DWCRA), Rashtriya Mahila Kosh (RMK), Integrated Child Development Scheme (ICDS) and Mahila Samriddi Yojana (MSY). Reorganized extension system (T&V System)–Salient features, Fort night Meetings, Monthly workshops, Linkages, Merits and Demerits, Emergence of Broad Based Extension (BBE).

Practical: Visits to a village and kisan mandal to study the ongoing development programmes. Visits to Panchayat Raj Institutions to study the functioning of Gram Panchayat (GP) & Zilla Praja Parishad (ZPP). Visit and study the District Rural Development Agency (DRDA). Participation in monthly workshops of Training and Visit (T & V) System. Visit to Watershed Development Project area. Visit to a village to study the Self Help Groups (SHGs) of DWCRA. Visit to a voluntary organization to study the developmental activities. Organizing PRA techniques in a village to identify the agricultural problems. Visit to villages.

Reference :

1. Govt. of India: "Extension Education in Community Development" Directorate of Extension, Ministry of Food and Agri., Govt. of India New Delhi.
2. Supe S.V. "An Introduction to Extension Education," Oxford & IBH Publishing Company Pvt., Ltd., 66 Janpath, New Delhi 110001.

3. Dahama, O.P. & Bhatnagar "Extension and Communication for Development" Exford & IBH Publishing Company, 66-Janpath, New Delhi 110001/
4. Dahama, O.P., Communication & Extension (Revised Edition) Ram Prasad & Sons, Agra.
5. Dahama, O.P. "Extension & Rural Welfare", Ram Prasad & Sons, Agra.
6. Daniel Benor, "Training & Visit," World Bank Publication.
7. प्रसार शिक्षा एवं सामुदायिक विकास – डॉ. बी.डी. त्यागी ।

COURSE TITLE	**:**	**COMPREHENSION AND COMMUNICATION SKILLS IN ENGLISH**
COURSE NO	:	AENG - 121
CREDIT HOURS	:	2 (1+1*)
YEAR/SEMESTER	:	1st YEAR/2nd SEMESTER

Theory:

Text for Comprehension

1. War Minus shooting - The sporting spirit (George Orwell)

(a) Reading comprehension

(b) Vocabulary - Synonyms - Antonyms - often confused words, and

(c) Two 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)

(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)

(a) Reading comprehension

(b) Language study, Functional Grammar, Agreement of Verb with subject

Text for communication skills

4. Writing skills

(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, Types of interviews, purpose, different settings, as interviewer, interviewee, physical makeup and manners, appearance, poise, speech, self reliance, Evaluation process, review or feedback.

*** Tutorial:** Listening Comprehension: Listening to short talks, lectures, speeches (scientific, commercial and general in nature) Practical: listening to at least two tapes, recorded conversations aimed at testing the listening comprehension of students; Communication: Spoken English, oral communication, importance stress and intonation. Practical: Spoken English practice by using audiovisual aids, the essentials of good conversations, oral exercises in conversation practice (At the Doctor, at the Restaurant, at the Market Yard); 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.; Dyadic communication, face to face conversation, Telephonic conversation, rate of speech, clarity of voice, speaking and listening politeness, telephone etiquette, Practical: Practice of Telephonic conversation; Reading

skills, using Dictionary, reading dialogues, rapid reading, intensive reading, improving reading skills; Meetings: purpose, procedure participation, chairmanship, physical arrangements, recording minutes of meeting; Practice of Presentation by using power point and LCD projector; Conducting Mock interviews – testing initiative, team spirit, leadership, intellectual ability – potential for development, memory, motivation, objectives, aptitude etc., Group Discussions and Debates on current topics; Review or Feed Back; Practical examination.

Recommended book:

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

Reference :

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.