



1. B.Sc. (Ag.) FIRST YEAR FIRST SEMESTER

1.1 Principles of Agronomy and Agricultural Meteorology [AGR 101]:

3 (2+1)

Theory:

Meaning and scope of Agronomy: National and International Agricultural Research Institutes in India, Agro-climatic zones of India. Tillage, crops stand establishment, Planting geometry and its effect on growth and yield, cropping systems, Harvesting. Agricultural meteorology: Weather and climate, micro-climate, weather elements, Earths' atmosphere, Composition and structure, solar radiation, Nature, properties, depletion, solar constant and energy balance, Atmospheric, temperature, factors affecting horizontal and vertical distribution, variations and global warming, Air Pressure variations; Wind: factors affecting, cyclones and anticyclones and general circulation, Atmospheric humidity, vapour pressure and saturation, Process of condensation, formation of dew, fog, mist, snow, rain and hail; Formation and classification of clouds, Introduction to monsoon, Basics of weather forecasting.

Practical:

1. Study of tillage implements;
2. Practice of ploughing;
3. Practice of puddling;
4. Study of seeding equipments and introduction of remote sensing.
5. Different methods of sowing;
6. Study of manures, fertilizers and green manure crops / seeds (including calculations);
7. Study of inter cultivation implements and practice;
8. Practice of methods of fertilizer applications;
9. Participation in ongoing field operations;
10. Site selection for Agromet observatory;



11. Measurement of temperature;
12. Measurement of rainfall;
13. Measurement of evaporation (atmospheric/soil);
14. Measurement of atmospheric pressure;
15. Measurement of sunshine duration and solar radiation;
16. Measurement of wind direction and speed and relative humidity;
17. Study of weather forecasting and synoptic charts.

References:

1. Hand Book of Agriculture- ICAR Publication
2. Principles of Agronomy- S.R. Reddy
3. A practical guide on Agro meteorology- K.K. Agrawal and A.P. Upadhyay
4. Introduction to Agronomy, Soil and Water Management- V.G. Vaidya and K.K. Sahastrabudhe
5. Agricultural Meteorology- GSLHV Prasad Rao

1.2 Principles of Genetics [GPB 101]**3 (2+1)****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 differences between chromosomal and cytoplasmic inheritance; Mutation and it's characteristic features; Methods of inducing mutations and C I 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 linkages 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;
6. Dihybrid ratio and its modifications;
7. Trihybrid ratio; Chi-square analysis and Interaction of factors;
8. Epistatic factors, Supplementary factors and Duplicate factors;
9. Complementary factors, Additive factors and Inhibitory factors;
10. Linkage – Two point test cross; Linkage – Three point test cross;
11. Induction of polyploidy using colchicines;
12. Induction of chromosomal aberrations using chemicals.

References:

1. Gardner E J & Snustad D.P. (1991). Principles of Genetics. John Wiley and Sons
2. Klug W S & Cummings M.R. (2003). Concepts of Genetics. Peterson Edu.
3. Lewin B. (2008). Genes IX. Jones & Bartlett Publ.
4. Redei G.P. (1982). Genetics. Macmillan Publ. co. :Inc Newyork
5. Russel P. J. (1998). Genetics. The Benzamin/Cummings Publ.co.
6. Snustad D P & Simmons M. J. (2006). Genetics. 4th Ed. John Wiley & Sons
7. Strickberger M W. (2005). Genetics (III Ed.). Prentice Hall. New Delhi, India.
8. Tamarin R H. (1999). Principles of Genetics. Wm.C.Brown Publ.
9. Stansfied W D. (1969). Schaum's outline series theory and problems of Genetics McGraw-Hill Book Co.



1.3. Introduction to Soil Science [SAC 101]

3(2+1)

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, Textural classes, Particle size analysis, Soil structure Classification, Soil aggregates, significance, Soil consistency, Soil crusting, Bulk density and particle density of soils & porosity, their significance and manipulation, Soil compaction, Soil Colour, Elementary knowledge of soil classification and soils of India; Soil water, Retention and potentials, Soil moisture constants, Movement of soil water, Infiltration, percolation, permeability, Drainage, Methods of determination of soil moisture, Thermal properties of soils, Soil temperature, Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth; Soil colloids, Properties, nature, types and significance; Layer silicate clays, their genesis and sources of charges, Adsorption of ions, Ion exchange, CEC & AEC, Factors influencing ion exchange and its Significance. Soil organic matter, Composition, Decomposability, Humus, Fractionation of organic matter, Carbon cycle, C: N ratio. Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Practical:

1. Determination of bulk density and particle density,
2. Aggregate analysis, Soil strength, Soil moisture determination, Soil moisture constants - Field capacity Infiltration rate, water holding capacity, soil texture and mechanical analysis - Soil temperature. Analytical chemistry - Basic concepts, techniques and calculations - Collection and processing of soil for analysis - Organic carbon, pH, EC, soluble cations and anions.
3. Study of a soil profile - Identification of rocks and minerals.

**References:**

1. Nature and Properties of Soils- H.O. Buckman and N.C. Brady
2. Soil Chemistry- M.M.Rai
3. Fundamentals of Soil- V.N. Sahai
4. Introduction of Soil Science- Dilip Kumar Das
5. Fundamentals of Soil Science- Indian Society of Soil Science, IARI, New Delhi.
6. Text Book of Soil Science- R.K. Mehra
7. Text Book of Soil Physics- A. K. Saha
8. Soil Physics- M.C. Oswal
9. Pedology, Concept and Application- J. Seghal.

**1.4 Fundamentals of Soil, Water Conservation & Engineering [AEG 101]
3(2+1)****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, contours. 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 sprinkler irrigation systems. Soil and water conservation – soil erosion, types and engineering control measures.

Practical:

1. Acquaintance with chain survey equipment;
2. Ranging and measurement of offsets;
3. Chain triangulation; Cross staff survey;
4. Plotting of chain triangulation;



5. Plotting of cross staff survey;
6. Levelling equipment - dumpy level, levelling staff, temporary adjustments and staff reading;
7. Differential leveling;
8. Profile leveling;
9. Contour survey - grid method;
10. Plotting of contours;
11. Study of centrifugal pumping system and irrigation water measuring devices;
12. Study of different components of sprinkler irrigation systems;
13. Study of different components of drip and sprinkler irrigation systems;
14. Uniformity of water application in drip and sprinkler systems;
15. Study of soil and water conservation measures.

References:

1. Surveying and Leveling Vol.1 by Kanetkar T P and Kulkarni S V 1981. Vidyarthi Griha Praksan, Pune.
2. Land and water Management Engineering by Murthy V V N 1982. Kalyani publishers, New Delhi.
3. Irrigation Theory and practice by Michael A M 1989. Vikas Publishing House Pvt. Ltd, New Delhi.
4. Principles of Agricultural Engineering - Vol II. By Michael A M and Ojha T P 1993. Jain Brothers, New Delhi.

1.5 Plant Pathogens and Principles of Plant Pathology [PPT 101]**4 (3+1)****Theory:**

Introduction, Important plant pathogenic organisms, different groups, fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, virioids, algae, protozoa and phanerogamic parasites with examples of diseases caused by them. Prokaryotes: classification of prokaryotes according to Bergey's Manual of Systematic Bacteriology. 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. 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 - Role of enzymes, toxins, growth regulators and polysaccharides. Defense mechanism in plants - Structural and Bio-chemical (pre and postinfection). 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 - Application of biotechnology in plant disease management - Development of disease resistant transgenic plants through gene cloning. Integrated plant disease management (IDM) - Concept, advantages and importance.

Practical:

1. Acquaintance to plant pathology laboratory and equipments;
2. Preparation of culture media for fungi and bacteria;
3. Isolation techniques, preservation of disease samples;
4. Study of Pythium, Phytophthora and Albugo;
5. Study of Sclerospora, Peronosclerospora, Pseudoperonospora, Peronospora, Plasmopara and Bremia;
6. Study of genera Mucor and Rhizopus.



7. Study of Oidium, Oidiopsis, Ovulariopsis, Erysiphe, Phyllactinia, Uncinula and Podosphaera;
8. Study of Puccinia (different stages), Uromyces, Hemiliae;
9. Study of Sphacelotheca, Ustilago and Tolyposporium;
10. Study of Agaricus, Pleurotus and Ganoderma;
11. Study of Septoria, Colletotrichum, Pestalotiopsis and Pyricularia;
12. Study of Aspergillus, Penicillium, Trichoderma, and Fusarium;
13. Study of Helminthosporium, Drechslera, Alternaria, Stemphyllium, Cercospora, Phaeoisariopsis, Rhizoctonia and Sclerotium;
14. Demonstration of Koch's postulates;
15. Study of different groups of fungicides and antibiotics;
16. Preparation of fungicides – Bordeaux mixture, Bordeaux paste, Chestnut compound;
17. Methods of application of fungicides – seed, soil and foliar; Bio-assay of fungicides – poisoned food technique, inhibition zone technique and slide germination technique;
18. Bio-control of plant pathogens – dual culture technique, seed treatment.
19. Visit to quarantine station and remote sensing laboratory.

References:

1. Introductory Mycology- (1996). C. J. Alexopoulos C. W. Mims and M. Blackwell, John Wiley and Sons Ltd. N. York.
2. Introduction to Mycology -(1990). R. S. Mehrotra and K. R. Aneja, Wiley E. Ltd. New Delhi
3. A text book of Fungi, Bacteria and Viruses- H. C. Dube, Vikas Publishing House P Ltd. New Delhi.
4. Plant Pathogens- The Fungi - (1982). R. S. Singh, Oxford and IBH Publishing Co., New Delhi.
5. Plant pathogens- The Prokaryotes- (1989). R. S. Singh, Oxford and IBH Publishing Co., New Delhi.



6. Introduction to Plant Viruses – (1987). C. L. Mandahar, Chand and Co., Pvt Ltd., New Delhi.
7. Fungicides in Plant disease control – Nene Y L and Thapliyal P N (1993). Oxford & IBM Publishing Co., New Delhi.
8. Hand Book of Systemic Fungicide – Vyas S C (1993). (Vol. I, II and III) Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.
9. IPM Systems in Agriculture, Vol.2 – Updyay R. K., Mukerji K. G and Rajak R L In: Biocontrol in Emerging Biotechnology – (1997). Aditya Books (P) Ltd., New Delhi.
10. Introduction to Principles of Plant Pathology – Singh R. S. (1984). Oxford & IBH Publishing Co., New Delhi.
11. Plant Pathology – Agios G.N. (1997) (4th Edition). Academic Press, New York.
12. Principles of Plant Pathology – Das Gupta M. K. (1999). Allied Publishers, Pvt. Ltd. New Delhi.
13. Principles of Plant Pathology – Vidyasekheran P (1993). CBS Publishers & Distributors, New Delhi.
14. Plant Pathology. Concepts and Laboratory Exercise. Trigiano, R.N., Windham, M.T. and Windham. A.S. (Eds), (2004). CRC Press, New York.

1.6 Production Technology of Fruit Crops [HRT 101]

3(2+1)

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:**

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

References:

1. Fruit Growing in India .Hayes, W. B. (1953). Kitabistan, Allahabad
2. Fundamentals of Horticulture. Edmond J.B. Senn, T.L. and Andrews, F.S. (1964). McGraw Hill Book Co., New York
3. Plant propagation Principles and practices Hartman, H.T. and Kester, D.E. (1968). Prentice Hall of India publishing Ltd., Bombay
4. Fruits, Ranjit Singh (1969). National Book Trust, New Delhi



5. Fruits – Tropical and Subtropical Bose, T.K. and Mitra, S. K. (1990). Nayaprakash, Calcutta
6. Basic Horticulture, Jitendra Singh, (2004). Kalyani publishers, New Delhi.
7. Propagation of Horticulture Crops Principles and practices – Sharma, R.R. (2002). Kalyani publishers, New Delhi
8. Introduction to Horticulture, Kumar N, (1990).Rajyalakshmi publishers, Nagar coil, Tamilnadu

1.7 Introductory Agriculture [AGR 102]

1(1+0)

Theory:

Art, Science and business of crop production, Basic elements of crop production; Factors affecting crop production; History of Agricultural Development; Ancient India Agriculture in Civilization Era, Chronological Agricultural Technology development in India. Indian Agriculture, balance sheet, liabilities; Assets and Contrasting trends (DATA), Agrl. growth, contrasting food chains, Diversity in physiography, Soil groups, marine, livestock and water; Liabilities: Soil factors, weather factors, Economic ecology, dry and irrigation agriculture Farming Systems approach, value addition, requirements in new 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, rural women; The nucleus of Agricultural Extension and Training.

References:

1. Anonymous, (1938). Soils and Men. The year book of Agrl. USDA.
2. Anonymous, (2006). Hand book of Indian Council of Agriculture Research., ICAR, New Delhi.
3. Durgan, G.H. and Ross, W.A. (1957). Growing Field Crops Mc.Graw Hills Book.Co.Inc., New York.
4. Evans, L.T. (1963). Environmental Control of Plant Growth. Academic Press, New York.
5. Kipps, M.S. (1970). Production of Field Crops. Mc.Graw Hills Book Co.Inc. New York.



6. Economic Survey 2004-05, G.O.I., Min.of Finance, Economics Div. 168-188.7. 50 years of Indian Farming – ICAR (1988).
7. Sustainable Agrl, towards evergreen Revolution by M.S. Swaminathan (1996).
8. Chatterji, S A, 1993. Simplify Tech. For Peasant Women Invention, Intelligence, Apr.(1993).
9. Jhabhavala, R. (1984, 1984). Unpaid family labour, Social Welfare, 31(2) 31-32.
10. Proceedings of National Seminar on farm women, December 28-30, (1993). NAARM, Hyderabad.
11. Mier, M. Lalita, K and Kumar, K, (1987). Indian women in subsistence and Agrl.Labour. Vistaar Publications, New Delhi.
12. Proceedings of International Workshop. On identification of appropriate Tech and Methods of Technology transfer for rural women. February 25 - March 8, (1985). Asian Institute of Tech, Bangkok.
13. Proceedings of National workshop on Rural Technologies, 28 - 29 July, (1997).

1.8 NSS/NCC

1(0+1)

NSS: [101]

Theory:

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: [101]

Theory:

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.

References:

1. Hand Book of NCC. (2003). Major R. D. Mishra, Pub. Kanti Prakashan Etawah (U.P.)
2. Cadets Hand Book (2007). Pub. Directorate of NCC. Govt. of India Press, New Delhi.