B.Sc. Agriculture

I-Semester

Elementary Agriculture	**Credit hours: 3 (2+1)**

Theory:

Indian agriculture-scope and resources; crop plants-their significance as source of food, feed, fuel and raw material for various industries. Shifting cultivation, crop rotation, sustainable agriculture, cropping systems, cropping patterns, farming systems, mixed farming, sole cropping, cropping scheme, mono cropping, multiple cropping, inter cropping, agro-climatic and agro-ecological zones in India. Soils-their formation, classification, physical and chemical properties, soil pH, Crop seasons and classification of crops according to seasons. Elementary knowledge of important crops in the state such as wheat, rice, maize, pealmillet, cotton, sorghum, sunhemp, jute, sunflower, safflower, Niger, sesame, castor, sweetpotato, groundnut, rape seed & mustard, chickpea, pigeonpea, mung bean, urd bean, lentil, linseed, oat, tobacco, berseem, potato and sugarcane and horticultural crops such as cabbage, cauliflower, chilli, cumin, carrot, Coriander, ginger, turmeric, onion, garlic, cucurbits, root crops, peas, tomato, brinjal, banana, apple, mango, litchi, citrus, guava. Essential plant nutrients, methods of manure & fertilizer application, composition of bulky organic manures, concentrated organic manures, green manures and various types of inorganic fertilizers, methods of irrigation and drainage and management, importance of water in relation to crop plants. Types of iron and steel used in agricultural implements; different types of plough, mechanical devices, their management and cost.Water lifting devices, tillage, different methods of ploughing. Power transmission through belts, pullies, gears, chaff, cutter, cane crusher. statistics related to agricultural production. Study of main breeds of animals such as cows, buffaloes, goats, sheep and poultry.Characteristics of milchcattles.

Practicals:

Identification of important field, vegetables, spices, fruits, medicinal and aromatic crops, crop seeds, fertilizers and agricultural chemicals, crop weeds, farm implements and irrigation resource and instruments. Study of milch cattle breeds. Practical Knowledge of seed bed preparation.

References:

- Fundamentals of agriculture vol-I & II, authored by Arun Katyana, Kalyani Publication, New Delhi.

Fundamentals of Soil Science	**Credit hours: 3(2+1)**

Theory:

Soil as a natural body and medium for plant growth; soil compounds and soil plants relationship; soil forming rocks and minerals; weathering and processes of soil formation; physical properties of soils – texture, structure, density and porosity, soil colour, consistence and plasticity, soil reaction pH and its measurement, soil acidity and alkalinity, buffering, effect of pH on nutrient availability, soil colloids – inorganic and organic; silicate clays: constitution and properties; humic substances nature and properties; ion exchange, cation exchange capacity, base saturation; soil organic matter: composition, properties and influence on soil properties, transformation of organic and inorganic constituents of soil; biological nitrogen fixation; recycling of organic wastes in soils – Urban and industrial wastes. Soil water retention, dynamics and availability; soil air composition and dynamics; source, amount and flow of heat in soils; soil temperature and plant growth; soil survey and classification, soils of India; soil pollution – behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practicals:

Study of soil as a natural body. Use of soil sampling tools, collection, processing and storage of soil samples. Study of soil forming rocks, mineral's density and porosity. Study of soil texture by feel methods. Study off soil structure, colour and soil map. Capillary rise phenomenon of water in soil column and water movement in soil. Soil reaction measurement by indicators and glass electrode pH meter. Determination of electrical charges on soil colloids and its nutrient retention capacity.Estimation of organic matter content and buffering capacity of soil.Microscopic examination of soil microbes.

References:

- Sharma, N.L. & Singh, T.B. (1996). Soil Science (Hindi edison) Rama pub. House, Barot, Merrut (U.P.).
- Biswas, T.D. and Mukherjee, S.K. (2006). Text book of Soil Science. Tata Mc Graw Hill publishing Co. Ltd, New Delhi.
- Brady, N.C. and Weil, R.R. (2002). The nature and properties of soils, prentiee hall of India Pvt. Ltd, M-97, Connaught Circus, New Delhi.
- Das, D.K. (2002). Introductory Soil Science, Kalyani publisher, New Delhi.
- ISSS (2002). Fundamentals of Soil Science, Div. of Soil Science, IARI, New Delhi.
- Jackson, M.L. (1973). Soil chemical analysis, Prentice Hall of India, Pvt. Ltd New Delhi.
- Piper, C.S. (1950). Soil and plant analysis.Hans publications, Bombay.
- Gupta, I.C. & Sharma, S.K. (1988) Crop production in salt affected soils, Oxford and IBH Publication, New Delhi.

Introductory Biology	**Credit hours: 3(2+1)**

Theory:

Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.Binomial nomenclature and classification Cell and cell division.Morphology of flowing plants.Seed and seed germination.Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae.Role of animals in agriculture.

Practical:

Morphology of flowering plants – root, stem and leaf and their modifications.Inflorence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides.Description of plants - Brassicaceae, Fabaceae and Poaceae.

Agricultural Microbiology	**Credit hour: 3(2+1)**

Theory:

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon.

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and sulphur cycles. Biological nitrogen fixation- symbiotic, associative and aysmbiotic.Azolla, blue green algae and mycorrhiza.Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation.

Practical:

Introduction to microbiology laboratory and its equipments; Microscope- parts, principles of microscopy, resolving power and numerical aperture.Methods of sterilization.Nutritional media and their preparations.Enumeration of microbial population in soil- bacteria, fungi, actinomycetes.Methods of isolation and purification of microbial cultures.Isolation of Rhizobium from legume root nodule.Isolation of Azotobacter from soil.Isolation of Azospirillum from roots.Staining and microscopic examination of microbes.

References:

- Mukherjee, N. and Ghosh T. 1998. Agricultural Microbiology, Kalyani Publishers, New Delhi.
- Pelczar, Jr. Michel J. Chan, E.C.S. and Krieg, Noel R. 1997. Microbiology. Tata McGraw - Hill Edition, 1993. India.
- Rao, N.S. 2000. Soil Microbiology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

English Language	**Credit hours: 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.

References:

- Thomson and Martinet (1995) "A Practical English Grammar" OUP Publication.
- Thomson and Martinet (1997) "A Practical English Grammar, Exercise Books Vol. I & II" OUP Publication.
- Michal Swan(1995) "A Practical English Grammar" OUP Publication.
- David Green (1990) "Contemporary English Grammar Structure Composition" McMillan.
- A.S. Hornby (1997) "Advance Learner's Dictionary" OUP Publication.
- S. Allen (1997) "Living English Structure" Orient Longman.
- Daniel Jones (1997) "Drills and Tests in English Sounds" ELBS.
- Krishnamohan" Speaking English Effectively" McMillan.

Computer Applications	**Credit hours: 3(2+1)**

Theory:

Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System, definition and types, Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, tabulation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, creating database, uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts and components.

Computer Programming, General Concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc, concepts and standard input/output operations.

Practical:

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros. MS-ACCESS: Creating Database, preparing queries and reports

References:

- Berkeley Hill (1980) An Introduction to Economics for students of agriculture, Pergaman Press, Oxford.
- Sankhayan, P.L. “Introduction to the Economics of Agricutural Production”.

Elementary Mathematics	**Credit hours: 2(2+0)**

Theory :

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x1, y1) & (x2,y2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line y = mx + c to the given circle x2 + y2 = a^2.Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of xn , ex , sin x &cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

References:

- Krishi Ganita by Gokhroo and Jain.
- Differential calculus by Dr. D.C. Gokhroo
- Integral calculus by Dr. D.C. Gokhroo

Agricultural Economics	**Credit hours: 2 (1+1)**

Theory:

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.*Demand:* meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility. Consumer's equilibrium and derivation of demand curve. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale. *Cost:* Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income:* Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT. *Economic systems:* Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning