## COURSWISE SCHEME 2015-16

### B.Sc Agriculture 1st Year 1st Semester

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AG101 : Principles of Agronomy and Agricultural Meteorology

1. Meaning and scope of Agronomy
2. National and International Research Institutions in India
3. Agro climatic zones of India and Madhya Pradesh
4. Definition, objectives and classification of tillage and tillage implements
5. Crops stand establishment
6. Planting geometry and its effect on growth and yield
7. Cropping systems
8. Harvesting
9. Agriculture Meteorology : weather and climate, micro-climate, weather elements
10. Earth's atmosphere, composition and structure
11. Solar radiation, nature, properties, depletion, solar constant and energy balance
12. Atmospheric temperature, factors affecting, horizontal and vertical distribution, variations and global warming
13. Air pressure variation
14. Wind : factors affecting, cyclones and anticyclones and general circulation
15. Atmospheric humidity, vapour pressure and saturation, process of condensation, formation of dew, fog, mist, snow, rain and hail
16. Formation and classification of clouds
17. Introduction to monsoon, basics of weather forecasting

Practical
1. Study of tillage implements
2. Practice of ploughing and puddling
3. Study of seeding equipments
4. Study about remote sensing
5. Study of methods of sowing of field crops
6. Study about manures, fertilizers and green manure crops / seeds (including calculation)
7. Study of intercultivation implements and practices
8. Methods of fertilizer application
9. Site selection for Agromet observatory
10. Measurement of temperature, rainfall and evaporation (atmospheric/soil)
11. Measurement of atmospheric pressure, solar radiation, sunshine duration
12. Measurement of wind direction, speed, and relative humidity
13. Study of weather forecasting and synoptic charts

References
3. Introduction to Agronomy and soil - V.G. Vaidya and K.K. Sahatrabudhe and water Management
AG102 : Principles of Genetics Theory

1. Mendel's laws of inheritance and exceptions to the laws
2. Types of gene action
3. Multiple alleles, Pleiotropism, Penetrance and expressivity
4. Quantitative traits, qualitative traits and differences between them
5. Multiple factor hypothesis
6. Cytoplasmic inheritance, its characteristics features and difference between chromosomal and cytoplasmic inheritance
7. Mutation and its characteristics features
8. Methods of inducing mutations and CIB technique, gene expression and differential gene activation
9. Lac operon and fine structure of gene
10. Ultra structure of cell and cell organelles and their functions
11. Study of chromosome structure, morphology, number and types, Karyotype and Idiogram
12. Mitosis and meiosis, their significance and differences between them
13. DNA and its structure, function, types, modes of replication and repair
14. RNA and its structure, function and types
15. Transcription, Translation, Genetic code and outline of protein synthesis
16. Crossing over and factors affecting it, Mechanism of crossing over and Cytological proof of crossing over
17. Linkage, Types of linkage and estimation of linkage
18. Numerical chromosomal aberrations (Polyploidy) and evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas
19. Structural chromosomal aberrations

Practical

1. Microscopy (light microscopes and electron microscopes) : Preparation and use of fixatives and stains for light microscopy
2. Preparation of micro slides and identification of various stages of mitosis
3. Preparation of micro slides and identification of various stages of meiosis
4. Monohybrid ratio and its modification; Dihybrid ratio and its modifications : Trihybrid ratio : Chi-square analysis and Interaction of factors
5. Epistatic factors, supplementary factors and duplicate factors complementary factors, additive factors and inhibitory factors, Linkage-two point test cross, linkage-three point test cross
6. Induction of polyploidy using colchicine
7. Induction of chromosomal aberrations using chemicals

References
1. Fundamentals of Genetics – B.D. Singh, Kalyani Publisher
2. Elements of Genetics – Phundan Singh, Kalyani Publisher
3. Genetics – M.W. Strickberger
AG103 : Introduction to Soil Science

1. Soil Pedological and Edaphological concepts, Origin of the earth, Earth’s crust.
2. Composition: rocks and minerals weathering.
3. Soil formation factors and processes, Components of soils.
5. Soil physical properties, Soil texture, Textural classes, Particle size analysis.
6. Soil structure classification, soil aggregates, their significance in crop production.
7. Soil consistency, soil crusting, soil compaction, soil colors.
8. Bulk density and particle density of soils and porosity, their significance and manipulation.
9. Elementary knowledge of soil, classification and soils of India.
10. Soil water, Retention and potentials, soil moisture constants.
11. Movement of soil water, infiltration, percolation, permeability, drainage.
13. Thermal properties of soils, Soil temperature.
15. Soil colloids, properties, nature, types and significance.
16. Layer silicate clays, their genesis and sources of charges.
17. Adsorption of ions, Ion exchange, CEC and AEC.
18. Factors influencing ion exchange and its significance.

Practical
2. Study of a soil profile – Identification of rocks and minerals.
3. Soil texture and identification of rocks and minerals.
4. Determination of bulk density and particle density.
5. Aggregate analysis, soil strength.
6. Soil moisture determination, soil moisture constants – Field capacity infiltration rate, water holding capacity.
7. Soil temperature.
8. Analytical chemistry – Basic concepts, techniques and calculations.

References
AG104 : Fundamentals of Soil and Water Conservation Engineering

1. Introduction to surveying and leveling.
2. Survey equipment and chain survey.
3. Cross staff survey and plotting procedure
4. Calculation of area of regular and irregular fields
5. Levelling – Terminology and equipment.
6. Types of levels – Dumpy level
7. Calculation of reduced levels
8. Various types of leveling
9. Contour and contour survey
10. Plotting and interpretation of contours
11. Importance of irrigation and water resources of the country
12. Flow irrigation and lift irrigation
13. Irrigation projects – classification and main irrigation projects of the country
15. Irrigation methods – drip and sprinkler irrigation
16. Water conveyance systems – open channel and pipeline
17. Measurement of irrigation water – Basic terminology and units, volume time and velocity area method.
19. Water lifting devices
20. Centrifugal pump
21. Centrifugal pump – Installation, selection and power requirement
22. Operation and maintenance of centrifugal pump
23. Soil erosion – Introduction and types of soil erosion
24. Water erosion – Factors affecting
25. Wind erosion – Factors affecting
26. Control measures to soil erosion – vegetative
27. Engineering measures to soil erosion
28. Engineering measures to soil erosion

Practical
1. Determination of pace factor and distance measurement by pacing
2. Chain surveying and plotting
3. Ranging and measurement of offsets
4. Setting and adjustment of dumpy level and staff reading.
5. Differential leveling, profile leveling.
6. Contour surveying and plotting of contour.
7. Evaluation of surface irrigation methods.
10. Flow measurement through weirs, flumes and orifices.
11. Acquaintance with various water lifting devices.
12. Installation of centrifugal pump.
13. Study of various control measures to soil erosion.

References
1. Principles of Agricultural Engineering Vol. II – Dr. A.M. Michael and Dr. T.P. Ojha
AG105 : Plant Pathogens and Principles of Plant Pathology

1. Introduction, Importance of Plant Pathology in Agriculture.
2. Different groups of microorganisms : Fungi, Bacteria Fastidious Vesicular bacteria, phytoplasmas, Spiroplasmas Viruses, Viroids, Algae, Protozoa, and Phanero-gamic Parasites with examples of diseases caused by them.
5. Fungal tissues, modification of fungus thallus.
8. Classification of fungi. Key to divisions and sub divisions.
9. Definition and objectives of Plant Pathology.
13. Dispersal of Plant Pathogens
17. Plant disease epidemiology, plant disease forecasting, remote sensing.
18. General principles of Plant disease mgmt, importance and general principles.
19. Avoidance, exclusion, protection.
21. Cultural Methods – Rougeing, 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.
22. Role and mechanisms of bio control and PGPR.
23. Physical methods – Heat and Chemical methods
24. Methods of application of fungicides.
25. Host Plant resistance – Application of biotechnology in Plant disease management, Development of disease resistant transgenic plants through gene cloning.
26. 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.
4. Study of Pythium, Phytophthora and Albugo.
5. Study of Sclerospora, Peronosclerospora, Pseudoperonospora, Peronospora, Plasmopara and Bremia.
6. Study of Mucor and Rhizopus.
7. Study of Oidium, Oidiopsis, Ovulatiopsis, Erysiphe, Phyllactinia, Uncinula and Podosphaera.
8. Study of Puccinia (different stages), Uromyes Hemiliea.
10. Study of Agaricus, Pleurotus and Ganoderma.
11. Study of Septoria, Colletotrichum, Pestatotisips and Pyricularia.
13. Study of *Sphacelotheca, Ustilago, Tolyposporium*.
14. Study of *Agaricus, Pleurotus* and *Ganoderma*.
15. Study of *Septoria, Colletotrichum, Pestatotiopsis* and *Pyricularia*.
16. Study of *Aspergillus, Penicillium, Trichoderma* and *Fusarium*.
17. Study of *Helminthosporium, Drechslera, Alternaria, Stemphyllium, Cercospora, Phaeoisariopsis, Rhizoctonia* and *Sclerotium*.
18. Demonstration of Koch's postulates.
19. Study of different groups of fungicides and antibiotics.
20. Preparation of fungicides - Bordeaux mixture, Bordeaux paste, Chestnut compound.
21. Methods of application of fungicides, seed, soil and foliar.
24. Visit to quarantine station and remote sensing laboratory.

**References**
1. Introduction to Principles of Plant Pathology - R.S. Singh
2. Plant Pathology - E.N. Agrios
3. Plant Pathology - R.S. Mehrotra
4. A text book of modern Plant Pathology - Bilgramie and Dubey,
AG106 : Production Technology of Fruit Crops

1. Definition and importance of Horticulture
2. Divisions of Horticulture
3. Climatic zones of Horticultural Crops in India and M.P.
4. Area and production of important fruit crops in India and M.P.
5. Establishment of orchard (selection of site, fencing, planning and layout, wind breaks, planting systems) high density planting
6. Propagation methods and use of root stocks
7. Training and pruning methods
8. Use of growth regulators in fruit production
9. Package of practices for cultivation of major fruit crops (Mango, Guava, Citrus, Banana, Grapes, Papaya, Sapota)
10. Minor fruits : Custard apple, Ber, Pomegranate, Jackfruit
11. Litchi, Apple, Pineapple, Falsa, Fig, Pear, Plum

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 cutting (soft wood, hard wood and semi hard wood), layering (simple layering, air layering, stooping 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
9. Description and identification of varieties of mango, guava, grape, papaya aonla and sapota
10. Description and identification of varieties of banana, citrus (lime, lemon, mandarin, pomegranate, ber)
11. Irrigation methods in fruit crops including drip-micro irrigation methods of establishment of orchard
12. Methods of fertilizer application in fruit crops; including fertigation technology
13. Visit to local commercial orchards
14. Preparation of growth regulators, powder, solution; and lanolin paste for propagation
15. Application of growth regulators for improving fruit set, fruit size, quality, delaying ripening and hastening ripening

References
1. Fruits : Tropical and Subtropical – Bose and Mitra
2. Plant propagation practices – Hortmann and Kester
3. Fruit culture in India – Sham Singh
4. Udhyam Vigyan – S.S. Shrivastava
AG107 : Introductory Agriculture (Ancient Heritage, Agricultural Scenario and Gender Equity in Agriculture)

1. Introduction of the term "Agriculture" and its relevance to livelihood of human being

2. Crop Production as a basic component in Agriculture. Crop production as an art, science and business. Factors (environment and management) affecting crop production.

3. History of Agricultural Development (1). Ancient Indian Agriculture in civilized era (Agriculture in pre historic era) - Conservation of describable plants, collection and preservation of seeds, sowing of seeds, tilling of lands, shifting cultivation, weed control, fallowing of lands, the use of domestic wastes as plant nourishment and practice of green manuring and crop-rotation. 
(2). History of Indian agriculture (Chronological agricultural technology development in India).

(a). Development of agriculture before independence
(b). Development of agriculture after independence

(3). Modern Indian Agriculture-Development of ideo plant types improved production technologies, intensive cropping systems, minimum/zero tillage, dryland agriculture, utilization of problematic and waste lands, maintenance of soil-health and ecological balance and precision farming.

4. Indian Agriculture

(a) Development of agriculture education, research and extension in India.
(b) Global issues related to agriculture (Food security, efficient use of natural resources, efficient use of knowledge of agricultural sciences, development of new plant types, multiple resistance crop varieties, commercialization of agriculture, sustainable agriculture and organic farming).
(c) Risk management in Indian agriculture (Production risks, marketing risks and financial risks).

5. Diversity of physiography, soil groups, marine, livestock, soil factors, weather factors, economic ecology, farming system approach, dry and irrigation agriculture.

6. Value addition (Post harvest management and requirements of new technology)

7. Women in agriculture - manifested roles and task, work stress factors, nutritional and rural life standards, role of house hold in 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

AG108 : National Service Scheme (NSS)

1. Historical background, motto, symbol, aims and objectives, duties and code of conduct for NSS volunteers.
2. The programme of development will be taken into consideration, keeping the view the necessities and availability of resources, the following activities can be taken up.

A. Education and Recreation
   1. Functional literacy CC
   2. Child nutrition programme
   3. Community entertainment programme
   4. Discussion on eradication of social evils
   5. Awareness programmes, consumer awareness, highlights of consumer act.
   6. National integrity
   7. Other activities

B. Production oriented programme
   1. Advocating advanced agricultural practices
   2. Initiation and motivation for agro-forestry
   3. Weed control
   4. Rodent control and pest management
   5. Soil testing and soil health care
   6. Awareness in use of fertilizers and hybrid seeds
   7. Development of social forestry
   8. Grain storage, poultry production, veterinary hospitals

C. Environmental Enrichment and Conservation:
   1. Construction and repair of roads, village streets, drains, environment pollution.
   2. Plantation, preservation and upkeeping of trees
   3. Preservation of soil erosion and work for soil conservation
   4. Popularization and construction of gobar gas plants
   5. Advocating people on the preservation of forests and wildlife
   6. Popularization of solar/gas cookers

D. Health, Family Welfare and Nutrition Programme
   1. Anti drug ediction drives
   2. Population education and family welfare
   3. Pathological examination
   4. Mass immunization
   5. Awareness against AIDS

E. Programmes for working during emergencies: