

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : Principles of Agronomy and Agricultural Meteorology

Paper Code : AG101

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

1. Principles of Agronomy - S.R. Reddy (1999), Kalyani Publication, New Delhi
2. Hand Book of Agriculture (2006) - ICAR Publication
3. Introduction to Agronomy and soil - V.G. Vaidya and K.K. Sahatrabadhe and water Management

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Faculty of Science

Class: B.Sc Agriculture– I Semester

Sub : Principles of Genetics Theory

Paper Code : AG102

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 colchicines

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
4. Principles of Genetics – Snoids & Simonds (4th edition) John Willy Publication, New York

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : Introduction to Soil Science

Paper Code : AG103

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.
4. Soil profile description. Diagnostic horizons.
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.
12. Methods of determination of soil moisture
13. Thermal properties of soils, Soil temperature
14. Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth.
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
19. Soil organic matter, composition, Decomposability, Humus Fractionation of organic matter
20. 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 – Organic carbon, pH, EC, soluble cations and anions
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

1. The Nature and Properties of Soil – Brady, N.C. & Weil, R.R., Macmillan
2. Soil Physics – M.C. Oswal, Oxford & IBH Publishing Co.
3. Soil Physics – Marshall, T.J., Holmes, J.W. & Rose, C.W., Cambridge Univ. Press

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : Fundamentals of Soil and Water Conservation Engineering

Paper Code : AG104

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
14. Irrigation methods – surface methods
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.
18. Measurement of irrigation weirs, – water flumes and orifices/interceptor and relief drains.
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.
8. Evaluation of drip and sprinkler irrigation method.

9. Flow measurement – volume – time and velocity area method.
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
2. Irrigation – Theory and Practice – Dr. A.M. Michael
3. Surveying and Leveling – B.C. Punamia

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : Plant Pathogens and Principles of Plant Pathology

Paper Code : AG105

1. Introduction, Importance of Plant Pathology in Agriculture.
2. Different groups of microorganisms : Fungi, Bacteria Fastidious Vesicular bacteria, phytoplasmas, Spiroplasmas Viruses, Virioids, Algae, Protozoa, and Phanero-gamic Parasites with examples of diseases caused by them.
3. Prokaryotes : Classification of Prokaryotes according to Bergey's Manual of Systematic Bacteriology.
4. General Characters of fungi. Definition of fungus, somatic structures.
5. Fungal tissues, modification of fungus thallus.
6. Reproduction in fungi (Sexual and Asexual).
7. Nomenclature, Binomial System of nomenclature.
8. Classification of fungi. Key to divisions and sub divisions.
9. Definition and objectives of Plant Pathology.
10. History of Plant Pathology.
11. Terms and Concepts in Plant Pathology.
12. Survival of Plant Pathogens.
13. Dispersal of Plant Pathogens
14. Phenomenon of infection – Pre penetration and post – penetration.
15. Pathogenesis – Role of enzymes, toxins, growth regulators and polysaccharide.
16. Defense mechanism in plants : Structural and Biochemical (Pre and Post infection).
17. Plant disease epidemiology, plant disease forecasting, remote sensing.
18. General principles of Plant disease mgmt, importance and general principles.
19. Avoidance, exclusion, protection.
20. Plant quarantine, and inspection – Quarantine rules and regulations.
21. Cultural Methods – Rougeing, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation, hot weather ploughing, soil amendements, 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.
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 *Mucor* and *Rhizopus*.
7. Study of *Oidium*, *Oidiopsis*, *Ovulariopsis*, *Erysiphe*, *Phyllactinia*, *Uncinula* and *Podosphaera*.
8. Study of *Puccinia* (different stages), *Uromyces* *Hemileia*.

9. Study of *Sphacelotheca*, *Ustilago*, *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.
18. Bio-assay of fungicides - Poisoned food, inhibition zone and slide germination techniques.
19. Biocontrol of Plant Pathogens, dual culture technique, seed treatment.
20. 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,

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : Production Technology of Fruit Crops

Paper Code : AG106

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. Udhyan Vigyan – S.S. Shrivastava

B.Sc. (Agriculture)

Paper Code : AG-107

PHYSICAL EDUCATION

Unit - I Introduction of Physical Education

Meaning Definition and Scope of Physical Education. Aims and Objective of Physical Education Importance of Physical Education in present era . Physical Education as an Art and Science .

Unit - II Principles of Physical Education

Definition of Education and Physical Education. Principles Sources of Principles of Physical Education. Difference between Physical Culture Physical training and Physical Education

Unit - III Ancient Olympic Games

Modern Olympic Games, International Olympic committee (IOC)

Unit - IV Modern Physical Education in India

1. Physical education and sports training institution in India
2. Indian Olympic association of India
3. National sports federation /associations
4. Sports Authority of India

Unit - V Biological and Sociological Growth and Development

Age and gender characteristics, Body Types, Anthropometric differences, Psychological Learning, Attitude, Interest, Cognition, Emotions. Society and Culture, Social acceptance and recognition.

References:

Bucher, C. A. (n.d.) Foundation of physical education. St. Louis: The C.V. Mosby Co. Deshpande, S. H. (2014). Physical Education in Ancient India. Amravati: Degree college of Physical education.

Mohan, V. M. (1969). Principles of physical education. Delhi: Metropolitan Book Dep.

Nixon, E. E. & Cozen, F.W. (1969). An introduction to physical education. Philadelphia: W.B. Saunders Co.

Obertuffer, (1970). Delbert physical education. New York: Harper & Brothers Publisher.

Sharman, J. R. (1964). Introduction to physical education. New York: A.S. Barnes & Co.

William, J. F. (1964). The principles of physical education. Philadelphia: W.B. Saunders Co.

Faculty of Science

Class: B.Sc Agriculture – I Semester

Sub : National Service Scheme (NSS)

Paper Code : AG108

1. Historical background, moto, 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:

1. Assisting authorities in distribution of essential items, relief and rescue work.
2. Other activities can be taken up as and when required.

Practical

1. Introduction to physical education, Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed.
2. Rules regulations of important games.
3. Skill development in any one of the games-football, hockey, cricket, volleyball, badminton, throw ball, tennis.
4. Participation in one of the indoor games-badminton, chess and table tennis.
5. Rules and regulations of athletic events, participation in any of the athletic events-long jump, high jump, triple jump, javelin throw, discus throw, shot put, short and long distance running.
6. Safety education, movement education, effective way of doing day-to-day activities.
7. First-aid training coaching for major games and indoor games.
8. Asanas and indigenous ways for physical fitness and curative exercises.
9. Exercises and games for leisure time, use and experience.

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

One lecture in a week is sufficient to complete the above course.

References

1. Foundation of Physical Education – C.A. Bucher and D.A. Wuest
2. Introduction to Physical Education, Fitness and Sports – Davyal
3. Applied Anatomy and Biomechanics in sports – John Bloom field *et al.*
4. Methods of Physical Education – Kamlesh and Sangral
5. Science of sports training – Hardayal Singh