Course No. : AGRO-111 Course Title : Agro-Techniques of Principal Field Crops- I (Kharif)

Credits : (1+1=2) Semester: I

Theory:

Importance of agricultural meteorology – weather and climatic factors affecting crops.Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif crops.Cereals : Rice, maize, kharif sorghum, pearl millet and minor millets Pulses : Pigeonpea, mungbean, uridbean, horsegram, mothbean, cowpea Oilseeds : Groundnut, sesame, soybean, castor and niger; Fibre crops : Cotton, jute, sunhemp and dhaincha Forage crops : Sorghum, pearlmillet, maize, cowpea, cluster bean, rainfed and irrigated grasses

Practical:

Introduction to agro-meteorological instruments.Rice nursery preparation and transplanting/seed bed preparation and sowing of Kharif crops; Calculations of seed rate; Sowing of soybean, pigeonpea, mungbean, maize, groundnut, and cotton; Effect of seed size on germination and seedling vigour of soybean/groundnut; Effect of sowing depth on germination of soybean; Identification of weeds in rice, maize and soybean fields and study of weed control experiments in these crops; Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum and millets; Study of yield contributing characters, yield calculations, harvesting and yield estimation of above crops; Study of crop varieties and important agronomic experiments; Study of forage experiments.

Teaching Schedule- Theory with weightages (%):

Lectures No.	Topic	Weightage (%)
1	Introduction and importance of Agro-meteorology	6
2	Weather and climate, Factors affecting crops	6
3	Production Technology of cereals (origin, geographical distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield): Cereals: Rice, Maize	12
4	Production Technology of Cereals: *Kharif*Sorghum, Pearl millet	12
5	Production Technology of Minor millets	6
6	Production Technology of Pulses: Pigeon pea, Mungbean	12
7	Production Technology of Pulses: Uradbean, Horsegram	5
8	Production Technology of Pulses: Mothbean, Cowpea	5
9	Production Technology of Oilseeds: Groundnut, Sesame	8
10	Production Technology of Oilseeds: Soybean, Castor, Niger	6
11	Production Technology of Fiber crops: Cotton, Jute	12

12	Production Technology of Fiber crops: Sun hemp, Dhaincha	2
13	Production Technology of Forage crops: Sorghum, Pearl-millet	2
14	Production Technology of Forage crops :Maize, Cowpea	2
15	Production Technology of Forage crops: Cluster bean	2
16	Production Technology of Rain fed and Irrigated grasses	2

Practical Exercises:

ExercisesNo.	Title
1	Introduction to Agro-meteorological instruments
2	Rice nursery preparation
3	Transplanting/Seed bed preparation
4	Sowing of different *kharif* crops
5	Calculations of seed rate
6	Effect of seed size on germination and seedling vigour of crops
7	Effect of sowing depth on germination of different crops
8	Identification of weeds in rice, maize and soybean fields
9	Study of weed control experiments in different crops
10	Top dressing of nitrogen in maize and rice
11	Study of fertilizer experiments on rice, maize, sorghum and millets
12	Study of yield contributing characters
13	Study of yield calculations
14	Harvesting and yield estimation of above crops
15	Study of crop varieties and important agronomic experiments
16	Study of forage experiments

Suggested readings:

1) Text Book:

2) Reference Books:

1. Hand book of Agriculture, ICAR Publication, 6th edition, 2006.
2. Chhida Singh, Prem Singh and Rajbir Singh Modern Techniques of raising field crops, , 2nd edition
3. Rajendra Prasad Field Crops,
4. Reddy SR,Principles of Agronomy, Kalyani PublishersThird edition
5. S.S. Cheema, B.K. Dhaliwal and T.S. Sahota Theory and Digest Agronomy
6. M.M. Hosmani, B.M. Chittarpur and H.B. Babalad.Farm Productivity New Century New Challenges
7. V.G. Vaidya, K.R. Sahasrabuddhe and V.S. Khuspe,Crop production and field experimentation Continental Prakashan, Pune.

3) e-books:

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Course No. : SSAC-111 **Course Title: Fundamentals of Soil Science**

Credits : (1+1=2) **Semester: I**

Theory:

Soil pedological and edapholgical concept. Origin of the earth Earth's crust composition Study of soil forming rocks and minerals, Weathering of rocks and minerals, Soil forming factors and processes, Components of soils, Study of soil profile, Soil physical properties: Soil texture, textural classes, particle size analysis, Soil structure Classification, soil aggregates, significance of soil consistency, Soil crusting. Bulk density and Particle density.Soil porosity, their significance and manipulation. Soil compaction and soil colour, Soil water: Retention and potentials, Drainage: Soil temperature, Soil air: Gaseous exchange. Influence of soil temperature, air on plant growth, Soil colloids: Properties, nature, types and significance, Ion exchange. CEC and AEC. Factors influencing ion exchange and its significance, Soil organic matter: composition, C:N ratio, Soil biology: Definition soil Biomass, soil organisms and their beneficial and harmful roles, Soil survey and USDA Soil classification. Land Capability classification Soils of India, Soils of Maharashtra, Soil erosion. Types, universal soil loss equation & control measures

Practical:

Study of soil farming rocks and their identification, Collection of soil sample and processing of soil for physio-chemical analysis, Study of soil profile in field, Determination of Bulk density and particle density of soil, Determination of hydraulic conducting of soil Determination soil strength and Determination of moisture content of soil, Determination of infiltration rate of soil, Determination of soil texture and particle size analysis by hydrometer method, Determination of soil temperature, Study of basic analytical concepts techniques and calculations, Determination of organic carbon content of soil, Determination pH and EC of soil, Determination of CEC of soil.

Teaching Schedule- Theory with weightages (%):

Lecture No.	Topic	Weightage (%)
1	Soil colour-definition, significance, Munsell soil colour chart. Factors influencing soil colour- parent material, soil moisture and organic matter.	5
2	Soil structure: definition, classification and Genesis. Factors influencing soil structure. Soil consistence, plasticity, Atterberg's limits.	5
3	Soil air : composition, factors influencing soil air, gaseous exchange/ renewal and effect on plant growth	5
4	Soil Temperature : Sources ,distribution of heat, factors influencing soil temperature and measurement of soil temperature and effect on plant growth	7.5
5	Soil chemical properties: Soil colloids: organic, humus, inorganic, secondary silicate clays and hydrous oxides	5

6	Ion exchange: cation and anion, importance of ion exchange.	5
7	pH and nutrient availability, soil buffering capacity.	5
8	Soil organic matter: sources, factors, decomposition and importance.	5
9	Soil water, soil moisture constants, energy concepts, measurement of soil water, movement, pF scale.	5
10	Soil biology :importance soil microbes, benefits and harmful effects	5
11	Soil taxonomy (soil orders), land capability classification, Soils of different ecosystems and their properties. Methods and objective of soil survey Soil erosion, types and control measures.	10
12	Aerial photography : Satellite image interpretation, Soil survey, types and importance ,Remote sensing application in soil and plant studies Soil degradation, soil compaction, compression, Problematic Soils –Salt affected soil, Acid soil, Flooded and Coastal saline soil properties. Management of problematic soils. Soil environmental quality.	10
	Total	**100**

Practical Exercises:

Exercises No.	Title
1	Basic analytical concepts, techniques and calculation.
2	Collection and preparation of soil samples for horticultural crops
3	Determination of moisture content in soil by gravimetric method
4	Determination of pH and EC of soil sample
5	Determination of calcium carbonate by Rapid Titration method
6	Determination of Organic carbon by Walkely and Black method
7	Determination of Bulk density and porosity of soil
8	Textural analysis of soil by Boucouyos hydrometer method
9	Determination of available nitrogen content in soil
10	Determination of available Phosphorus from soil
11	Determination of available Potassium from soil
12	Determination of available sulphur from soil
13	Determination of DTPA extractable micronutrient from soil
14	Description of soil profile in field
15	Determination of soil colour using Munsell colour chart, Estimation of water holding capacity , Field capacity, Permanent wilting point and
16	Determination of soil water potential characteristic curve by tensiometer and pressure plate apparatus Visit to Soil and Water Clinic

Suggested readings:

1) Text Book:

1. By J. A. Daji Text book of Soil Science.

2) Reference books:

1. By C. C. Shah and NK. Narayana (1966) Physical properties of soil
2. By Henry. D. Fothk Fundamentals of Soil Science (8th edition) 1990.

3. By Biswas and Mukharjiee Text book of Soil Science (Second edition) 1994
4. By N. C. BradyNature and properties of soils (Tenth edition), prentice Hall of India Pvt. Ltd. New Delhi.
5. By V.D. Patil & C.V. Mali Fundamentals of Soil Science – A Text Book
6. Fundamentals of Soil Science by ISSS, New Delhi .

3) e book:

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Course No. : HORT -111 **Course Title: Production Management of Important Fruit Crops**

Credit : (1+1=2) **Semester: I**

Theory:

Classification of fruit crops on horticultural basis. Importance, present status and future scope for fruit growing in Maharashtra and India. Area and production, export, import scenario of fruit crops and plantation crops in Maharashtra and India.Nutritive value of fruits, importance of selection of site, fencing, planting systems, high density planting, wind breaks and shelter belts in fruit production.Propagation methods and use of rootstocks, methods of training and pruning. Special horticultural practices like bahar treatment, ringing, girdling, bending, notching, etc. Nutrient management, water management, weed control, mulching, intercropping, use of growth regulators in fruit production, physiological disorders in fruit crops. Package of practices for cultivation of major fruit crops like, mango, banana, citrus, grape, papaya, sapota, guava, pomegranate, minor fruit crops like ber, fig, coconut, arecanut,etc. Industrial value of plantation crops (Give brief cultivation information in tabular form for minor crops).

Practical:

Study of garden tools and implements.Study of propagation media, containers, potting mixture, potting, repotting and transplanting. Nursery practices for raising seedlings. Identification of fruit and plantation crops.Plant propagation by seed, cutting, layering, budding and grafting.Practices in planning (layout) and planting systems of fruit crops.Training and pruning, manures and fertilizers application, irrigation methods. Special horticultural practices like bahar treatment, ringing, girdling, bending, notching etc. Preparation and application of growth regulators.Preparation and application of Bordeaux solution and paste.Identification of important pests and diseases of fruit crops and their control. Harvesting, post harvest treatments, grading and storage. Visit to commercial orchards

Teaching Schedule- Theory with weightages (%):

Lecture No.	Topic	Subtopic	Weightage (%)
1	Classification of fruit crops on horticultural basis.	Botanical, Climatic Adaptability, Fruit Morphology, Rate of Respiration, Nutrient Content, Photoperiodic Response	06
2	Importance, present status	Importance, present status and future scope for fruit growing in Maharashtra and India. Area and production, export, import scenario of fruit crops and plantation crops in Maharashtra and India	06
3	Nutritive value of fruits, Importance of selection of site, fencing, planting systems	Role in Human Nutrition Selection of site, Primary Operation, planning of orchard, fencing, Methods of planting systems with diagram	05
4	high density planting, wind breaks and shelter belts in fruit production	Definition, Importance, Characteristics, Advantages	10
5	Propagation methods and use of rootstocks, Methods of training and pruning.	Methods of propagation and their advantages and disadvantages Definition, Methods, Advantages and disadvantages	05
6	Special horticultural practices like bahar treatment, ringing, girdling, bending, notching, etc.	Definition and procedure	06
7	Nutrient management, water management, weed control, mulching, intercropping	Methods of Irrigation, manures and fertilizer application	07
8	Use of PGR physiological disorders in fruit crops	Role of PGR in plant growth Substances and Retardance	10
9	Package of practices for cultivation of major fruit crops like, mango,	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	05
10	Package of practices for cultivation of banana,	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity	05

		Indices, Harvesting and Yield	
11	Package of practices for cultivation of Citrus	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	05
12	Package of practices for cultivation of Grape	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	05
13	Package of practices for cultivation of Papaya and Sapota	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	07
14	Package of practices for cultivation of Guava and Pomegranate	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	07
15	Package of practices for cultivation of minor fruits Ber, Fig,	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	03
16	Package of practices for cultivation of minor fruits Coconut, Arecanut	Cultivation Practices ,Soil and Climate Requirement ,Varieties, Propagation, Planting, Irrigation, Manures and Fertilizers, Maturity Indices, Harvesting and Yield	03

Practical Exercises:

Exercise No.	Title
1	Study of Garden tools and Implements.
2	Study of Propagation Media, Containers, Potting Mixture, Potting, Repotting and Transplanting.
3	Nursery Practices for Raising Seedlings.
4	Identification of Fruit and Plantation Crops.
5	Plant Propagation by Seed, Cutting, Layering, Budding and Grafting
6	Practices in Planning (Layout) and Planting Systems of Fruit Crops.
7	Training and Pruning.
8	Manures and Fertilizers application
9	Irrigation Methods.

10 & 11	Special Horticultural Practices like Bahar Treatment,Ringing, Girdling, Bending, Notching etc.
12	Preparation and Application of Growth Regulators
13	Preparation and Application of Bordeaux Solution and Paste
14	Identification of Important Pests and Diseases of Fruit Crops and Their Control.
15	Harvesting, Grading and Storage
16	Post Harvest Treatments

Suggested readings:

1) **Text Book:**

2) **Reference books:**

1. Hayes, W. B. Fruit Growing in India. Kitab Publishing Co., Allahabad.
2. Shanmugavelu, K. G. Production Technology of Fruit Crops, SBA Publishers,Kolkatta.
3. Singh, Ranjeet. Fruits. National Book Trust Ltd., New Delhi.
4. Sham Singh. Fruit Growing. Kalyani Publishers, New Delhi.
5. Bose, T. K. and S. K. Mitra. Propagation of Tropical and Subtropical Horticultural Crops, Naya Udyog, 206, BidhanSavani, Kolkatta-700016.
6. Baker, H. Fruits. Mitchell Meagrely Publications, London.
7. Singh, A. Fruit Production and Technology. Kalyani Publishers, New Delhi.
8. Yadav, P. K. Fruit Production Technology. International Book Distributing Co., Division, Lucknow, Inida.
9. Sharma, R. R. Fruit Production Problems and Solutions. International Book Distributing Co., Division, Lucknow, India.
10. Kumar, P. Management of Horticultural Crops. (HortSciene Series Vol. 11, New India Publishing Agency, NIPA). Kumar, P. Management of Horticultural Crops. (HortSciene Series Vol. 11, New India Publishing Agency, NIPA).
11. Kunte, Y. N, Kawthalkar, M. P., Yawalkar, K.S. Principles of Horticulture and Fruit growing, Agro-Horticultural Pub.House, Nagpur.

3) **e book:**

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Course No. : ASDS -111 Course Title :Livestock Production & Management

Credit : (1+1=2) Semester: I

Theory:

Scope of livestock in Indian economy.Livestock census and trend of livestock production. Terminology used in livestock care, poultry care and management of livestock and poultry

i.e. calf, heifer, milking animal, dry animal, pregnant animal, draft animal and breeding bull, stress management. Housing of different livestock and poultry.Routine farm management.Preparation of animal for different purposes. Various breeds of cattle , sheep, goat, buffalo and poultry. Nutrient requirement of livestock and poultry.Maintenance of records on livestock dairy and poultry farms.Animal health cover, clean and hygienic milk production. Systems of breeding, artificial insemination

Practical:

Study of body parts of different classes of livestock, i.e. cattle, buffalo and poultry.Handling and control of animals. Routine practices on livestock and poultry farms. Vaccination schedules of livestock and poultry. Record keeping, judging of animals for dairy and draft purpose, instruments and equipments used in AI. Layout of various dairy structures. Utilization of dairy farm wastes. Disposal of milk

Teaching Schedule- Theory with weightages (%):

Lecture No.	Topic	Weightage (%)
1	Scope of livestock in Indian economy. Livestock census and trend of livestock production.	6
2	Terminology used in livestock and poultry	6
3&4	Care and management of livestock i.e. calf, heifer, milking animal, dry animal, pregnant animal, draft animal and breeding bull, stress management.	13
5	Care and management of poultry, Housing of different livestock and poultry.	12
6	Routine farm management	6
7	Preparation of animal for different purposes	6
8	Various breeds of cattle , buffalo, sheep, goat and poultry	7
9& 10	Nutrient requirement of livestock and poultry	6
11&12	Maintenance of records on livestock dairy and poultry farms, Animal health cover.	13
13	Structure of udder and letting down of milk, clean and hygienic milk production	6
14	Reproductive systems of male and female, estrus cycle, pregnancy and parturition	7
15 & 16	Systems of breeding, Artificial insemination	12

Practical Exercises:

Exercises No.	Title
1&2	Study of body parts of different classes of livestock, i.e. cattle, buffalo
3	Study of body parts of poultry
4	Handling and control of animals

5	Routine practices on livestock.
6	Routine practices on poultry farms.
7	Vaccination schedules of livestock and poultry
8	Record keeping for livestock and poultry
9	Judging of animals for dairy and draft purpose
10	Instruments and equipments used in AI.
11	Layout of various dairy and poultry structures
12	Utilization of dairy farm wastes
13	Disposal of milk.
14	Economics of milk production
15	Preparation of viable bank proposal for livestock and poultry
16	Visit to livestock and poultry farm

Suggested readings:

1) **Text Book:**
2) **Reference books:**

1. Singh, R.A. Poultry Production. Kalyani Publishers, New Delhi
2. Maske, O Norton. Commercial Chicken Production. Manuel AVI Publishers, INC West Port.
3. Devendra, C. and G. B. McElroy. Goat and Sheep Production in Tropics – Long man Group Ltd., London.
4. Wong, et al. Fundamentals of Dairy Chemistry. Publishers Van Nastrand Rain hold Comp. New York
5. Ling, E.R. Text Book and Dairy Chemistry. Chapman Hall Ltd., London.
6. Sukumar de Outline of Dairy Technology.
7. Dairy processing Hand book
8. Banerjee, G. C. Text Book of Animal Husbandry. Oxford and IBH Publishers, New Delhi.
9. Sashry, C.K. Thomas and R. A. Singh. Farm Animal Management and Poultry Production. NSR, Vikas Publishing House Pvt. Ltd., Delhi.
10. Hand book of Animal Husbandry, ICAR, New Delhi.
11. Panda, B. and et al. Feeding of Poultry. ICAR, Publication, New Delhi.
12. Singh, R.A. Poultry Production. Publishers, New Delhi