



SKN COLLEGE OF AGRICULTURE

(SRI KARAN NARENDRA AGRICULTURE UNIVERSITY)

JOBNER-303329 DISTT. JAIPUR (RAJ.)

Phone: 01425-254022 (Office)

Dr. R.C. Kumawat
Dean & Faculty Chairman

No.F. (TC)DEAN-SKNCOA/2017

2838

Date: 15.12.2017

OFFICE ORDER

16

In continuation to earlier office order No.F. (TC)DEAN-SKNCOA/2017 /1067 dated 23.6.2017 the following courses will run in the II semester, 2017-18 commencing from January, 2018. The details of the courses are as under:

II Semester, 2017-18			
1.	GPB-121	Fundamentals of Generics	3(2+1)
2.	SSAC-121 [@]	Agricultural Microbiology	2(1+1)
3.	AGENGG-121	Introductory Soil and Water Conservation Engineering	2(1+1)
4.	CPHYS-121	Fundamentals of Crop Physiology	2(1+1)
5.	AGECON-121	Fundamentals of Agricultural Economics	2(2+0)
6.	PPATH-121	Fundamentals of Plant Pathology	3(2+1)
7.	ENTO-121	Fundamentals of Entomology	3(2+1)
8.	EXCOM-121	Fundamentals of Agricultural Extension Education	3(2+1)
9.	CSPD-121 [©]	Communication Skills and Personality Development	2(1+1)
10.	AGRON-121	Introductory Agro-meteorology & Climate Change	2(1+1)
11.	NSS/NCC/PEYP	NSS/NCC/Physical Education & Yoga Practices**	To be continued
TOTAL			24(15+9)

@ Course to be shared with Plant Pathology


© Common Course

**NG: Non-gradual courses

The detailed course contents of the above cited courses are also enclosed.

All the Deans and Heads of the Departments are hereby asked to allocate the teachers for teaching the above cited courses well in time so that the classes may commence as per schedule.

Encl: Course contents (1-18 pages)


(R.C. Kumawat)
Dean & Faculty Chairman

Copy forwarded for information and necessary action to:

1. P.S. to the Hon'ble Vice Chancellor, SKN Agriculture University, Jobner.
2. The Director Education, SKN Agriculture University, Jobner.
3. All Deans, SKNAU, Jobner.
4. All Heads of the Departments, SKNCOA, Jobner.
5. The Controller of Examination, SKNAU, Jobner.
6. The Principal, Government College, Uniara, Tonk / BBD, Govt. PG College, Chimanpura, Shahaçura (Jaipur)/ M.B. College of Agriculture, Panchkuiya Darwaja, Purani Tonk (Tonk)/ Dayanand College, Ajmer (Raj.)/ Late M.C. Meena, Agriculture College, Gangapur Road, Lalsot (Dausa)/ Pandit Deen Dayal Upadhyay Agriculture College, Deoli, Tonk/ O.P. Krishi Mahavidyalaya, Budhwal Tehsil, Bahor District Alwar (Raj.)/ Maharaja Surajmal Agriculture College, Rahimpur, Post-Nekpur, Tehsil-Roopwas, Distt. Bharatpur/ Ganeshi Lal Agriculture College, Kishangarh bas, Alwar.
7. The Incharge CIMCA, SKNAU, Jobner with the remarks to please upload on university website.
8. The Incharge, Student Section, SKNCOA, Jobner.
9. PA to the Dean, SKNCOA, Jobner.
10. Guard file.


ASSTT. REGISTRAR

GPB-121	Fundamentals of Genetics	3(2+1)
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Theory

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity, Cell division – mitosis, meiosis, Probability and Chi-square. Dominance relationships, gene interaction. Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping.

Structural changes in chromosome, Numerical changes in chromosome, Proof for DNA as genetic material and Genetic code, Mutation, classification, Methods of inducing mutation & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Epistatic interactions with examples. Cytoplasmic inheritance. Genetic disorders.

Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Practical

Study of microscope. Study of cell structure. stains and fixatives, Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross. Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structure.

Lecture Schedule

Theory

L. No.	Name of topic	Cr. Hrs.
1	Pre and Post Mendelian concepts of heredity	1
2	Mendelian principles of heredity	1
3	Cell division - mitosis	1
4	Cell division - meiosis	1
5	Probability and Chi-square	1
6	Dominance relationships and gene interaction	1
7	Epistatic gene interactions with examples (complementary, supplementary, duplicate gene interactions)	1
8	Epistatic gene interactions with examples (masking, inhibitory, polymeric and additive gene interactions)	1
9	Pleiotropism, pseudoalleles, Multiple alleles and Blood group genetics	1
10	Sex determination	1
11	Sex limited, sex influenced and sex linked traits	1
12	Sex linkage	1
13	Linkage and its estimation	1
14	Crossing over : introduction & mechanisms	1
15	Chromosome mapping	1
16	Structural changes in chromosome	1
17	Numerical changes in chromosome	1

18	Mutation: introduction, characteristics & classification	1
19	Mutagenic agents: physical and chemical mutagens	1
20	Induction of mutation, Methods of inducing mutation & CIB technique	1
21	Qualitative & Quantitative traits, Polygenes and continuous variations	1
22	Multiple factor hypothesis	1
23	Cytoplasmic inheritance	1
24	Genetic disorders	1
25	Nature, structure and types of genetic material	1
26	Proof for DNA as genetic material	1
27	Replication of genetic material	1
28	Genetic code & Protein synthesis	1
29	Transcription mechanism of genetic material	1
30	Translational mechanism of genetic material	1
31	Gene concept: Gene structure and function	1
32	Gene regulation, operon concept, Lac and Trp operons	1

Practical

L. No.	Name of topic	Cr. Hrs.
1	Study of microscope: parts and types	1
2	Study of cell structure	1
3	Experiments on monohybrid, test cross and back cross	1
4	Experiments on dihybrid, test cross and back cross	1
5	Experiments on trihybrid, test cross and back cross	1
6	Experiments on epistatic interactions including test cross and back cross	1
7	Experiments on epistatic interactions including test cross and back cross	1
8	Stains and their preparation	1
9	Fixatives and their preparation	1
10	Practice on mitotic cell division	1
11	Practice on meiotic cell division	1
12	Experiments on probability	1
13	Experiments on Chi-square test	1
14	Determination of linkage and cross over analysis (through two point test cross and three point test cross data)	1
15	Study on sex linked inheritance in Drosophila	1
16	Study of models on DNA and RNA structure	1

Reference books:

1. Gupta P.K.2004. Cytology, Genetics and evolution. Rastogi Publications, Meerut. (Hindi Edition)
2. Klug, W.W.and Cummings, M.R.2005.Concepts of genetics Pearson Education (Singapore) pvt. Ltd., Indian Branch, Pratap Ganj, New Delhi.
3. Singh, B.D. 2001.Kalyani Publishing House, New Delhi.
4. Strickberger, M.W.2001.Genetics. Prentice Hall of india. Pvt. Ltd., New Delhi.

SSAC-121	Agricultural Microbiology (Course to be shared with Plant Pathology)	2(1+1)
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THEORY

Introduction to microbial world: Prokaryotic and eukaryotic microbes. Sterilization, disinfection, pasteurization and Koch's postulates. Bacteria: cell structure, growth, Gram positive and Gram negative bacteria, chemoautotrophy and photoautotrophy. 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 asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, bio-fertilizers, bio-pesticides, bio-fuel production and biodegradation of agro-wastes.

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. Methods of isolation and purification of microbial cultures. Isolation of *Rhizobium*, *Azotobacter* and BGA. Staining and microscopic examination of microbes. Enumeration of microbial population in soil- bacteria, fungi and actinomycetes.

Lecture Schedule: Theory

S.No.	Topic	No. of lectures
1.	Introduction to microbial world: Prokaryotic and eukaryotic microbes.	1
2.	Sterilization, disinfection and pasteurization and Koch's postulates.	1
3.	Bacteria: cell structure, growth, Gram positive and Gram negative bacteria, chemoautotrophy and photoautotrophy.	2
4.	Bacterial genetics: Genetic recombination: transformation, conjugation and transduction, plasmids, transposon.	3
5.	Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles.	3
6.	Biological nitrogen fixation: symbiotic, associative and asymbiotic.	2
7.	Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.	1
8.	Microbes in human welfare: silage production,	1
9.	Bio-fertilizers, bio-pesticides and bio-fuel production	1
10.	Biodegradation of agro-wastes.	1

Lecture Schedule: Practical

S.No.	Topic	No. of lectures
1.	Introduction to microbiology laboratory and its equipments.	1
2.	Microscope: parts, principles of microscopy, resolving power and numerical aperture.	2
3.	Methods of sterilization.	1
4.	Nutritional media and their preparations.	3
5.	Methods of isolation and purification of microbial cultures.	3
6.	Isolation of <i>Rhizobium</i> , <i>Azotobacter</i> and BGA..	2
7.	Staining and microscopic examination of microbes.	2
8.	Enumeration of microbial population in soil- bacteria, fungi and actinomycetes	2

References:

1. Biswas, T.D. and Mukherjee, S.K. 1990. Text Book of Soil Sciences, Tata McGraw-Hill Publishing Company Limited, New Delhi.

2. Mukherjee, N. and Ghosh T. 1998. Agricultural Microbiology, Kalyani Publishers, New Delhi.
3. Pelczar, Jr. Michel J. Chan, E.C.S. and Krieg, Noel R. 1997. Microbiology. Tata McGraw -Hill Edition, 1993. India.
4. Rangaswami, G. and Bagyaraj, D.J. 1993. Agricultural Microbiology. Prentice Hall of India Pvt. Limited, New Delhi.
5. Rao, N.S. 2000. Soil Microbiology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Vishunavat, K. and Kolte, S.J. 2005. Essentials of Phytopathological Techniques. Kalyani Publishers, New Delhi
7. Sharma, P.D. 2010. Microbiology. 3rd edition Rastogi Publishers, Meerut
8. Dube H.C. 2007. A Text Book of Fungi, Bacteria & Viruses. 3rd ed. Agrobios India, Jodhpur.
9. Agrios, G.N. 2005. Plant Pathology. 5th ed. Academic Press, New York.

AGRICULTURAL ENGINEERING

AGENGG-121	Introductory Soil and Water Conservation Engineering	2(1+1)
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Theory

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Soil Loss Equation. Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways. Water harvesting and its techniques. Wind erosion - principle of wind erosion control and its control measures. Familiarization with centrifugal pumps, measurement of irrigation water, water conveyance system and familiarization with pressurized irrigation methods.

Practical

General status of soil conservation in India and Rajasthan. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of contour bunds. Design of graded bunds. Problem on wind erosion. Numerical problems on friction head, velocity head, total head and horse power calculation of pumps. Measurement of irrigation water in the field by different methods and related numerical. Study of components of drip and sprinkler system. Study of watershed area.

Lecture schedule : Theory

S.No.	Topic	No. of lecture
1.	Introduction to Soil and Water Conservation and causes of soil erosion	1
2.	Definition and agents of soil erosion and water erosion	1
3.	Forms of soil erosion-rain drop, sheet, rill and gully erosion: factor affecting soil erosion.	1
4.	Gully classification and control measures.	1
4.	Soil loss estimation by universal Soil Loss Equation.	1
5.	Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways.	2
6.	Water harvesting and its techniques.	1
7.	Wind erosion- principle of wind erosion and its control measures	1
8.	Centrifugal pumps- volute and diffuser types; Principle of operation of centrifugal pumps.	1
9.	Pump related terms- capacity, suction lifts, suction heads, discharge heads, friction head, pressure head, total head, velocity head, net positive suction head, maximum practical suction lift of pumps, water horsepower, shaft	2

	horse power, pump efficiency, brake horsepower.	
10.	Measurement of irrigation water- volume method, velocity- area methods, water meter, weirs- rectangular, cipolletti, 90° v- notch.	2
11.	Drip irrigation method- Adoptability, limitation, components and layout.	1
12.	Sprinkler irrigation method- adoptability, limitations, types, components and layout.	1

Practical schedule

S.No	Topic	No. of lecture
1	General status of soil conservation in India and Rajasthan	1
2	Calculation of erosion index	1
3	Estimation of soil loss.	2
4	Preparation of contour maps	2
5	Numericals on design of contour bunds	2
6	Numerical problems on friction head, velocity head, total head and horse power calculation of pumps.	2
7	Measurement of irrigation water in the field by different methods and related numericals.	2
8	Study of different components of drip irrigation system	1
9	Study of different components of sprinkler irrigation system	1
10	Visit to nearby watersheds	2

References:

1. Land and Water Management Engineering. 1982. Murthy V.V.N. Kalyani Pubhliers, New Delhi.
2. Irrigation: Theory and Practices.2012. Michael A.M. Vikas Publishing House Pvt. Ltd., New Delhi.
3. Principles of Agricultural. Engineering. Vol. II. 2012. Michael A.M. and T.P. Ojha. Jain Brothers, New Delhi.
4. Soil and Water Conservation Water Management. 2010. Mahnot, S.C., Singh P.K. and Chaplot, P.C.,. Apex Publication House, Udaipur.

CPHYS-121	Fundamentals of Crop Physiology	2(1+1)
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Theory: Introduction to crop physiology and its importance in Agriculture. Plant cell: an Overview, Diffusion and osmosis, Absorption of water, transpiration and Stomatal Physiology. Mineral nutrition of Plants; functions and deficiency symptoms of nutrients and nutrient uptake mechanisms. Photosynthesis; Light reaction and Dark reactions: C₃, C₄ and CAM plants. Respiration; Glycolysis, TCA cycle and electron transport chain. Physiology of flowering. Plant growth regulators; physiological roles and agricultural uses. Physiological aspects of growth and development of major crops. Growth analysis. Role of Physiological growth parameters in crop productivity.

Practical: Preparation of solutions and buffers. Demonstration of the process of osmosis, plasmolysis, root pressure in plants. Measurement of transpiration rate using Ganongs potometer. Estimation of relative water content in plants. Visual symptoms of nutrient deficiency in plants. To study structure and distribution of stomata in leaf. Separation of photosynthetic pigments through paper chromatography. To demonstrate that O₂ is evolved during photosynthesis and light and CO₂ is essential for photosynthesis using Molls half leaf experiment. Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyzer (IRGA). Demonstration of anaerobic respiration. Measurement of respiration quotient, plant growth by Arc auxanometer and growth analysis parameters.

Lecture Schedules

Theory

L. No.	Name of topic	Cr. Hrs.
1	Introduction to crop physiology and its importance in Agriculture	1
2	Plant cell: an Overview	1
3	Diffusion and osmosis, Absorption of water, transpiration and Stomatal Physiology	2
4	Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients and nutrient uptake mechanisms	2
5	Photosynthesis: Light reaction	1
6	Dark reactions: C ₃ , C ₄ and CAM plants	1
7	Respiration; Glycolysis	1
8	TCA cycle and electron transport chain	1
9	Physiology of flowering	1
10	Plant growth regulators: Physiological roles and agricultural uses	2
11	Physiological aspects of growth and development of major crops	1
12	Growth analysis, Role of Physiological growth parameters in crop productivity	2

Practical

L. No.	Name of topic	Cr. Hrs.
1	To prepare solutions and buffers	1
2	To demonstrate the process of osmosis	1
3	To demonstrate the process of plasmolysis	1
4	To measure the root pressure in plants	1
5	To measure the rate of transpiration using Ganongs potometer	1
6	Estimation of relative water content in plants	1
7	Visual symptoms of nutrient deficiency in plants	1
8	To study structure and distribution of stomata in leaf	1
9	Separation of photosynthetic pigments through paper chromatography	1
10	To demonstrate that O ₂ is evolved during photosynthesis	1
11	To demonstrate that light and CO ₂ is essential for photosynthesis using Molls half leaf experiment	1
12	Measurement of photosynthetic CO ₂ assimilation by Infra Red Gas Analyzer (IRGA)	1
13	To demonstrate anaerobic respiration	1
14	Measurement of respiration quotient	1
15	Measurement of plant growth by Arc auxanometer	1
16	Measurement of growth analysis parameters	1

Reference books:

1. S. N. Pandey and B. K. Sinha.1977.Plant Physiology. Vikas Publishing House Pvt. Ltd, New Delhi.

2. A. Kumar and S.S.Purohit.1998. Plant Physiology Fundamental and Application. Agrobotanica 4E 176 J.N. Vyas Nagar, Bikaner.
3. N.K. Gupta and S. Gupta. 2005. Plant Physiology. Oxford & IBH, New Delhi.
4. M.Bala,S.Gupta and N.K.Gupta.2013.Practicals in Plant Physiology. Scientific publisher, Jodhpur.
5. D.L.Bagdi. 2016.Crop Physiology. New India Publishing Agency, New Delhi.

AGECON-121	Fundamentals of Agricultural Economics	2(2+0)
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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. 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. *Demand:* meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium, concept of consumer surplus. 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 markets. Price determination under perfect competition in short run. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income:* Meaning and importance, concepts of national income accounting and approaches to measurement. Population: Importance, Malthusian population theory, current policies and programmes on population control. Money meaning and functions of money, general price index, inflation and deflation. Banking: types of banks, functions of commercial Bank. *Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT & GST. *Economic systems:* meaning of capitalistic, socialistic and mixed economies.

References:

1. K.K. Dewett and J.D. Verma (1986) Elementary Economic Theory, S. Chand & Company, New Delhi
2. S.K. Mishra and V.K. Puri (1996) Indian Economy, Himalaya Publishing House, New Delhi
3. G.B. Jakhar and S.G. Beri (1996) Elementary Principles of Economics, Oxford University Press (10th Edition), Delhi
4. Berkeley Hill (1980) An Introduction to Economics for students of agriculture, Pergaman Press, Oxford
5. B.L. Gupta (1996) Introduction to Economic Theory, Arya Book Depot, New Delhi

PPATH-121	Fundamentals of Plant Pathology	3(2+1)
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Theory

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.

Fungi: general characters, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, classification of fungi (key to Domain to Phylum).

Bacteria and mollicutes: general morphological characters, reproduction and classification of plant pathogenic bacteria. **Viruses:** nature, structure and transmission.

Nematodes: General morphology, outline of classification, symptoms and nature of damage caused by plant nematodes (*Heterodera*, *Meloidogyne* and *Anguina*).

Role of enzymes and toxins in disease development. Defense mechanism in plants.

Practical

Acquaintance with various laboratory equipments and microscopy. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Identification of plant parasitic nematodes (*Heterodera*, *Meloidogyne* and *Anguina*). Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting.

Lecture Schedule: Theory

S.No.	Topic	No. of lectures
1	Importance of plant diseases, scope and objectives of Plant Pathology	1
2	History of Plant Pathology with special reference to Indian work.	3
3	Terms and concepts in Plant Pathology	3
4	Pathogenesis.	2
5	Causes and classification of plant diseases.	1
6	Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vascular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them.	3
7	Diseases and symptoms due to abiotic causes.	1
8	Fungi: General characters, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus,	2
9	Fungi: Reproduction (asexual and sexual).	1
10	Fungi: Nomenclature, Binomial system of nomenclature, classification of fungi (key to Domain to Phylum).	3
11	Bacteria and mollicutes: General morphological characters, reproduction and classification of plant pathogenic bacteria.	2
12	Classification of plant pathogenic bacteria.	2
13	Viruses: nature, structure and transmission.	2
14	Nematodes: General morphology, outline of classification,	2
15	Nematodes: Symptoms and nature of damage caused by plant nematodes (<i>Heterodera</i> , <i>Meloidogyne</i> and <i>Anguina</i>).	2
16	Role of enzymes and toxins in disease development.	1
17	Defense mechanism in plants.	1

Lecture Schedule: Practical

S.No.	Topic	No. of lectures
1	Acquaintance with various laboratory equipments and microscopy	2
2	Preparation of media and isolation	2
3	Koch's postulates	1
4	General study of different structures of fungi	1

5	Study of symptoms of various plant diseases	2
6	Staining and identification of plant pathogenic bacteria	2
7	Transmission of plant viruses	2
8	Identification of plant parasitic nematodes (<i>Heterodera</i> , <i>Meloidogyne</i> and <i>Anguina</i>)	2
9	Sampling and extraction of nematodes from soil and plant material and preparation of nematode mounting	2

References:

1. Agrios, G.N. 2005. Plant Pathology. 5th ed. Academic Press, New York.
2. Alexopolus, C.J., Mims, C.W. and Blackwell, M. 2013. Introductory Mycology. John Wiley Eastern Private Limited, New York.
3. Mehrotra, R.S. and Agrawal, A. 2013. Plant Pathology. 2nd ed. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. Singh, R.S. 2011. Introduction to Principles of Plant Pathology. 4th ed. Oxford & IBH Publishing Company. New Delhi.
5. Nene Y.L. and Thapliyal, P.N. 2011. Fungicides in Plant Diseases Control. 3rd Ed. Oxford & IBH published Co. Pvt. Ltd. New Delhi.
6. Dube H.C. 2007. A Text Book of Fungi, Bacteria & Viruses. 3rd ed. Agrobios India, Jodhpur.
7. Dube, H.C. 2012, Modern Plant Pathology, 2nd ed. Agrobios (India), Jodhpur
8. Dube, H.C. 2013, An Introduction to Fungi. 4th ed. , Scientific Publishers India, Jodhpur.

ENTO-121	Fundamentals of Entomology	3(2+1)
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Theory

Part - I

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Major sensory organs like simple and compound eyes, chemoreceptor. Metamorphosis in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (endocrine) and reproductive system, in insects. Types of reproduction in insects.

Part-II

Systematics: Taxonomy -importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Gryllidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Bombycidae; Coleoptera: Coccinellidae, Gelerucidae, Cerambycidae, Curculionidae, Bruchidae, Melonthidae; Hymenoptera: Tenthredinidae, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.

Practical

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Cockroach; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Lecture Schedule

Theory

S.No.	Topic	Lectures
1.	History of Entomology in India.	1
2.	Major points related to dominance of Insecta in Animal kingdom.	1
3.	Classification of phylum Arthropoda upto classes.	1
4.	Structure and functions of insect cuticle and molting.	1
5.	Morphology of grasshopper: Body segmentation- structure of head, thorax and abdomen.	2
6.	Structure and modifications of insect antennae.	1
7.	Structure and modifications of insect mouth parts.	3
8.	Structure and modifications of insect leg.	1
9.	Wing venation, modifications and wing coupling apparatus.	1
10.	Structure of genital organs and sensory organs (simple and compound eyes, chemoreceptor).	2
11.	Metamorphosis in insects, types of larvae and pupae.	1
12.	Structure and functions of digestive system.	1
13.	Structure and functions of circulatory and excretory system.	2
14.	Structure and functions of respiratory system.	1
15.	Structure and functions of nervous system.	1
16.	Structure and functions of secretory (endocrine) system	1
17.	Structure and functions of reproductive system and types of reproduction in insects.	2
18.	Taxonomy- importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order.	2
19.	Orthoptera: Acrididae, Gryllidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae. Thysanoptera: Thripidae.	2
20.	Hemiptera: Pentatomidae, Coreidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae.	1
21.	Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Bombycidae.	1
22.	Coleoptera: Coccinellidae, Galerucidae, Cerambycidae, Curculionidae, Bruchidae, Melonhidae.	1
23.	Hymenoptera: Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae.	1
24.	Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae; Neuroptera: Chrysopidae.	1

Practical

S.No.	Practical	Lectures
1.	Methods of collection and preservation of insects including immature stages.	1

2.	External features of Grasshopper/Cockroach.	1
3.	Types of insect antennae, mouthparts and legs.	4
4.	Wing venation, types of wings and wing coupling apparatus.	1
5.	Dissection of digestive system in insects (Grasshopper/ Cockroach)	1
6.	Dissection of male and female reproductive systems in insects	1
7.	(Grasshopper/ Cockroach). Study of characters of orders Orthoptera, Dictyoptera with their families.	1
8.	Study of characters of orders Odonata, Isoptera, Thysanoptera with their families.	1
9.	Study of characters of order Hemiptera with its families.	1
10.	Study of characters of order Lepidoptera with its families.	1
11.	Study of characters of order Coleoptera with its families.	1
12.	Study of characters of order Diptera with its families.	1
13.	Study of characters of orders Hymenoptera and Neuroptera with their families.	1

Suggested Readings

1. Chapman .R.F.1981. Insect Structure and Function, ELBS Publishers New Delhi.
2. David B.V. and Ananthakrishnan .T.N. 2003. General and Applied Entomology, 2nd Ed. Mc graw Hill publishing Co. Ltd. New Delhi.
3. Mathur and Upadhyay, 2005. A Text Book of Entomology, Aman Publishing House, Meerut.
4. Pant. N.C. and Ghai, S. 1981. Insect Physiology and Anatomy, ICAR, New Delhi.
5. Richards O.W. and Davies R.G. 1977. Imm's General Text Book of Entomology, Vol. I & II. Chapman and Hall, London.
6. Snodgrass R.E .2001. Principles of Insect Morphology, CBS Publishers and Distributors, New Delhi.

EXCOM-121	Fundamentals of Agricultural Extension Education	3(2+1)
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Theory:

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development.

Extension systems in India: Extension efforts in Pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.). Post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); Various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, NARP, ATIC,RKVY, Pradhan Mantri Fasal Bima Yojana, Soil Health Card, NRLM etc.)

New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.. Rural Development: Concept, meaning, definition; various rural development programmes launched by Govt. of India. T & V System,SGSY, ICDS, IRDP, NHM,MNREGA, Rajiv Ganghi Scheme for empowerment of Adolesent girls / Boys, Gramin Bhandaran Yojana, Pradhan Mantri Adarsh Gram yojana, Pradhan Mantri Kaushal Vikas yojana,

Community Development-meaning, definition, concept & principles, Philosophy of C.D, Panchayati Raj System.Extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of

extension programmes; Transfer of technology: concept and models, capacity building of extension personnel; Training: Types , planning a training Programme. Diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical

To get acquainted with university extension system. Group discussion- exercise; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media.

S. No.	Course Content	No. of Lectures
	Theory	
1.	Education: Meaning, definition & Types;	1
2.	Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education;	3
3.	Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development.	2
4.	Extension systems in India: Extension efforts in Pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.).	3
5.	Post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.);	2
6.	Various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, NARP, ATIC,RKVY, Pradhan Mantri Fasal Bima Yojana, Soil Health Card, NRLM etc.)	6
7.	New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc..	3
8.	Rural Development: Concept, meaning, definition; various rural development programmes launched by Govt. of India. ICDS, IRDP, NHM,MNREGA, Rajiv Gandhi Scheme for empowerment of Adolescent girls / Boys, Gramin Bhandaran Yojana, Pradhan Mantri Adarsh Gram yojana, Pradhan Mantri Kaushal Vikas yojana,	5
9.	Community Development-meaning, definition, concept & principles, Philosophy of C.D,	1
10.	Panchayati Raj System.	1
11.	Extension administration: meaning and concept, principles and functions.	1
12.	Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes;	1
13.	Transfer of technology: concept and models, capacity building of extension personnel;	1
14.	Training: Types, planning training Programme.	1
15.	Diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.	1
	Practical	
1.	To get acquainted with university extension system.	1
2.	Group discussion- exercise;	1
3.	Preparation and use of AV aids,	4
4.	Preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories;	4

5.	A visit to village to understand the problems being encountered by the villagers/ farmers;	1
6.	To study organization and functioning of development departments at district level;	1
7.	Visit to NGO and learning from their experience in rural development;	1
8.	Understanding PRA techniques and their application in village development planning;	2
9.	Exposure to mass media.	1

Suggested readings

1. Adivi Reddy, A., 2001, *Extension Education*, Sree Lakshmi press, Bapatla.
2. Dahama, O. P. and Bhatnagar, O. P., 1998, *Education and Communication for Development*, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
3. Jalihal, K. A. and Veerabhadraiah, V., 2007, *Fundamentals of Extension Education and Management in Extension*, Concept publishing company, New Delhi.
4. Muthaiah Manoraharan, P. and Arunachalam, R., *Agricultural Extension*, Himalaya Publishing House (Mumbai).
5. Rathore, O. S. et al., 2012, *Handbook of Extension Education*, Agrotech Publishing Academy, Udaipur.
6. Ray, G. L., 1991 (1st Edition), *Extension Communication and Management*, Kalyani Publishers, Ludhiana {7th revised edition - 2010}.
7. Supe, S. V., 2013 (2nd Edition), *A Text Book of Extension Education*, Agrotech Publishing Academy, Udaipur.
8. Van Den Ban, A. W. and Hawkins, H. S., *Agricultural Extension*, S. K. Jain for CBS Publishers & Distributors, New Delhi.
9. Debabrata Das Gupta. *Extension Education*. Agrobios (India), Agro house behind Nasrani Cinema, Chaupasani Road, Jodhpur- 342402, Phone -0291-2642319, Fax- 0291-2643993, Email- agrobios@sify.com
10. Sharma, O. P. & Somani, L. L. 2012. *Dimension of Agricultural Extension*, Agrotech Publishing Academy. Udaipur.

CSPD-121	Communication Skills and Personality Development	2(1+1)
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Theory

Communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences. Soft Skills. Extension teaching methods: meaning, classification, individual, group and mass contact methods. ICT Applications in TOT (New and Social Media), media mix strategies;

Practical

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations. Handling and use of audio visual equipments and digital camera and LCD projector; Group discussion- exercise; Presentation skills exercise; micro teaching exercise; Script writing, writing for print and electronic media, developing script for radio and television. Visit to community radio.

Lecture Schedule:

S. No.	Course Content	No. of Lectures
	Theory	
1.	Communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication.	2
2.	Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication;	1
3.	Listening and note taking,	1
4.	Writing skills, oral presentation skills;	1
5.	Field diary and lab record; indexing, footnote and bibliographic procedures.	1
6.	Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting;	2
7.	Individual and group presentations, impromptu presentation, public speaking;	2
8.	Group discussion. Organizing seminars and conferences.	2
9.	Soft Skills.	1
10.	Extension teaching methods: meaning, classification, individual, group and mass contact methods.	2
11.	ICT Applications in TOT (New and Social Media), media mix strategies;	1
	Practical	
1.	Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.	3
2.	Reading and comprehension of general and technical articles,	1
3.	Precise writing, summarizing, abstracting; individual and group presentations.	2
4.	Handling and use of audio visual equipments and digital camera and LCD projector;	4
5.	Group discussion- exercise;	1
6.	Presentation skills exercise;	1
7.	Micro teaching exercise;	1
8.	Script writing, writing for print and electronic media, developing script for radio and television.	2
9.	Visit to community radio.	1

Suggested readings

1. Sandhu, A. S. (1999). Textbook on Agricultural Communication; process and methods oxford RIBH Publishing co. Pvt. Ltd. New Delhi.
2. Berlo, David K. (1960). The process of Communication. Nw Yark, Holt, Rinehart and Winston Inc.
3. Dahama, O. P. and Bhatnagar, O.P., 1998, *Education and Communication for Development*, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
4. Jalihal, K. A. and Veerabhadraiah, V., 2007, *Fundamentals of Extension Education and Management in Extension*, Concept publishing company, New Delhi.
5. Ray, G. L., 1991 (1st Edition), *Extension Communication and Management*, Kalyani Publishers, Ludhiana {7th revised edition - 2010}.
6. Supe, S. V., 2013 (2nd Edition), *A Text Book of Extension Education*, Agrotech Publishing Academy, Udaipur.
7. M Hilaris 2011. Indian agriculture and information and communication technology (ICT): Soundari, New century Publications, Carnegie,
8. Dale. 2012. *How to Win Friends and Influence People in the Digital Age*. Simon & Schuster.
9. Covey Stephen R. 1989. *The Seven Habits of Highly Successful People*. Free Press.
10. Verma, K.C. 2013. *The Art of Communication*. Kalpaz.

11. Mohan Krishna and Meera Banerjee. 1990. Developing Communication Skills. Macmillan India Ltd. New Delhi.
12. Sharma R C and Krishna Mohan. 1978. *Business Correspondence*. Tata Mc Graw Hill
13. Adivi Reddy, A., 2001, *Extension Education*, Sree Lakshmi press, Bapatla.

AGRON-121	Introductory Agrometeology & Climate change	2(1+1)
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Theory

Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

Practical

Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of windrose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET

Lecture schedule : Theory

S.No	Topic	No. of lectures
1.	Meaning and scope of agricultural meteorology	1
2.	Earths atmosphere- its composition, extent and structure	1
3.	Atmospheric weather variables; Atmospheric pressure, its variation with height	1
4.	Wind, types of wind, daily and seasonal variation of wind speed	1
5.	Cyclone, anticyclone, land breeze and sea breeze	1
6.	Nature and properties of solar radiation, solar constant, depletion of solar radiation	1
7.	Short wave, longwave and thermal radiation, net radiation, albedo	1
8.	Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature,	1
9.	Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure,	1
10.	Process of condensation, formation of dew, fog, mist, frost, cloud	1

11.	Precipitation- process , types such as rain, snow, sleet, and hail	1
12.	Cloud formation and classification; Artificial rainmaking, Monsoon-mechanism and importance in Indian agriculture	1
13.	Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave	1
14.	Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production	1
15.	Weather forecasting- types of weather forecast and their uses	1
16.	Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.	1

Lecturer schedule: Practical

S.N	Topic	No. of lectures
1	Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording.	2
2	Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law.	2
3	Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS.	2
4	Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.	1
5	Measurement of soil temperature and computation of soil heat flux.	1
6	Determination of vapor pressure and relative humidity.	1
7	Determination of dew point temperature.	1
8	Measurement of atmospheric pressure and analysis of atmospheric conditions.	1
9	Measurement of wind speed and wind direction, preparation of windrose.	1
10	Measurement, tabulation and analysis of rain.	1
11	Measurement of open pan evaporation and evapotranspiration.	1
12	Computation of PET and AET.	2

References:

1. Sacheti, A.K. 1985. Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT Publication, New Delhi.
2. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad..
3. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR, New-Delhi.
4. Sahu, D.D., 2007. Agrometeorology and Remote sensing: Principles and Practices , Agrobios (India) , Jodhpur.
5. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology , Kalyani Publishers, New-Delhi
6. Panda, S.C.2012. Modern Concepts and Advance Principles in Crop Production. Agrobios (India), Jodhpur
7. Balasubramaniyan, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy, Agrobios (India), Jodhpur
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		NSS/NCC/Physical Education & Yoga Practices	2(0+2)
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Course Title: National Service Scheme II

Importance and role of youth leadership

Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership

Life competencies

Definition and importance of life competencies, problem-solving and decision-making, inter personal communication

Youth development programmes

Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led originations

Health, hygiene and sanitation

Definition needs and scope of health education; role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health.

Youth health, lifestyle, HIV AIDS and first aid

Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid

Youth and yoga

History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method

Semester II: National Cadet Corps

1. Arms Drill- Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms.
2. Shoulder from the order and vice-versa, present from the order and vice-versa.
3. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa.
4. Guard mounting, guard of honour, Platoon/Coy Drill.
5. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning and sight setting.
6. Loading, cocking and unloading. The lying position and holding.
7. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight.
8. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing.
9. Characteristics of Carbine and LMG.
10. Introduction to map, scales and conventional signs. Topographical forms and technical terms.
11. The grid system. Relief, contours and gradients. Cardinal points and finding north. Types of bearings and use of service protractor.
12. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map.
13. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
14. Field defenses obstacles, mines and mine lying. Bridging, watermanship
15. Field water supplies, tracks and their construction.
16. Nuclear, Chemical and Biological Warfare (NCBW)
17. Judging distance. Description of ground and indication of landmarks.

18. Recognition and description of target. Observation and concealment. Field signals. Section formations.
19. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill.
20. Types of communication, media, latest trends and developments.

Semester II: Physical Education and Yoga Practices

1. Teaching of skills of Hockey – demonstration practice of the skills and correction.
2. Teaching of skills of Hockey – demonstration practice of the skills and correction. And involvement of skills in games situation
3. Teaching of advance skills of Hockey – demonstration practice of the skills and correction.
Involvement of all the skills in games situation with teaching of rules of the game
4. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
5. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
Involvement of the skills in games situation
6. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction.
Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of different track events – demonstration practice of the skills and correction.
8. Teaching of different track events – demonstration practice of the skills and correction.
9. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
10. Teaching of different field events – demonstration practice of the skills and correction.
11. Teaching of different field events – demonstration practice of the skills and correction.
12. Teaching of different field events – demonstration practice of the skills and correction.
13. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
14. Teaching of different asanas – demonstration practice and correction.
15. Teaching of different asanas – demonstration practice and correction.
16. Teaching of different asanas – demonstration practice and correction.
17. Teaching of different asanas – demonstration practice and correction.
18. Teaching of weight training – demonstration practice and correction.
19. Teaching of circuit training – demonstration practice and correction.
20. Teaching of calisthenics – demonstration practice and correction.

Note: 1) Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants) 2) The games mentioned in the practical may be inter changed depending on the season and facilities.