

SYLLABUS

Based on

CHOICE BASED CREDIT SYSTEM (CBCS)

under

**LEARNING OUTCOMES BASED CURRICULUM
FRAMEWORK (LOCF)**

B. Sc. (Rural Technology)

2021-2022



**DEPARTMENT OF RURAL TECHNOLOGY AND SOCIAL
DEVELOPMENT**

GURU GHASIDAS VISHWAVIDYALAYA
(A Central University)
Koni- Bilaspur 495009 Chhattisgarh

Program Outcomes (POs) of Undergraduate Programs

PO1. Knowledge and Awareness: Adequate information on basics and advance fields of the core and applied subjects will be provided to enhance knowledge and awareness so that a professionalism may be developed in students.

PO2. Problem solving and Critical Thinking: To enable the students to take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO3. Effective Communication and Social Interactions: Speak, read, write and listen clearly individually and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology. Realize and respect of views of others, mediate disagreements and cooperate to reach conclusions in group settings.

PO4. Effective Citizenship and Ethics: To groom the students in such a way that they perform empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering. Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO5. Environmental awareness and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO6. Skill Development and Employability: To generate special skill through vocational training, workshops, field visits, entrepreneurial and career development courses so that students may generate employability for themselves and others.

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological, socio-economic and socio-cultural improvements.

Program Specific Outcomes

PSOs of B.Sc. Rural Technology

PSO1. Understand nature and basic concept and applied aspects of Organic Manure Production Techniques, Elementary Biology, Soil and Fertilizers, Horticulture and Landscaping, and Organic Farming, Microbial Technology, Dairy Management and Products, Plant Propagation and Nursery Management, Herbal Production Techniques, Sericulture, Basics of Mushroom Production, Aquaculture, Integrated Pest Management, Indigenous Art and Crafts,

PSO2. Understand nature and basic concept and applied aspects of Rural Social Structure and Planning, Poultry Production Techniques, Plant Morphology and Reproduction, Economic Botany, Rural Entrepreneurship and Management, Goat and Pig Production Techniques, Lac and Honey Production, Remote Sensing, Medicinal Plants, and Natural Products Management.

PSO3. Analyse the relationships among animals, plants microbes and use of Engineering and Computer Sciences for socio-economic development in rural areas.

PSO4. Perform procedures as per laboratory standards in the areas of Organic Farming, Dairy, Mushroom, Poultry, and Herbal Production, Sericulture, Aquaculture, Art and Crafts, Plant Propagation and Nursery Management.

PSO5. Understand the applications of biological and computer sciences in Apiculture, Aquaculture, Agriculture, Medicine, Remote Sensing and GIS, Rural Engineering and Rural Planning.

SYLLABUS as per LOCF		
B.Sc. I SEMESTER		
Course Title: ORGANIC MANURE PRODUCTION TECHNIQUES		
Course Code: RTUATC1	Credit: 04	Marks:100

Course outcomes

On completion of the course, the students will be able to:

1. Provide Knowledge about organic manures, their types and production process.
2. Develop awareness regarding the harmful effect of chemical fertilizers and learned the production methods of organic manures.
3. Understand the development of skill related to production and marketing.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Organic manure- concepts, meaning, definition and importance of organic manure, types of manures, components of organic manure, preparation method of manures, farm yard manure, vermicompost, chemical composition of manures, precaution needed for compost preparation.

Composting Methods- Indore method, trench method, heap method, strip method, vegetable wood box method, analysis of quality of compost and its chemical composition.

Nadep compost- Preparation of Nadep compost, construction and design of nadep compost tank, traditional design and low cost compost pit, chemical composition of nadep compost.

Organic Farming-Introduction, concept, principle and importance of organic farming, green manure, BGA, azolla, recycling of organic residues, application of manures, regulations and policy related to organic manure production.

Suggested Readings:

Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvarak-

S.S. Reddy- Principles of Agronomy

Joseph C. Gilman- A manual of soil fungi-

Dilip Kumar Das- Introductory Soil Science-

Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvarak-

S.S. Reddy- Principles of Agronomy

A manual of soil fungi- Joseph C. Gilman

Dushyant Malhotra- Jav Urvarak

Arun K. Sharma- Jaivik Kheti

Das- Manures and fertilizers

Basak- Fertilizers A Text Book

Gustafson- Handbook of fertilizers

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUALC1	Credit: 01	Marks:100

Course outcomes

On completion of the course, the students will be able to:

1. Students will be realizing the importance of ecofriendly farming system.
2. Learn the skills on culture and mass production of organic manures. biofertilizers and biopesticides.
3. Acquire knowledge on the efficacy of biofertilizers and biopesticides in organic farming

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification of various organic manures.
2. Preparation of nadep-compost
3. Preparation of FYM.
4. Preparation of vermicompost.
5. Demonstration of various types composting models.
6. Application of manures.

SYLLABUS as per LOCF		
B.Sc. I SEMESTER		
Course Title: ELEMENTARY BIOLOGY		
Course Code: RTUATC2	Credit: 04	Marks:100

Course outcomes

On completion of the course, the students will be able to:

1. Understand the fundamental knowledge about living world.
2. Understand the elementary knowledge about macro and micro molecules of life, cell composition.
3. Understand the elementary knowledge of non-chordates, and chordates.
4. Enhance knowledge about animal kingdom and its economic importance.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1

CO4	3	3	1	-	3	3	3	-	-	3	1
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Weightage: 1-Slightly; 2-Moderately; 3-Strongly

The living world: characteristics of living organism, basic or fundamental elements of taxonomy, taxonomy, systematic and classification, nomenclature, rules for binomial nomenclature, Taxonomical hierarchy, tools for taxonomic studies- herbarium, botanical garden, museum, zoological parks, taxonomic keys, taxonomic literature, outline of five kingdom classification.

Bio-molecules: Chemical constituents of living cells; Bio-molecules, Structure and function of protein, carbohydrates, lipids, nucleic acid, enzymes; types, properties, enzyme action.

Cell: Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells, Cell organelles- Structure and function of mitochondria, chloroplast, endoplasmic reticulum, golgi body, ribosomes, lysosomes, nucleus, nucleolus. Chromosomes: Structure and function of chromosome, types of chromosomes; cell cycle, mitosis, meiosis and their significance.

General characters of non-chordates, Economic importance of non-chordates; Diseases: Caused by protozoans, helminthes and insects.

General characters of chordates, poisonous and non-poisonous snakes of India, venom and antivenin of snakes; Economic importance of Chordates.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUALC2	Credit:01	Marks:100

Course outcomes

On completion of the course, the students will be able to:

1. Learn the microscopic technique and identification of algae, fungi, bryophytes, lichens, pteridophytes and gymnosperm

2. Learn the Gram staining of bacteria and knowledge about various stages of mitosis and meiosis using permanent slides and stages of mitosis through slide preparation from onion root tips.
3. Gain knowledge about classification of plants and animals through various museum specimens.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of various plant cell-types
2. To prepare squash mounts from onion root-tips to study mitosis
4. Micro chemical tests for the identification of protein, starch, sugar, fats
6. To study meiosis through permanent slides.
7. Study of permanent slides of invertebrates materials.
8. Study of permanent slides of vertebrates materials.
9. Study of museum specimen of invertebrates.
10. Study of museum specimen of vertebrates.

Suggested Readings:

Mayer & Ashlock: Principles of Systematic Zoology (1991, McGraw Hill)
 Boolotian & Stiles: College Zoology (10th ed 1981, Macmillan)
 Nigam: Biology of Non-chordates (1997, S. Chand).
 Nigam: Biology of Chordates (1997, S. Chand)
 Purves *et al.*: Life-the Science of Biology, (7th ed. 2004, Sinauer)
 S.S. Lal: Invertebrates-Practical Zoology (Rastogi Pub.).
 S.S. Lal: Vertebrates- Practical Zoology (Rastogi Pub.)
 E.L. Jordan and P.S. Verma: Chordate zoology (S. Chand and Comp., N. Delhi.).
 P.S. Verma: Invertebrates- A Manual of Practical Zoology (S. Chand & Co., N. Delhi).

R.L. Kotpal: Vertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
 R.L. Kotpal: Invertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
 Cell Biology:CB Power
 Singh V., Pandey P.C and Jain D.K 1998, A Text book of Botany for Undergraduate Students:, Rastogi Publications.

SYLLABUS as per LOCF		
B.Sc. I SEMESTER		
Course Title: SOIL AND FERTILIZERS		
Course Code: RTUATG1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students would be able to

1. Understand types of rocks and mineral
2. Understand about types of soil and soil profile.
3. Learn nutrient management in plants and application of bio fertilizers.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Rocks and Minerals: Rocks and its classification, weathering of rocks, soil formation-physical, chemical and biological soil forming process.

Soil: Introduction, definition, components of soil, soil profile, types of soil, physical properties of soil- soil color, soil separates, soil structure, soil texture, bulk density, particle density and porosity of soil.

Soil Air: soil aeration, factor affecting soil aeration, soil water and soil water movement, soil moisture measurement, availability of soil water,

Fertilizers: Macro elements and Micro elements, classification of fertilizers, deficiency symptoms in plants, Integrated Nutrient Management (INM), application methods of fertilizers,

Bio Fertilizers: Introduction, Concept, Types of Biofertilizers, Nitrogenfixing biofertilizers, Phosphate-solubilizing biofertilizers, Preparation of a biofertilizers- *Azolla*, Blue Green Algae (BGA).

Suggested Readings:

Dilip Kumar Das- Introductory Soil Science

Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvark

S.S. Reddy-Principles of Agronomy-

Das- Manures and fertilizers

Basak- Fertilizers A Text Book-

Gustafson- Handbook of fertilizers

Hand book of Fertilizer Association of India, New Delhi, 1998.

Slack A.V- Chemistry & Technology of Fertilizers, Interscience, New York, 1967.

N S Subba Rao-Bio fertilizers in Agriculture, Oxford & IBH Publishing Company

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUALG1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students would be able to

1. Students will gain the knowledge on essential nutrients, soil fertility, nutrient transformations in soil.
2. Learn about manures, fertilizers and soil fertility management through various approaches.
3. Learn the skill about soil health, soil quality indices and their management.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of different types of rocks.
2. Study of different types of soil.
3. Measurement of soil moisture, pH, bulk and particle density.
4. Identification of various fertilizers.
5. Calculation of fertilizers doses for crops.
6. To study about green manuring.

SYLLABUS as per LOCF		
B.Sc. II SEMESTER		
Course Title: MICROBIAL TECHNOLOGY		
Course Code: RTUBTC1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students would be able to

1. Learn historical background of microbiology.
2. Understand about the microorganism and their usefulness and also their harmful effects.
3. Learn economically important microorganisms and their functioning.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

History of microbiology, Scope of microbiology, Viruses- general characters, Bacteria-general characters, Staining – types of staining, Gram staining technique, Economic importance of bacteria.

Mycoplasma- general characters. Actinomycetes – General characters, Cyanobacteria-general characters, Structure of heterocyst.

Introduction to fermentation technology- Definition of fermentation, fermenter configuration, general aspects of production of Streptomycin, Amylase, Citric acid, Ethyl alcohol and vitamin B₁₂ by microbial fermentation.

Yeast and its uses, Uses of yeast and Yeast products, Microbiology of milk, production of yoghurt, butter milk, cheese, spoilage of food and techniques of food preservation.

Organic matter decomposition: composition of litter, microorganisms associated with organic matter decomposition, Organic compost, Factors affecting the composting-microorganisms.

Suggested Readings:

1. A text book of microbiology- R.C. Dubey and D.K. Maheshwari
2. Industrial Microbiology- A.H. Patel
3. Microbiology Fundamentals and Application- S.S. Purohit
4. General Microbiology- Powar and Daghinawala
5. Microbiology A System Approach- M.K. Cowan
6. Microbiology- L.M. Prescott

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUBLC1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students would be able to:

1. Know about the types of microorganisms in and around humans and metabolism and mechanism of microbial life.
2. Learn the important and diversified groups of microorganism in nature and their classification, and interactions within the microbial communities and between microorganism and plants and animals.
3. Knowledge about use of microbiological equipment and observations.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Laboratory course-

1. Study of basic instruments used in microbial techniques- Laminar air flow, oven, Incubator, Autoclave.
2. Gram staining technique for the identification of Gram +ve and Gram –ve bacteria.
3. Identification of Nostoc, Anabaena, Rhizopus, Yeast
4. Detection of adulteration in food items.
5. Study of various food preservative methods.

SYLLABUS as per LOCF		
B.Sc. II SEMESTER		
Course Title: DAIRY MANAGEMENT AND PRODUCTS		
Course Code: RTUBTC2	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Identify different breeds of cows and buffaloes and their feeding management
2. Understand housing and health management of cows and buffaloes.
3. Understand general caring practices needed for cows and buffaloes.
4. Prepare various dairy products and enhance their skill for establishment of Dairy.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1

CO3	3	3	1	-	3	3	3	-	-	3	1
CO4	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction of important breeds of cows and buffaloes, Government schemes / programs related to Dairy Industry.

Dairy farm management: Location of different farm buildings, Design and structure of sheds/shelters materials used for shed/shelters, essential appliances and hygiene, types of barns, housing systems. Care of dry and milch cows and maintenance of different dairy cattle registers.

Fodder: Classification, hay preparation, types, qualities, principles and calculation of ration. Animal Breeding Methods: Mating seasons, inbreeding and out breeding, their advantages and disadvantages, Artificial Insemination- its methods, importance, limitations.

Animal Diseases: Foot and mouth disease, Anthrax, Black Quarter, Rinderpest, Mastitis and Haemorrhagic septicemia –their diagnosis, treatment, precautions, vaccination schedule.

Dairy Products: Processing of milk, pasteurization of milk, method of preparation of butter, cheese, khoa, paneer, yoghurt, cream, and shrikhand.

Suggested Readings:

Amlendu Chakerbarti Handbook of Animal Husbandary”

Jagdish Prasad: Poultry Production and Management”

R.A. Singh: Poultry production”

Jagdish Prasad:. Principle and practice of Dairy Farm Management”

B. Panda & B.R. Reddy: Feeding of poultry

Eiri Board of Consultant & Engineers: Hand Book of Dairy Farming

D. Ramaswamy :Dairy Technology Hand Book

P.N. Bhatt and B.U. Khan: Goat Production

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUBLC2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain in-depth knowledge of dairy production and processing techniques.
2. Gain proficiency in quality control and food safety practices specific to the dairy industry.
3. Gain ability to operate and maintain dairy machinery and equipment.
4. Understand of the economic and environmental aspects of the dairy sector.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1
CO4	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Visit to cow, buffalo, and goat farms and report preparation.
2. Study of system of housing for cattle and goats.
3. Visit to dairy plant and report submission.
4. Calculation of ration for cow, buffalo, and goat.
5. Preparation of various dairy products paneer, shrikhand, khoa etc.
6. Various adulterations and their tests in milk.

SYLLABUS as per LOCF		
B.Sc. II SEMESTER		
Course Title: PLANT PROPAGATION AND NURSERY MANAGEMENT		
Course Code: RTUBTG1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand various plant nursery and its special functions.
2. Acquired skills about propagation of nursery plants and their handling
3. Calculate the recommended dose of pesticide and fertilizers in orchard.
4. Gain technical confidence and skills for establishment of plant nursery.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1
CO4	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Concept, meaning, definitions and Importance of plant nursery, Types and functions of plant nursery, site selection for nursery, physical and financial resources for nursery, nursery expenditure, Cost and profit analysis.

Plantation techniques: soil analysis, land preparation, pit formation, species selection, planting system, pit filling, preparation of nursery beds and management of mother plants.

Plant propagation, method- Sexual and Asexual propagation, Vegetative propagation- division, cutting, layering, budding and grafting. Micro-propagation and hardening, plant propagation material, integrated nutrient management, irrigation system, packing and transport of nursery plants.

Planting time and planting method- entire plant planting and stump planting, clonal plantation, pre and post activity in plantation, water, nutrients, weeds, disease and pest management of planted plant, Training and pruning practices.

Protected propagation structures-Quonset, Gutter connected, Glass House, plastic film Green House, Rigid Panel Greenhouses and Greenhouse with Double-Layer Covering.

Suggested Readings:

Plantation Forestry: R.K. Luna

Nursery Technology: S.S. Negi

Plant Propagation and Nursery Husbandry: J.S. Yadav

Introductory Horticulture: E.P. Christopher

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUBLG1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain knowledge of gardening, cultivation, multiplication, raising of seedlings of garden plants.
2. Gain knowledge of new and modern techniques of plant propagation.
3. Understand different technologies like training, pruning, etc regarding nursery management.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Layout preparation for plant nursery.
2. Sexual and asexual methods of plant propagations; Seed, division, cutting, layering, budding and grafting.
3. Preparation of nursery beds
4. Preparation of planting media.
5. Training and pruning practices in nursery plants.
6. Potting and repotting of nursery plants.
7. Nursery plant management.

ECA	RTUBPS1	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachchhta / vocational Training/ Sports/ others
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Course outcomes

On completion of this course, the students will be able to:

1. Gain working knowledge on the subject through participation during field visits and tours.
2. Understand their responsibility towards society, environment and inculcate moral obligations, cooperation with one another, teamwork and sense of healthy competition through sports, NSS and Swachchhata etc activities.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	3	3	3	-	3	3	1
CO2	3	3	1	3	3	3	3	-	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

SYLLABUS as per LOCF		
B.Sc. III SEMESTER		
Course Title: SERICULTURE		
Course Code: RTUCTC1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn the scientific method of rearing, cultivation of silkworm and management of host plants.
2. Identify the various seed cocoon, commercial cocoon, silk fibre and get knowledge of diseases and pests management of host plant.
3. Obtain job opportunities in the public, private and government sectors.
4. Gain technical confidence and skills for establishment of orchards.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1
CO4	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction to Sericulture: Definition, history and importance of sericulture, sericulture industry in India, prospects and problems, Study of mulberry and non-mulberry silk worms- Tasar, Eri and Muga including classification, geographical distribution, hosts plants and silk characteristics produced.

Biology of silk moth: Anatomy of and behavior silk worm- Digestive system including mouth parts, Reproductive system, life cycle including moulting and metamorphosis, silk glands, spinning of silk threads, diseases and pests of mulberry silk worm.

Host plant cultivation: Types of host plants for sericulture, effects of agro-climatic conditions on the growth of host plants with special reference to mulberry, mulberry cultivation and its management, diseases, pests and predators of mulberry plant.

Rearing techniques: Ideal rearing house and its types, advantages and disadvantages, various rearing appliances, Young age (chawki rearing) and late age rearing, mountages and mounting, harvesting of cocoons.

Reeling: Grading of reeling cocoons, stifling of cocoons, reeling machines: charkha, cottage basin, processing of raw silk.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLC1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Student will gain the skill with hands on training on mulberry cultivation and carry forward to field.
2. Understand the procedure of silkworm egg production and support grainage activity.

3. Acquire knowledge and develop skill in silkworm rearing and support silkworm farming.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	3	-	-	3	1
CO2	3	3	1	-	3	3	3	-	-	3	1
CO3	3	3	1	-	3	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of host plants of silk worms.
2. Plantation techniques (pit and row) of host plants.
3. Study of propagation techniques of host plants.
4. Study of morphological characters of silk worm.
5. Identification of pests and predators of silk worm.
6. Dissection of alimentary canal and silk gland and study of their various parts.
7. Visit to nearest silk worm rearing centers.
8. Visit to rearing centers to observe the silk worm diseases and collection of diseased worms.

Suggested Readings:

- Sericulture introduction – Ganga, G.
 Seri Manual – FAO Manual
 Appropriate Sericulture – Jolly, M.S.
 Sericulture in India- Vol. I to IV, H.O. Agrawal and M.K. Seth.
 An introduction to Sericulture –G.J. Sulochana
 Principle of temperate Sericulture – Dr. A.S. Kamal, Kamayani Publisher
 Silk reeling and testing manual- Youngwoolee (Daya Pub. House).

SYLLABUS as per LOCF		
B.Sc. III SEMESTER		
Course Title: BASICS OF MUSHROOM PRODUCTION		
Course Code: RTUCTC2	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Identify edible and non-edible mushrooms.
2. Learn mushroom production techniques and their management.
3. Build up the efficiency of mushroom production, management and marketing.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction- Distribution, History and scope of Mushrooms, Characteristic features of Basidiomycotina fungi.

Identification of commonly grown mushroom species, Edible mushroom and their characteristics, Nutritional value of Mushrooms, Features of poisonous mushrooms, Medicinal mushrooms and their properties.

Spawn production technique- Equipments, mother culture preparation technique and their management.

Production Techniques of Oyster Mushroom, Paddy Straw Mushroom, White Button Mushroom and White Milky Mushroom.

Post-harvest handling of mushrooms, Problems related to mushroom production, Management of pests and diseases.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLC2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. To identify edible types of mushroom.
2. Gain the knowledge of cultivation of different types of edible mushrooms and spawn production
3. To manage the diseases and pests of mushrooms and to evolve themselves towards self-employment and income generation.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification of different mushroom species.
2. Equipment's used in mushroom production.
3. Culture preparation and Spawn preparation.
4. Different types of mushroom production.
5. Different types of Mushroom bed preparation.
6. Mushroom hut management.
7. Study of different types of pests and diseases of mushroom.

Suggested Readings:

The Mushroom Identifier- David Pegler & B. Sproner.
Mushroom Cultivation- B. Tripathi & H.P. Shukla
Mushroom Growing- S.C. Day

SYLLABUS as per LOCF		
B.Sc. III SEMESTER		
Course Title: AQUACULTURE		
Course Code: RTUCTC3	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand different types of fish and general physiology.
2. Understand fish production techniques and their management.
3. Get skill to establish entrepreneurship in aquaculture.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Ichthyology and its scope, types of carp fishes and their characteristic features, common major and minor carps found in Chhattisgarh, larvivorous fishes, ornamental fishes.

Exoskeleton: scales, coloration, Lateral line system, Food, feeding behavior and digestion in fish, respiratory organs: aquatic and air breathing, swim bladder, breeding of fish, fish seed resources and their transportation; Common disease of fish and their cure.

Chemical composition of fish; economic value of fish; fish preservation and processing; preparation and maintenance of aquarium, planktons and their importance.

Fisheries and its various classification: Overview of Inland, Estuarine and Marine fisheries; Fish culture in ponds and pond management; Composite fish farming, cage culture and use of sewage for fish culture; Integrated fish farming; fishing crafts and

gears; introduction to biofloc system for fish farming. Government schemes / programs related to fish culture.

Prawn culture and processing; Pearl culture: technical and economic aspects.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLC3	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the scope and significance of aquaculture, knowledge on taxonomy and morphology of fishes.
2. Learn about the types and practices of culture of Prawns and Pearl oyster.
3. Gain the knowledge on, disease diagnosis and control measures of fishes.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification and morphological studies of different fish types.
2. Study and mounting of fish scales.
3. Identification of diseased fishes.
4. Morphological study of cultivable crustaceans and Pearl oysters.
5. Studies of fishing gears/ crafts.
6. Visit to fish pond/ reservoir/ fish processing unit and report writing.

SYLLABUS as per LOCF		
B.Sc. III SEMESTER		
Course Title: INTEGRATED PEST MANAGEMENT		
Course Code: RTUCTG1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the objective of IPM and aware of harmful insect and pest.
2. Learn pest monitoring, measurement of pest population and its effects in cropping fields.
3. Understand the sustainable approaches for pest control and harmful effect of pesticides in environment public health.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Integrated Pest Management- Concept, meaning, importance and history of IPM.

Relation of pests with plants, ranking of pests.

Concept, characteristic and types of insect and pests, Decision making in Integrated Pest Management, Types of Pesticides, host plant interaction with insects and pests, Host plant resistance capacity.

Effect of pests on cropping fields, measuring pest population and Estimation of crop loss.

Sustainable approach towards Integrated Pest Management, Monitoring of Pest in Crops.

Control of crops against adverse effect of pests, application of Cultural, Mechanical, Biological and Chemical methods in cropping fields, Advantage, limitations and application of IPM in different crops.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLG1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn about pest, damage and how to control pest and what are the methods were useful to prevent insect pest and disease.
2. Learn different types of symptoms were take place in plant parts.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study the monitoring, surveillance and forecasting.
2. Assessment of pest population and damages at different growth stage of crops.
3. Preparation of low cost bio-pesticides.
4. Identification of different disease and pests.
5. Preparation of sticky and light trap to control of pest.

SYLLABUS as per LOCF		
B.Sc. III SEMESTER		
Course Title: HORTICULTURE AND LANDSCAPING		
Course Code: RTUCTA1	Credit: 02	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the knowledge about horticulture practices and its importance.
2. Learn detail information of orchard establishment and management will able to disseminate this knowledge to the farmers.
3. Adopt horticulture as entrepreneurship.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Horticulture: Concept, scope, definition, economic importance and classification of horticultural crops, fruit and vegetable zones of India, exports and imports opportunities, Government schemes / programs related to horticulture and landscaping.

Establishment of orchard: site selection, principles, planning and layout of orchard, tools and implements. Management of orchard-Planting systems, training and pruning, nutrient, water, weeds, and pests management in orchard trees. Cultivation practices of major fruit crops-Citrus fruits, papaya, banana, ber, Guava and Mango.

Fundamental of Floriculture, Scope and importance of floriculture in India, Importance and production technology of cut flowers and loose flowers. Production techniques of ornamental plants like rose, marigold, chrysanthemum, gladiolus, jasmine, dahlia, tuberose and gerbera.

Landscaping: Principles and components, landscape designs, Styles of garden: formal, informal and free style gardens; types of landscape: Urban landscaping, bio-aesthetic planning, eco- tourism, theme parks, indoor gardening.

Plant components for landscaping: Lawns-Establishment and maintenance, Plants-herbs, annuals, hedges, climbers and creepers, cacti and succulents, flower borders and beds, ground covers, carpet beds, bamboo groves.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLA1	Credit:02	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Realize the scope and significance of horticultural practices, orchards development and its managements.

2. Gain knowledge about utilization of green manure and organic fertilizers.
3. Learn various cultivation practices of plants at commercial scale.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification of garden equipments required for gardening and landscaping.
2. Preparation and maintenance of garden
3. Propagation and maintenance of annuals and perennials.
4. Training and Pruning of plants
5. Cutting, budding and grafting practices.
6. Identification of common garden weeds.
7. Making of Bonsai, Terrarium culture.

Suggested Readings:

Commercial Floriculture – V.H. Ries and A. Lasrice

Floriculture and Land Scaping – Desh Raj

Cultivation of Minor Fruit – B.C.Das and S.N.Das

Plant Propagation and Nursery Husbandary – J.S.Yadav

Fruit Production- K. N. Dubey

Modern Olericulture and Floriculture – G.S.Sainey

SYLLABUS as per LOCF		
B.Sc. IV SEMESTER		
Course Title: RURAL SOCIAL STRUCTURE AND PLANNING		
Course Code: RTUDTC1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Develop the knowledge about rural social structure and planning.
2. Understand about panchayati raj system and other developmental policies and program.
3. Understand pre-independence and post independence development programme

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Basic concept and principles of rural sociology and its application in day to day life, social institutions, social stratification, social process, culture and personality, groups and community, social relations and social organizations in rural areas.

Rural settlement: types of settlement pattern. Rural social structure- family, marriage, religion, caste system etc.

Panchayati Raj system and its implementation, Rural credit and banking- Nationalized bank, Cooperative bank, Non- institutional credit agencies, their types and working.

Historical review of Pre-independence development programme – Shantiniketan, Gandhian concept, Nilokheri project, Gurgaon project, Marthandm project, Etawah project and YMCA.

Post independence development programmes – Five years plans of India CD, CADP, IRDP, RLEGP, TRYSEM, DWCRA, CAPART, MGNREGA, WDP, NRLM, BRGF.

Rural health care programme – NRHM, ASHA. Sanitation programmes.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUDLC1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Inculcate the sensitivity towards ethics, public policies and their responsibilities towards the rural society.
2. Impart better education with values and transformation of knowledge from class room to common man.
3. Understand the rural Sociology and social anthropology from rural development perspectives, and characteristics of rural society.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	3	-	-	3	1
CO2	3	3	1	-	2	3	3	-	-	3	1
CO3	3	3	1	-	2	3	3	-	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. To study the social stratification.
2. Study of rural development programme.
3. To study the rural social and economical structure.
4. Impact analysis of MGNREGA.

Reference Book:

1. Indias Developing Villages – G. R. Madan
2. Rural Development – G. R. Madan
3. Rural Sociology – A. R. Desai
4. Panchayati Raj institution – G. S. Bal
5. India 2011 (Section – Rural Development)

SYLLABUS as per LOCF		
B.Sc. IV SEMESTER		
Course Title: POULTRY PRODUCTION TECHNIQUES		
Course Code: RTUDTC2	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Study the Poultry production techniques and their management.
2. Identify the different types of Layer chickens and their management.
3. Establish entrepreneurship in this field.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Breeds and Nutrition: Identification and characteristics of important Indian and Exotic poultry breeds. Poultry nutrition- nutrients and their function, energy sources, vegetable and animal protein sources.

Poultry farm Management: Farm system, provisions for good housing, commercial chick, grower, broiler and layer management.

Breeding and products technology: Principles of breeding, breeding system, development of layer and broiler varieties. Assessment of egg quality, nutritive value of eggs, grading of eggs, processing and preservation of poultry products, egg and meat products.

Poultry health management: Symptoms, treatment/control and vaccination strategies of- Viral disease (New castle disease, fowl pox, avian influenza, polyneuritis), Bacterial disease (Pullorum, fowl typhoid, fowl cholera, chronic respiratory disease), Parasitic disease (Coccidiosis) and Fungal disease (Mycotic pneumonia).

Other poultry species and marketing strategies: elementary knowledge of other poultry species- duck, quail, turkey, emu, geese and pigeon. Egg and meat marketing, distribution channel, exports.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUDLC2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Know the requirements of the main commercial poultry systems and deliver routine husbandry procedures and poultry production performance.
2. Learn about the poultry farming, site selection, and accommodation arrangements, handling of birds, feed and water.
3. Gain skill to maintain the health of birds from diseases, symptoms, culling, vaccination etc.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification and morphological study of poultry breeds.
2. Assessment of quality of egg.
3. Study of housing system for poultry.
4. Study of feed and feeding equipments.
5. Study of various types of poultry diseases and treatment.
6. Visit to poultry farms and report preparation.

Suggested Readings:

Amlendu Chakerbarti Handbook of Animal Husbandary”
 Jagdish Prasad: Poultry Production and Management”
 R.A. Singh: Poultry production

SYLLABUS as per LOCF		
B.Sc. IV SEMESTER		
Course Title: PLANT MORPHOLOGY AND REPRODUCTION		
Course Code: RTUDTC3	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Identify plants on the basis of morphological feature up to species level.
2. Understand basic knowledge of plant reproduction.
3. Learn seed development and seed dispersion mechanism.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

General structure of higher plants, Characteristic feature of Gymnosperm and Angiosperm, Plant morphology- Morphological features of root, and stem; modification of stem and root, morphological adaptations; Vegetative and floral morphological features.

Types of Tissue and cells: Meristmatic and permanent tissues, Gland and ducts; Anatomy of angiospermic (monocot and dicot) stem and root, Vascular cambium – structure and function, seasonal activity.

Phyllotaxy: Leaf morphology (terminology)- Arrangement- Phyllotaxy, and Venation; Inflorescence: Racemose, Cymose and Special types with examples.

Structural organization of flower: Structure of anther and pollen; Structure of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac. Pollination and fertilization: Pollination mechanisms and adaptations; Double fertilization.

Embryo and endosperm: Endosperm types, structure and functions; Dicot and monocot embryo; Fruits: Simple, Aggregate and Multiple types, Seed-structure appendages and dispersal mechanisms.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUDLC3	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn about plants anatomical and morphological structure, reproductive parts development of male, female gametophytes and fruits.
2. Gain knowledge about vascular tissues and its constituents by sections and maceration, wood anatomy, TS, TLS and RLS.
3. Gain knowledge about mechanical tissues (collenchyma, sclerenchyma, stone cells and xylem), secretory tissues (mucilage canals, resin canals, nectaries, and oil glands), laticifers (latex cells and vessels), Gain knowledge about normal and abnormal secondary growth etc.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Preparation of temporary double stained slides of T.S. of stem, root, leaf.
2. Study of permanent slides of T.S. of monocot and dicot stem and root.
3. Study of abnormal secondary growth with help of permanent slides V. S., entire and V. S. of ovule.
4. Study of types of tissues: Temporary and Permanent.
5. Study of types of leaves, venation, vein islet number and stomata count.
6. Study of flower, fruits and seeds of available plants.

Suggested Readings:

Vasishta, Sinha and Anil Kumar B: Botany for Degree Students, Gymnosperm, S.Chand & Co.

Maheswari P. – Embryology of Angiosperms – Vikas Pub

Pandey, B .P. (1997) – Plant Anatomy – S.Chand and co. New Delhi

Prasad and Prasad (1972) Out lines of Botanical Micro technique, Emkay publishers, New Delhi

Coutler E. G. (1969) Plant Anatomy – Part I Cells and Tissues – Edward Arnold, London

Vashista .P. C (1984) – Plant Anatomy – Pradeep Publications – Jalandhar

Singh, Singh and dey- Plant B, Daya ehavior on New Delhi

SYLLABUS as per LOCF		
B.Sc. IV SEMESTER		
Course Title: ECONOMIC BOTANY		
Course Code: RTUDTG1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn different types of cereals crops, oil plants, non alcoholic beverages trees, Bio fuels and fibers crops.
2. Understand oil yielding plants and Non-alcoholic Beverages.
3. Learn the production and economic importance of the crops

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Economic importance and uses of Cereals- Wheat, Rice, Maize, Jowar; Pulses- Soybean, Mustard, Gram, Pigeon Pea, Moong and Urd, minor millets.

Oil yielding plants: importance and uses of Coconut, Castor, Olive, Palm oil, Sunflower and Safflower.

Non-alcoholic Beverages- Tea, Coffee, Cocoa; Alcoholic beverages- Beer, Wine, Whisky, Vodka, Brandy.

Biofuels: First generation biofuels- bioalcohols, biodiesel, biogas, Second generation biofuel- Cellulosic ethanol, Algal fuel; Plants used as sustainable biofuel.

Importance and uses of fibre crops- Cotton, Flax and Jute.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUDLG1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the qualitative and quantitative method to estimate the number of floral components by using enumeration and suitable sampling and techniques.
2. Gain practical knowledge about production and economic importance of the crops.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Preparation of herbaria.
2. Study of oil producing plants and fibre yielding plants.
3. Study of Cereals and Pulses.
4. Identification of different oils.
5. Identification of kharif crops and seeds.
6. Study of different methods of sowing.

Suggested Readings:

Economic Botany: B.P. Pandey

Medicinal Plants: Conservation, Cultivation and Utilization Chopra, Khanna, Prasad, Malik, Bhutiani, Daya Publication, New Delhi

Medicinal Plants: Robert Bentley, Henri Trimen

Introductory Horticulture: E.P. Christopher

SYLLABUS as per LOCF		
B.Sc. IV SEMESTER		
Course Title: HERBAL PRODUCTION TECHNIQUES		
Course Code: RTUDTA1	Credit: 02	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Aware with the vast medicinal flora and their scientific role.
2. Gain technical confidence and skills to develop entrepreneurship.
3. Understand herbal production techniques of various herbal products.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Ayurvedic dosage form – Classification, Extraction- Kwatha, Pachana, Avaleha, Bhawwan, Putapka, Fermentation- Asava & Arista, Arka, Guggulu, Ghrita, Churna, Lepa, Vati and Gutikabhasma, Lauha.

Appartus-Dolyantram, Svedaniyantram, Dhupayantram, Patanayantram, Adhaspatanyantram, Tirgakapatanyantram, Vidhyadharyantum, Putas, Mahaputa, Musha, Hamspakayantram.

Utilisation and development of drugs from plants- Analgesic drugs, anti- inflammatory drugs, hypotensive drugs, antimalarial drugs, anti-cancer drugs, cardiovascular drugs, bronchodilatory drugs.

Herbal Preparations- Triphala churna, sitopaladi churna, Preparation of Avleha- Chyawanprash, Preparation of Asawas- Drakshasava, Preparation of Tooth powder, Preparation of beauty products.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUDLA1	Credit:02	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain knowledge about the selection and processing of herbal drugs as raw materials for herbal drug preparation.
2. Learn about principles of traditional medicinal systems with method of preparation and standardization of crude and ayurvedic formulation.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of equipments used in preparation of ayurvedic formulations.
2. Preparation of Triphala/Sitopaladi/Lawanbhaskar churna
3. Preparation of tooth powder.
4. Preparation of Hair oil/pain killer oil.
5. Preparation of herbal products.
6. Preparation of Awaleha.

Suggested Readings:

Professional Pharmacy: N.K. Jain

Medicinal Plants: Conservation, Cultivation and Utilization Chopra, Khanna, Prasad, Malik, Bhutiani, Daya Publication, New Delhi

Ayurvedic Pharmacology: C.K. Kokate, A. P. Purohit and S. B. Gokhale

INTERNSHIP PROGRAMME (B.SC. IV) ONE MONTH PROGRAMME

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: LAND SURVEYING, LEVELING AND DRAWING		
Course Code: RTUETC1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn about basic concepts of surveying.
2. Apply surveying for rural infrastructure development and land reforms.
3. Enhance their surveying skills for job opportunity.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Concept of surveying for rural development, objectives, types, units of measurement, instruments used for surveying.

Chain surveying: Introduction, principle and purpose, accessories for chaining, methods, running survey lines, Types of ranging survey, Errors in chaining, Testing and adjustment of chain.

Plane table survey: Introduction, principle and purpose, various equipments used in plane table survey, Method of plane table, Errors in plane table survey and precautions.

Concept of contour, characteristics of contour; Methods of contouring, various contour map application. Concept of leveling, level surface, Differential Global Positioning System (DGPS) and Global Positioning System (GPS).

Introduction to various drawing techniques, instruments and accessories used for drawing, Sizes of drawing sheets and their layouts, Lettering techniques and printing.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELC1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the basic surveying instruments and techniques.
2. Apply skills in using surveying instruments and analyze data.
3. Apply skills to conduct traverse survey and to find the area

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. To study about the instruments used in chain survey.
2. To study about the conventional signs and symbol used in chain survey.
3. Calculation of area by using chain survey.
4. To study about the field book.
5. Calculation of area by using plane table survey by radiation method.
6. Numerical related to the error in measurement.
7. Chain survey for the measurement of the area.
8. Instrument related to the plane table survey.

Suggested Readings:

Arora K.R., Surveying Vol. I & II, Standard Book House, Delhi

Kanitkar T.P., Surveying & Levelling Vol. I & II, Pune Vidyarthi Griha Prakashan, Pune

Basak P.N., Surveying & Leveling, Tata Mc Graw – Hill Publishing Co. Ltd., Delhi.

Agarwal G.D., Surveying Vol. I & II, Unitech Publishers, Lucknow

Dass G., Surveying Vol. I & II, Nav Bharat Prakashan, Meerut.

Punmia B.C., Surveying Vol. I & II, Laxmi Publications (P) Ltd. New Delhi

Duggal S.K., Surveying Vol. I & II, New Age International Publishers New Delhi.

Chandra A.M., Surveying Problem Solving with Theory & Objective Type Questions, New Age International Publishers New Delhi.

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: BUILDING CONSTRUCTION MATERIAL AND RURAL INFRASTRUCTURE		
Course Code: RTUETC2	Credit: 04	Marks:100

Course outcome:

On completion of this course, the students will be able to:

1. Learn about basic concept of construction engineering.
2. Learn about the low cost sustainable technologies for infrastructure developments.
3. Enhance low cost building construction skills for rural areas.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Building construction- introduction and site selection, Foundation, choice of soil for foundation, anti-termite treatment for building foundation, causes of foundation failure, concept of green building.

Building construction materials, stone, lime, bricks, properties of bricks, manufacturing of bricks, sand, and properties of good sand.

Cement, Manufacturing of cement, types of cement, mortar, functions of mortar, Concrete, Reinforced cement concrete (RCC), Flooring material Concept of plastering.

Type of Rural Housing: Brief study about rural housing and design of RCC, pattern of bamboo house, mud house, wooden house, Govt. schemes for rural housing.

Rural Road – Type of rural road, manufacturing condition of rural roads, manufacturing process of rural road, different technologies adopted for construction of rural roads.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELC2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Design integrated framework for infrastructure planning and management.
2. Analyze the strategies for infrastructural implementations.
3. Perform Infrastructure modeling techniques.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of Building materials.
2. Study of various types of bricks and cement.
3. Calculation techniques of bricks for building
4. Calculation techniques of bar for building.
5. Calculation techniques of cement and sand for building.
6. Visit to some under construction sites of urban and rural areas.
7. Geo tagging of construction site.

Suggested Readings:

Gurcharan Singh, Building Materials, Standard Publishers Distributors, Delhi.

Rangwala S.C., Engineering Materials, Charotar Publishing House Pvt. Ltd., Adand.

Mittal D.C., Engineering Materials

S. Kulkarni G.J., Engineering Materials

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: GOAT AND PIG PRODUCTION TECHNIQUES		
Course Code: RTUETD1	Credit: 04	Marks:100

Course outcome:

On completion of this course, the students will be able to:

1. Identify different breeds of goats and pigs and understanding of their feeding management.
2. Understand housing and health management of goats and pigs.
3. Understand general caring practices needed for goats and pigs.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Breeds, Breeding and Feeding of goats: Characteristics of important Indian breeds of goat of different regions. Modern techniques in reproduction. Feed, forage, nutrition and rationing.

Housing and health management in goats: Sheds/shelters and their orientation, ventilation, height and roofing material, floor type and space, shelter surroundings, essential appliances and hygiene. Health management in goats.

General caring practices of goat: determination of age, identification, disbudding and dehorning, castration, exercise, hoof trimming, care of bucks, mating seasons, care of kids, does, Techniques of milking and its collection.

Breeds, Breeding and Feeding of pigs: Characteristics of important breeds of pigs. Breeding systems, feeding and rationing.

Housing and health management in pigs: Housing strategies for different members in pig, wallows, essential appliances and hygiene. Marketing and transport of pigs. Pig disease (tuberculosis, mycoplasma pneumonia, Colibacelliosis, Brucellosis, Swine fever, foot and mouth disease, swine pox, ascariasis).

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELD1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the importance of record keeping, principles of housing and feeding, breeding management to improve the reproductive efficiency and detailed account on care and management of different classes of goat and pig.
2. Gain knowledge on various aspects of health care of pig and goat.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification of important breeds of goats and pigs.
2. Visit to goat /pig farms and report preparation.
3. Study of housing system for goats and pigs.
4. Calculation of ration for goat and pig.
5. Pathological conditions of diseases

Suggested Readings:

Amlendu Chakerbarti Handbook of Animal Husbandary”

Jagdish Prasad:. Principle and practice of Dairy Farm Management”

Eiri Board of Consultant & Engineers: Hand Book of Dairy Farming

P.N. Bhatt, N.H. Mohan and Such Deo: Pig Production

P.N. Bhatt and B.U. Khan: Goat Production

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: RURAL ENTREPRENEURSHIP AND MANAGEMENT		
Course Code: RTUETD2	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn about entrepreneurship and qualities of an entrepreneur.
2. Know how to start SSI/ cottage industries along with the various sources of financial support.
3. Promote entrepreneurship and least dependency upon government jobs.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Entrepreneur definition, characters, function, types, issues and problems of entrepreneurs. Entrepreneurship- meaning, definition, environment for entrepreneurship, behavior and theories.

Micro, small and medium enterprises (MSME), Evolution of concept of SSI, Concept of MSME, Problems of SSI, Policy support to SSI.

Project Identification- Meaning of Project, Definition of Project, Project Classification, Project life cycle, Project Identification.

Project Report- Nature of Project Report, Process involved in preparation of DPR, DPR analysis , Format of Project Report. Location of an Enterprise, need and importance of location.

Government Policy towards Small Business, Industrial and commercial policy of Chhattisgarh. Institutional Support to Small Business: NSIC, SSIDCs, NABARD, KVIC, SISIs, SIDBI.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELD2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Provide exposure and good understanding on rural enterprises and its various aspects.
2. Understand about scientific methodology for learning different enterprises and design modules for rural enterprises.
3. Specify the need for Rural technology interventions and its importance in rural areas.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Industrial visit and preparation of report.
2. Preparation of project proposal.
3. Behavioral study of entrepreneur.
4. To study the process of registration for MSME/ Udyog Aadhaar/Udyam/Aakanksha.

Suggested Readings:

S.S. Kanka: Entrepreneurial Development

Prasanna Chandra: Project Planning, Analysis, Selection, Implementation and Review
Tata McGraw Hill.

Vasantha Desai: Dynamics of Entrepreneurial Development

C.B. Gupta & N.P. Sreenivasan: Entrepreneurial Development

Dr. Anupam Tiwari: Grain Management: To Ensure Food Security, , Marks Books,
New Delhi

Nirmal K. Gupta: Small Industry – Challenges and Perspectives

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: NATURAL PRODUCT MANAGEMENT		
Course Code: RTUETD3	Credit: 04	Marks:100

Course outcome:

On completion of this course, the students will be able to:

1. Understand non timber forest products and their importance.
2. Develop understanding of grasses of economic importance.
3. Identify the common natural products of plant origin and its production and processing.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Definition, contribution of natural products for National Economy, important non timber products of forest area, and their role in rural economy and livelihood.

Classification and use of grasses, bamboos and canes. Economic importance of grasses, bamboos and canes. Essential oils. Importance of oils and waxes in rural economy.

Tannin and its uses – Wood tannin, bark tannin, fruit tannin and leaf tannin, Dye-wood, bark, flower and fruit dyes, root dyes leaf dyes, animal dyes, uses of tannins and dyes in Rural industries,

Gums and Resins- true gums, hard resins, oleo resins, utilizations of gums and resins, gum and resin tapping. Manufacturing of turpentine, katha, cutch and charcoal.

Management of Natural Products- collection, storage, utilization pattern of non timber products and their marketing.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELD3	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain a broad knowledge of the major classes of natural products and be able to describe several detailed examples for each.
2. Understand the need, when developing product concepts, to consider issues around indigenous knowledge, traditional use, cultural perspectives and ownership of native flora and fauna.
3. Gain fundamental practical laboratory skills in the extraction, purification and analysis of natural products.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	1
CO2	3	3	1	-	2	3	-	3	3	3	1
CO3	3	3	1	-	2	3	-	3	3	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Study of local Non timber forest products (NTFPs).
2. Preparation of dyes.
3. To study the source of Tannin, gum and resins.

Suggested Readings

Non – Timber Forest Product – S. Negi.

Forest Non – Wood Resources – A.P. Dewadi.

Indian Forest Utilization Vol.- II, FRI Edition

SYLLABUS as per LOCF		
B.Sc. V SEMESTER		
Course Title: AGRICULTURAL EQUIPMENTS AND CROP PRODUCTION		
Course Code: RTUETD4	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Obtain basic knowledge about agriculture equipments, implements and farm machinery for crop production and their management.
2. Learn about cropping system and cropping pattern,
3. Enhance their knowledge and skills related to package and practices of crop production.
4. Calculate the recommended dose of fertilizers and pesticides.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	1
CO2	3	3	1	-	3	3	-	3	-	3	1
CO3	3	3	1	-	3	3	-	3	-	3	1
CO4	3	3	1	-	3	3	-	3	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Equipments required for cultivation- Plough, Share, Cultivator, Hoe, harrow and tractor, Sowing equipment, Plant protection equipments, Crop harvesting and threshing implement.

Definition of Agronomy, scope and importance of agronomy, classification of crops, concepts and types of cropping systems, intensive cropping, crop rotation, mono-cropping, sole-cropping, alley cropping, contour cropping, jhum and shifting cultivation.

Package of practices of Cereal Crops Production: Paddy, Wheat, Maize, Barley, Sorghum. Pulses crops: Groundnut, Pigeon pea, Green and Black Gram, Chickpea, oil crop-Sunflower, Soybean, Mustard, cash crop- Sugarcane and Cotton.

Water management- concepts of water use efficiency, irrigation methods and drainage system.

Weeds- Definition, Identification, classification and spread of different weeds, integrated weed management (IWM).

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUELD4	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the advanced concepts of crop growth and productivity in relation to climate change.
2. Gain knowledge on different technologies of agriculture, modern concepts in tillage and farm mechanization.
3. Gain knowledge on principles and components of organic farming, vermi technology, resource conservation technology.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	1
CO2	3	3	1	-	3	3	-	3	-	3	1
CO3	3	3	1	-	3	3	-	3	-	3	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Identification of agricultural equipments.
2. Identification of weeds.
3. Identification of important crop varieties.
4. Visit to agricultural forms.
5. Calculation of recommended dosage of fertilizers and pesticides.

Suggested Readings:

Principle of Agronomy – Om Prakash Ahalawat

Handbook of Agriculture – ICAR publication

Handbook of Agriculture –S.S. Singh

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: INTRODUCTION TO REMOTE SENSING		
Course Code: RTUFTC1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Obtain fundamental knowledge of remote sensing and gain basic experience in hands on application of remote sensing.
2. Aware with the prospect and potential of remote sensing and its application in the field of rural development.
3. Understand the software of remote sensing and GIS application in the field of rural development.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction & Definition of Remote Sensing, Kinds of Remote Sensing, History and development of Remote Sensing in world. Advantages of remote sensing. Real and Ideal Remote Sensing

Energy Sources, Electromagnetic Energy, Electromagnetic Spectrum & Radiation, Scattering, Absorption and Reflectance in Remote Sensing. Spectral reflectance response of different earth surface features, image enhancement.

History of Aerial Remote Sensing, type of Aerial photograph, Photographic scale, introduction to Photogrammetry, application of photogrammetry in vertical aerial photograph, difference between satellite image and aerial photograph, stereoscope and platform.

Platform, Kinds of platforms Introduction to Satellite, Polar orbiting, Geosynchronous and GPS Satellites, their functions and importance

Map, spatial elements in image, classification of maps, Map scale, Spatial referencing system, map projection.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLC1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Identify, analyze and solve geospatial problems.
2. Develop practical and executable solutions to the challenges of growing field of Remote Sensing and GIS.
3. Interpret the remotely sensed data.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

- 1.To study about toposheet and its component.
- 2.To study about the map and calculation of map scale
- 3.To study about different software related to remote sensing
- 4.Geometric correction.
- 5.Image processing.

Suggested Readings:

F.F. Sabins : Remote Sensing – Principles & interpretation

Dr. P. Nag, Dr. M. Kudrat : Digital Remote Sensing, Concept Publishing company 1998

P.J. Curran : Principles of Remote Sensing, Longman.

J.A. Richards : Digital Image Processing in Remote Sensing, Springer

F.F. Sabins : Remote Sensing – Principles & interpretation

Lillesand & Keifer : Remote Sensing & Image interpretation

SYLLABUS as per LOCF
B.Sc. VI SEMESTER
Course Title: INTRODUCTION TO MEDICINAL PLANTS

Course Code: RTUFTC2	Credit: 04	Marks: 100
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Course outcomes

On completion of this course, the students will be able to:

1. Identify medicinal plant and collection of botanical information.
2. Understand cultivation technique of medicinal plants.
3. Understand various processing of crude drugs.
4. Create documentation of medicinal knowledge and conservation.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	2
CO2	3	3	1	-	3	3	-	3	-	3	2
CO3	3	3	1	-	3	3	-	3	-	3	2
CO4	3	3	1	-	3	3	-	3	-	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction to different parts of medicinal plants- Stem, Root, Leaf, Flowers, Fruits, Seeds, Woods,

Eargastic substance of plants, organized and unorganized drugs- Gums, Resins, Lattices. Sustainable conservation and development strategies of medicinal plant.

Cultivation Techniques of medicinal plants- Eco friendly farming, Organic farming, Nature farming, Ecological farming systems, Integrated intensive farming system, LEISA, Biodynamic agriculture.

Disease of medicinal plants- plant diseases, plant and pathogen relationship, disease development stages, nature and classification of plant diseases, Diseases of medicinal plant –*Withania* and *Rauvolfia*.

Collection and processing of crude drugs- Harvesting, Drying, Decoction, Garbling, Packing, Storage, Active constituents, Standardization of medicinal plants.

Assessment of herbal Medicine-Traditional medicine programme, Importance of plant derived drugs, WHO guidelines for assessment of herbal drugs, objective for improvement, and its strategy.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLC2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Acquire operative knowledge and be able to carry out technical regarding medicinal plants.
2. Learn about the medicinal plants and their derivatives for use in herbal, food and cosmetic products.
3. Learn the skill of recognition, collection and preservation of medicinal plants.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	2
CO2	3	3	1	-	3	3	-	3	-	3	2
CO3	3	3	1	-	3	3	-	3	-	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Morphological study of available local medicinal plant.
2. Anatomical study of available local medicinal plants.
3. Processing Practices of collected medicinal plant products.
4. Study of Plant Diseases of medicinal plants.
5. Preparation of herbaria of locally available plants.

Suggested Readings:

Pharmacognosy – C.K. Kokate, A.P. Purohit and S.S. Gokhale

Medicinal Plant Cultivation- Purohit and Vyas

Agro Techniques of Medicinal Plants- Ravindra Sharma

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: RURAL ENERGY RESOURCES		
Course Code: RTUFTD1	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand various energy resources prevalent in India.

2. Aware about energy consumption in rural India.
3. Understand energy conservation and utilization techniques.
4. Aware about limited energy resources and their alternatives.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	2
CO2	3	3	1	-	3	3	-	3	-	3	2
CO3	3	3	1	-	3	3	-	3	-	3	2
CO4	3	3	1	-	3	3	-	3	-	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction, Sources of energy, classification of energy, Energy demand in rural and urban sector, future energy challenges, Need for rural energy development.

Bio-gas technology, anaerobic fermentation process, hydrolysis, acidification and methanol-genesis, factors affecting gas yield, retention time, composition and characteristics of bio-gas, bio-gas uses, bio-gas model.

Solar Energy- Solar radiation, solar water heating, solar drying, solar greenhouse, solar energy use in rural areas. Solar cell, PV Cells, Type of PV system, Efficiency of solar cells, application of solar photovoltaic.

Bio-fuel properties, characteristics, petro crops, biodiesel, economic feasibility of biodiesel.

Problems in rural energy sector, farm forestry, harvest flexibility, species, calorific value, energy plantations.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLD1	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the need of energy conversion and the various methods of energy storage.
2. Learn about the field applications of solar energy.
3. Gain skill on bio gas generation and its impact on environment.
4. Understand the direct energy conversion systems and their applications.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	3	3	-	3	-	3	2
CO2	3	3	1	-	3	3	-	3	-	3	2
CO3	3	3	1	-	3	3	-	3	-	3	2
CO4	3	3	1	-	3	3	-	3	-	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. To study about petro-crops.
2. To study about biogas plant.
3. To study the biomass.
4. Identification of different types of coal.
5. To study about energy plantation.
6. Visit to various power plant.
7. Submission of Visit reports.

Suggested Readings:

Non conventional energy – G.D. Rai

Energy security – D. Bhaskaran Rao

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: WATERSHED MANAGEMENT		
Course Code: RTUFTD2	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Learn the soil and water conservation techniques.
2. Understand knowledge about watershed management.
3. Promote soil and water conservation in the society.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Hydrological cycle, rainfall and its measurement, ground and surface recharge, water conservation and recycling.

Concept of land and water management, soil and water erosion, Runoff erosivity factor, erodibility factor.

Watershed management concept- objectives, types, characterization, planning and execution, suitable plants and crops for watershed area, study of water basin.

Water harvesting structures: Gabian structure, percolation tank, Contour trench, check dam, stop dam, Bench Terracing, Zing terracing, trenching, Gully control.

Introduction to integrated watershed management program and their impact, Application of Remote Sensing & GIS in watershed management for Natural Resource Management, projects related with surface water managements.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLD2	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Understand the concepts of watershed management and its effect on land, water and ecosystem resources.
2. Able to develop control and mitigation techniques for watershed problems.
3. Able to analyze the public policies and practices of watershed planning

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2

CO3	3	3	1	-	2	3	-	3	3	3	2
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Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Visit to watershed area and identification of problems.
2. Preparation of various models for watershed management.
3. Watershed Map preparation through remote sensing.

Suggested Readings:

Integrated watershed management: Rajesh Rajora

Watershed management: E.M. Tidema

Soil erosion and conservation: R.P. Tripathi and S.P. Singh

Land and Water Management: V.V.N. Murti

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: RURAL HEALTH CARE		
Course Code: RTUFTD3	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Aware about the health problem, their causes and sanitation techniques.
2. Understand awareness programs for sanitation and health improvement.
3. Aware about the rural health management.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Rural Health: Understanding of health, epidemiology, natural history of diseases, determinants of health, indicators of health.

Rural Health and Nutrition Status: Health and nutrition linkages and status, dietary intake, trends in health and nutrition, factors influencing health and nutrition status.

Rural Health and Communicable Diseases: Understanding communicable diseases, different communicable diseases and etiology of – respiratory infection, water and food borne infections, contact diseases, arthropod borne diseases and zoonosis. Characteristics of common communicable diseases. Prevention and control of communicable diseases.

Rural Health Management: Health care services- (a) general services, (b) Maternal and child health services (c) services provided under national health program

Rural Sanitation and hygiene: Government Schemes like, Swachhha Bharat Mission, Nirmal Bharat Abhiyan and Amrut Mission.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLD3	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain knowledge about the health care service.
2. Gain skill on improvement of awareness level on various issues on health.
3. Learn about basic rural health management for rural areas.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. To identify causative agents of zoonotic diseases.
2. Anthropometric analysis among students for nutritional status.
3. Performance of few hematological and serological endpoints
4. Group discussion on communicable diseases.
5. Visit to nearby PHC/CHC/wellness centers.

Suggested Readings:

Health Care in Rural Areas: J. Cyril kanmony

Tribal Fertility, Morality And Health Care Practices: R. Mutharayappa

Rural Behavioral Health Care: An Interdisciplinary Guide: B. Handnall Stamm

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: ORGANIC FARMING		
Course Code: RTUFTD4	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students would be able to

1. Understand the concepts of organic farming and disseminate the knowledge about organic farming among the farmers to overcome the threat of excess use of chemical fertilizer and pesticides.
2. Understand about different components of organic farming and produce organic crop.
3. Understand the Organic farming Certification.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Organic farming- meaning, concept, definition, types of organic farming and benefits of organic farming. Principle of organic farming. Scope and present status of organic farming; India and Chhattisgarh.

Components of Organic farming –organic manure, green manure, animal based manure, agro industry based manure, crop rotation, biological management, Bio-fertilizers.

Organic crop management through – integrated pest management (IPM), integrated disease management (IDM), integrated nutrient management (INM), integrated water management (IWM), integrated weed management (IWM).

Organic crop production practice in - Rice, Wheat, Pigeon pea, plantation crops like Mango and Guava.

Organic farming Certification- Policies and incentive of organic production, Agencies and institution related to organic farming, procedures of certification for organic farming.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLD4	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Gain knowledge about performance of organic farming.
2. Understand about different components of organic farming and produce organic crop.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. To study the components of organic farming.
2. To study the production methods of organic manures.
3. To study the methods of application of organic manures.
4. To study the IPM, IDM, IMM and IWM for organic farming.
5. To study the certification process of organic farming.

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: INDIGENOUS ARTS AND CRAFTS		
Course Code: RTUFTD5	Credit: 04	Marks:100

Course outcomes

On completion of this course, the students will be able to

1. Learn about various art forms of our country and also historical background of traditional art of Chhattisgarh.
2. Learn about basic pattern and modern styles of Terracotta art, Bamboo art, Ranjwar bhitti art.
3. Understand the importance of economic aspects of traditional arts and economic status of rural artisan.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2
CO3	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Introduction to Indian art, Art scope in Chhattisgarh, Various traditional arts and its importance in Chhattisgarh. Origin and history of Chhattisgarh traditional art, Background, different technique related with Chhattisgarh traditional art.

Terracotta art - Materials, quality of soils, traditional designs, processes and techniques.

Bamboo art- type of bamboo, materials, processes, techniques, equipments and applications.

Rajwar Bhitti art- Materials, traditional designs, processes and techniques, innovations.

Wooden art- Materials, quality of wood, traditional designs, processes and techniques.

Economy and marketing- Marketing problems related with rural art, present situation of rural artisans of Chhattisgarh state, role of different government and non-government organization in the development of rural artisans.

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUFLD5	Credit:01	Marks:100

Course outcomes

On completion of this course, the students will be able to:

1. Perform basic pattern and modern styles of Terracotta art, Bamboo art, Ranjwar bhitti art.
2. Gain knowledge on economic aspects of traditional arts and economic status of rural artisan.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	3	3	3	2
CO2	3	3	1	-	2	3	-	3	3	3	2

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

1. Making of soil for Terracotta art.
2. Making of articles from bamboo.
3. Making of articles from wooden art.
4. Making of articles from rajwar bhitti art
5. Making of soil for Terracotta art.
6. Training or workshop or exposure for Terracotta art and Bamboo art.

Suggested Readings

Bamboo Research in India: Gaur R.C.
 Timber Bamboo: Soori S.K. and Chauhan R.S.
 Monograph on Bamboo: Tiwari D.N..

SYLLABUS as per LOCF		
B.Sc. VI SEMESTER		
Course Title: PROJECT WORK/DISSERTATION		
Course Code: RTUFDF6	Credit: 10	Marks:100

Course outcomes

On completion of this course, the students will be able to

1. Analyse the relationships among animals, plants microbes and use of Engineering and Computer Sciences for socio-economic development in rural areas.
2. Understand the applications of biological and computer sciences in Apiculture, Aquaculture, Agriculture, Medicine, Remote Sensing and GIS, Rural Engineering and Rural Planning.
3. Perform procedures as per laboratory standards in the areas of Organic Farming, Dairy, Mushroom, Poultry, and Herbal Production, Sericulture, Aquaculture, Art and Crafts, Plant Propagation and Nursery Management.

Course Outcomes and their mapping with Program Outcomes:

COs	POs						PSOs				
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	-	2	3	-	-	3	3	3
CO2	3	3	1	-	2	3	-	-	3	3	3
CO3	3	3	1	-	2	3	-	-	3	3	3

Weightage: 1-Slightly; 2-Moderately; 3-Strongly