MINUTES OF MEETING OF BOARD OF STUDIES OF STIDIES HELD ON 05-04-2022

A meeting of board of studies (BOS) of the Department of Rural Technology and social Development was held on 05-04-2022 with following members to discuss, review and modify the syllabus as per the learning Outcome- based Curriculum Framework (LOCF) Guideline for the UG and PG Programs. Following members were presented in the meeting.

I. **Dr. P.R.Singh(Chaieman)**
II. **Prof.Rajendra Singh Negi (Academic External Expert-)**
III. **Mr.Amit Gupta(Industry External Expert)**
IV. **Dr. R, Mehta(Member)**
V. **Dr. S.K.Nirala (Member)**
VI. **Dr.Bhaskar Chaurasia(Member)**
VII. **Dr.Alka Mishra(Member)**
VIII. **Dr. Dilip Kumar (Member)**
IX. **Dr. Lokesh Kumar Tinde (Member)**
X. **Dr. D.S.Porte (Member)**

The chairman of BOS welcome the BOS members and following resolution were passed:

1. **All members of the BOS Discussed the scheme and syllabus of tree Year B.Sc (RT) Program and two year M.Sc.(RT) Program as per the LOCF Criteria**
2. **The LOCF based scheme and syllabus for B.Sc. Rural Technology (All the Six semesters) and M.Sc. Rural Technology (All the Four Semesters) was approved by the BOS(Scheme and syllabus is attached herewith).**
   The paper entitled "woodenart" has been modified in "wooden arts and craft" and syllabus of the paper has also been modified accordingly as per the expert advice.
   A 30 hours value added course on " Mushroom Agronomics" was proposed by course Co-coordinator Dr. Bhaskar chaurasia all members of the BOS discussed the syllabus and and scheme of examination of the value added course and approved the prposed value added course (scheme and syllabus is attached herewith)
3. **Following new courses are introduced in the department from session 2021-22**

Sr. No.	Course Code	Name of the Course
	New Courses introduced in B.Sc. Rural Technology	
1.	RTUATC1	Organic Manure Production Techniques
2.	RTUALC1	Laboratory course based on theory
3.	RTUATC2	Elementary Biology
4.	RTUALC2	Laboratory course based on theory
5.	RTUATG1	Soil and Fertilizers
6.	RTUALG1	Laboratory course based on theory
7.	RTUATL1	Horticulture and Landscaping
8.	RTUALL1	Laboratory course based on theory
9.	RTUATA1	Organic Farming

10.	RTUALA1	Laboratory course based on theory
11.	RTUBTC1	Microbial Technology
12.	RTUBLC1	Laboratory course based on theory
13.	RTUBTC2	Dairy Management and Products
14.	RTUBLC2	Laboratory course based on theory
15.	RTUBTG1	Plant Propagation and NurseryManagement
16.	RTUBLG1	Laboratory course based on theory
17.	RTUBTL1	Herbal Production Techniques
18.	RTUBLL1	Laboratory course based on theory
19.	RTUBTA1	Rural Health Care
20.	RTUCTC1	Sericulture
21.	RTUCLC1	Laboratory course based on theory
22.	RTUCTC2	Basics of Mushroom Production
23.	RTUCLC2	Laboratory course based on theory
24.	RTUCTC3	Aquaculture
25.	RTUCLC3	Laboratory course based on theory
26.	RTUCTG1	Integrated Pest Management
27.	RTUCLG1	Laboratory course based on theory
28.	RTUCTA1	Wooden Art
29.	RTUCLA1	Laboratory course based on theory
30.	RTUDTC1	Rural Social Structure and Planning
31.	RTUDLC1	Laboratory course based on theory
32.	RTUDTC2	Poultry Production Techniques
33.	RTUDLC2	Laboratory course based on theory
34.	RTUDTC3	Plant Morphology and Reproduction
35.	RTUDLC3	Laboratory course based on theory
36.	RTUDTG1	Economic Botany
37.	RTUDLG1	Laboratory course based on theory

38.	RTUDTA1	Indigenous Art
39.	RTUDLA1	Laboratory course based on theory
40.	RTUETC1	Land, Surveying, Leveling and Drawing
41.	RTUELC1	Laboratory course based on theory
42.	RTUETC2	Building Construction Material and Rural Infrastructure
43.	RTUELC2	Laboratory course based on theory
44.	RTUETD1	Goat and Pig Production Techniques
45.	RTUELD1	Laboratory course based on theory
46.	RTUETD2	Rural Entrepreneurship and Management
47.	RTUELD2	Laboratory course based on theory
48.	RTUETA3	Lac And Honey Production
49.	RTUELD3	Laboratory course based on theory
50.	RTUFTC1	Introduction to Remote Sensing
51.	RTUFLC1	Laboratory course based on theory
52.	RTUFTC2	Introduction to Medicinal Plants
53.	RTUFLC2	Laboratory course based on theory
54.	RTUFTD1	Natural Product Management
55.	RTUFLD1	Laboratory course based on theory
	New Courses introduced in M.Sc. Rural Technology	
56.	RTPATC-1	Concepts of Statistical Analysis
57.	RTPALC-1	Laboratory Course (Based on RTPATC-1)
58.	RTPATC-2	Innovation, Appraisal and action for Rural Development
59.	RTPALC-2	Field based work/ Survey (Based on RTPATC-2)
60.	RTPATG-1	Sericulture
61.	RTPALG-1	Laboratory Course (Based on RTPATG-1)
62.	RTPATG-2	Lac production technique
63.	RTPALG-2	Laboratory Course (Based on RTPAGT-2)
64.	RTPATO-1	Natural Product and Processing Techniques

65.	RTPALO-1	Laboratory Course (Based on RTPATO-1)
66.	RTPBTC-1	Fundamentals of Medicinal Plant
67.	RTPBLC-1	Laboratory Course (Based on RTPBTC-1)
68.	RTPBTC-2	Concept of Remote Sensing and GIS-I
69.	RTPBLC-2	Laboratory Course (Based on RTPBTC-2)
70.	RTPBTA-1	Research Methodology and Ethics
71.	RTPBTG-1	Rural Waste Management
72.	RTPBPG-1	Laboratory Course (Based on RTPBTG-1)
73.	RTPBTG-2	Soil and Water Conservation Engineering
74.	RTPBPG-2	Laboratory Course (Based on RTPBTG-2)
75.	RTPCTC-1	Drug Formulation and Extraction
76.	RTPCLC-1	Laboratory Course (Based on RTPCTC-1)
77.	RTPCTC-2	Geospatial Technology and its Application
78.	RTPCLC-2	Laboratory Course (Based on RTPCTC-2)
79.	RTPCTG-1	Mushroom Cultivation Technology
80.	RTPCLG-1	Laboratory Course (Based on RTPCTG-1)
81.	RTPCTG-2	Beekeeping Techniques
82.	RTPCLG-2	Laboratory Course (Based on RTPCTG-2)
83.	RTPCTA-1	Instrumentation and Techniques
84.	RTPCLA-1	Laboratory Course (Based on RTPCTA-1)
85.	RTPCSA-1	Seminar
86.	RTPDTG-1	Computer application
87.	RTPDTG-2	Entrepreneurship
88.	RTPDDC-1	Dissertation/ Project work followed by seminar

HEAD
Department of Rural Technology
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Guru Ghasidas Vishwavidyalay
Bilaspur (C.G.) 495009

Scheme and Syllabus

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

DEPARTMENT OF RURAL TECHNOLOGY & SOCIAL DEVELOPMENT,
GURU GHASIDAS VISHWAVIDALAYA
SEMESTER SCHEME
Bachlor of Science of Rural Technology

B. Sc. I SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUATC1	ORGANIC MANURE PRODUCTION TECHNIQUES	70	30	-	100
RTUALC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUATC2	ELEMENTARY BIOLOGY	70	30	-	100
RTUALC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUATG1	SOIL AND FERTILIZERS	70	30	-	100
RTUALG1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUATL1	HORTICULTURE AND LANDSCAPING	70	30	-	100
RTUCLL1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUATA1	ORGANIC FARMING	70	30	-	100
RTUALA1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
	Total	350	300	350	1000

B. Sc. II SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUBTC1	MICROBIAL TECHNOLOGY	70	30	-	100
RTUBLC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUBTC2	DAIRY MANAGEMENT AND PRODUCTS	70	30	-	100
RTUBLC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUBTG1	PLANT PROPAGATION AND NURSERY MANAGEMENT	70	30	-	100
RTUBLG1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTPBTL1	HERBAL PRODUCTION TECHNIQUES	70	30	-	100
RTUBLL1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUBTA1	RURAL HEALTH CARE	70	30	-	100
	Total	350	270	280	900

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

B. Sc. III SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUCTC1	SERICULTURE	70	30	-	100
RTUCLC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUCTC2	BASICS OF MUSHROOM PRODUCTION	70	30	-	100
RTUCLC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUCTC3	AQUACULTURE	70	30	-	100
RTUCLC3	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUCTG1	INTEGRATED PEST MANAGEMENT	70	30	-	100
RTUCLG1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUCTA1	WOODEN ARTS AND CRAFT	70	30	-	100
RTUCLA1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
	Total	**350**	**300**	**350**	**1000**

B. Sc. IV SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUDTC1	RURAL SOCIAL STRUCTURE AND PLANNING	70	30	-	100
RTUDLC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUDTC2	POULTRY PRODUCTION TECHNIQUES	70	30	-	100
RTUDLC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUDTC3	PLANT MORPHOLOGY AND REPRODUCTION	70	30	-	100
RTUDLC3	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUDTG1	ECONOMIC BOTANY	70	30	-	100
RTUDLG1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUDTA1	INDIGENOUS ARTS AND CRAFTS	70	30	-	100
RTUDLA1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUDEC1	INTERNSHIP PROGRAMME (B.SC. IV) ONE MONTH PROGRAMME				
	Total	350	300	350	1000

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

B. Sc. V SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUETC1	LAND SURVEYING, LEVELING AND DRAWING	70	30	-	100
RTUELC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUETC2	BUILDING CONSTRUCTION MATERIAL AND RURAL INFRASTRUCTURE	70	30	-	100
RTUELC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUETD1	GOAT AND PIG PRODUCTION TECHNIQUES	70	30	-	100
RTUETD1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUETD2	RURAL ENTREPRENEURSHIP AND MANAGEMENT	70	30	-	100
RTUELD2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUETA1	LAC AND HONEY PRODCUTION	70	30	-	100
RTUELA1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
	Total	350	300	350	1000

B. Sc. VI SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTUFTC1	INTRODUCTION TO REMOTE SENSING	70	30	-	100
RTUFLC1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUFTC2	INTRODUCTION TO MEDICINAL PLANTS	70	30	-	100
RTUFLC2	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUFTD1	NATURAL PRODUCT MANAGEMENT	70	30	-	100
RTUFLD1	LABORATORY COURSE BASED ON THEORY	-	30	70	100
RTUFDF1	PROJECT WORK/DISSERTATION	70	30	-	100
RTUFSF2	SEMINAR	-	30	70	100
	Total	280	240	280	800

Department of Rural Technology & Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for UG Course 2021-2022

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

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

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

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 Urvark-
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 Urvark-
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

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**

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

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

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**

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

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Semester-wise syllabus for UG Course 2021-2022

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**

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

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

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: Intoduction, 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**

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. I SEMESTER Course Title: HORTICULTURE AND LANDSCAPING		
Course Code: RTUATL1	**Credit: 02**	**Marks:100**

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

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

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: RTUCLL1	**Credit:01**	**Marks:100**

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 Oleri and Floriculture – G.S.Sainey

SYLLABUS as per LOCF B.Sc. I SEMESTER Course Title: ORGANIC FARMING		
Course Code: RTUATA1	**Credit: 04**	**Marks:100**

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

- 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 pesticide.
- Understand about different components of organic farming and produce organic crop.

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: RTUALA'	Credit:01	Marks:100

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. II SEMESTER Course Title: MICROBIAL TECHNOLOGY		
Course Code: RTUBTC1	Credit: 04	Marks:100

Learning outcomes

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

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

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 B_{12} 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

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.

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Semester-wise syllabus for UG Course 2021-2022

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

Learning outcomes
On completion of this course, the students will be able to:
- Identify different breeds of cows and buffaloes and their feeding management
- Understand housing and health management of cows and buffaloes.
- Understand general caring practices needed for cows and buffaloes.
- Prepare various dairy products and enhance their skill for establishment of Dairy.

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, hey 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

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.

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

Learning outcomes
On completion of this course, the students will be able to:
- Understand various plant nursery and its special functions.
- Acquired skills about propagation of nursery plants and their handling
- Calculate the recommended dose of pesticide and fertilizers in orchard.
- Gain technical confidence and skills for establishment of plant nursery.

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

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.

SYLLABUS as per LOCF B.Sc. II SEMESTER		
Course Title: HERBAL PRODUCTION TECHNIQUES		
Course Code: RTUBTL1	Credit: 02	Marks:100

Learning outcomes

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

- Aware with the vast medicinal flora and their scientific role.
- Gain technical confidence and skills to develop entrepreneurship.

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, antimalerial 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: RTUBLL1	Credit:02	Marks:100

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

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SYLLABUS as per LOCF		
B.Sc. II SEMESTER		
Course Title: RURAL HEALTH CARE		
Course Code: RTUBTA1	Credit: 02	Marks:100

Learning outcomes
On completion of this course, the students will be able to:
- Aware about the health problem, their causes and sanitation techniques.
- Understand awareness programs for sanitation and health improvement.
- Aware about the rural health management.

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, Swachchha Bharat Mission, Nirmal Bharat Abhiyan and Amrut Mission.

Suggested Readings:
Health Care in Rural Areas: J. Cyril kanmony
Tribal Fertility, Morality And Health Care Practics: R. Mutharayappa
Rural Behavioral Health Care: An Interdisciplinary Guide: B. Handnall Stamm

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

Learning outcomes
On completion of this course, the students will be able to:
- Learn the scientific method of rearing, cultivation of silkworm and management of host plants.
- Identify the various seed cocoon, commercial cocoon, silk fibre and get knowledge of diseases and pests management of host plant.
- Obtain job opportunities in the public, private and government sectors.
- Gain technical confidence and skills for establishment of orchards.

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

Biology of silk moth: Anatomy of ehavior 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

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

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

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

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 Milkey 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

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

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

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

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

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.

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

Learning outcomes

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

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

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

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.

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SYLLABUS as per LOCF B.Sc. III SEMESTER		
Course Title: WOODEN ARTS AND CRAFT		
Course Code: RTUCTA1	Credit: 02	Marks:100

Fundamental of wooden art: Introduction, history, objective, vision, ritual value, distribution in India and Chhattisgarh.

Types of raw material used, raw material availability, tools used, traditional and modern drawing and design technique used, methodology used for preparation of wood structure, purpose, planning, management and quality control.

Marketing of wooden art (local, national and international level), status of wooden market in India and Chhattisgarh, problems related with rural market.

Fundamental of Bamboo art: Introduction, history, types of bamboo, distribution of bamboo species in India and Chhattisgarh. Bamboo art and its importance, design and modern techniques ues in bamboo art.

Socio-economic status of wooden artesian, relationship between forest department and artesian. Entrepreneurship and sustainable development of wooden artesian, contribution of Government and Non-government organizations for wooden art.

Reference Books:

Sculpture in Wood: Jack C. Rich

The book of Wood Carving : Technique, Design and Projects – Charles Marshall Sayers

Manual of Traditional Wood Carving: Paul N. Hasluck

Course Title: LABORATORY COURSE BASED ON THEORY		
Course Code: RTUCLA1	Credit:01	Marks:100

1. To study of type of wood
2. To study of tools used in wooden and bamboo art.
3. To study different species of bamboo.
4. Making of wooden and bamboo articles.

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

Learning outcomes

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

- Develop the knowledge about rural social structure and planning.
- Understand about panchayti raj system and other developmental policies and program.

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

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**

Learning outcomes

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

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

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**

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**

Learning outcomes

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

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

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**

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
4. V. S. of ovule.
5. Study of types of tissues: Temporary and Permanent.
6. Study of types of leaves, venation, vain islet number and stomata count.
7. 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

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

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

- Learn different types of cereals crops, oil plants, non alcoholic beverages trees, Bio fuels and fibers crops.
- Learn the production and economic importance of the crops

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

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. VI SEMESTER		
Course Title: INDIGENOUS ARTS AND CRAFTS		
Course Code: RTUDTA1	Credit: 04	Marks:100

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

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

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.

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: RTUDLA1	Credit:01	Marks:100

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..

Course Title: INTERNSHIP PROGRAMME (B.SC. IV) ONE MONTH PROGRAMME		
Course Code: RTUFFC5		Credit:06

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

Learning outcomes
On completion of this course, the students will be able to:
- Learn about basic concepts of surveying.
- Apply surveying for rural infrastructure development and land reforms.
- Enhance their surveying skills for job opportunity.

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

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

Learning outcome:
On completion of this course, the students will be able to:
- Learn about basic concept of construction engineering.
- Learn about the low cost sustainable technologies for infrastructure developments.
- Enhance low cost building construction skills for rural areas.

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

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

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

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

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

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

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

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

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

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
mal K. Gupta: Small Industry – Challenges and Perspectives

SYLLABUS as per LOCF B.Sc. V SEMESTER Course Title: LAC AND HONEY PRODCUTION		
Course Code: RTUETA3	Credit: 01	Marks:100

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

- Understand the lac life cycle and its various host
- Identify various species of Honey Bee
- Understand basics of Apiculture.

Biology of lac insect: Classification and morphology of lac insect, life cycle of lac insect, lac glands and their distribution, history of lac culture in India, states cover under lac production.

Introduction to lac culture: Important host plant species for lac cultivation, Lac cultivation technology, processing technique of raw lac, production of shellac and white lac, study of different types of lac, commercial and domestic use of lac, enemies of lac culture and control measures.

Biology of honey bees: Classification and geographical distribution of bee and their races, morphology of honey bee, bee casts, internal anatomy of honey bee, life cycle of honey bee, royal jelly, bee bread and wax, swarming, absconding and supercedure, social organization in honey bee, morphology of bee-hive, bee communication, diseases and pests of honey bee.

Introduction to Apiculture: Definition and scope of apiculture, artificial bee keeping (Apiary), collection techniques of honey from natural sites, physical and chemical properties of honey, Utilization of honey and wax in different commercial products.

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

1. Visit to poultry farms and report preparation.
2. Study of system of housing for poultry.
3. Identification of different host plants for lac cultivation.
4. Identification of different type of lac.
5. Study of equipments used in apiary.

Reference Books:

Chapman: The Insects: structure and function 94th ed, 1998, ELBS)
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)
Mcgavin: Essential Entomology 92001, Oxford Univ Press)
Srivastava: A textbook of applied entomology, vol.I & vol II (1993, Kalyani publishers)
The Insect. Ramesh Arora and G. S. Dariwal
The World of Honey Bee. A.S.Atwal
Bee Keeping for pleasure and profit. Muh. Naim.
Honeybee Disease and Management. D.P.Abrol.
Perspective In Indian Apiculture. R.C.Mishra

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Atlas of Indian Lac, Ajit Prasad Jain.
Lac cultivation in India. M.G.Kamath
A handbook of shellac Analysis. G.N.Bhattacharya and P.K.Bose.
Prayogic kenchua Khad Sandarshika- D. Singh
Earthworm-R.K. Bhatnager

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

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

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

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

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

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

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

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

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: NATURAL PRODUCT MANAGEMENT		
Course Code: RTUFTD1	Credit: 04	Marks:100

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

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

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.

Tannes and it uses – Wood tannes, bark tannes, fruit tannes and leaf tannes, Dyes-wood, bark, flower and fruit dyes, root dyes leaf dyes, animal dyes, uses of tannins and dyes in Rural industries,

Gums and Resins- true gumes, 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: RTUFLD1	Credit:01	Marks:100

1. Study of local Non timber forest products (NTFPs).
2. Preparation of dyes.
3. To study the source of Tannes, 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. VI SEMESTER Course Title: PROJECT WORK/DISSERTATION		
Course Code: RTUFDF6	Credit: 10	Marks:100

SYLLABUS as per LOCF B.Sc. VI SEMESTER Course Title: SEMINAR		
Course Code: RTUFSF4	Credit: 10	Marks:100

DEPARTMENT OF RURAL TECHNOLOGY & SOCIAL DEVELOPMENT,
GURU GHASIDAS VISHWAVIDALAYA
SEMESTER SCHEME
Master of Science of Rural Technology

M. Sc. I SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPATC-1	Concepts of Statistical Analysis	70	30	-	100
RTPALC-1	Laboratory Course (Based on RTPATC-1)	-	30	70	100
RTPATC-2	Innovation, Appraisal and action for Rural Development	70	30	-	100
RTPALC-2	Field based work/ Survey (Based on RTPATC-2)	-	30	70	100
RTPATG-1	Sericulture	70	30	-	100
RTPALG-1	Laboratory Course (Based on RTPATG-1)	-	30	70	100
	OR				
RTPATG-2	Lac production technique	70	30	-	100
RTPALG-2	Laboratory Course (Based on RTPAGT-2)	-	30	70	100
RTPATO-1	Natural Product and Processing Techniques	70	30	-	100
RTPALO-1	Laboratory Course (Based on RTPATO-1)		30	70	100
	Total	280	240	280	800

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M. Sc. II SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPBTC-1	Fundamentals of Medicinal Plant	70	30	-	100
RTPBLC-1	Laboratory Course (Based on RTPBTC-1)	-	30	70	100
RTPBTC-2	Concept of Remote Sensing and GIS-I	70	30	-	100
RTPBLC-2	Laboratory Course (Based on RTPBTC-2)	-	30	70	100
RTPBTA-1	Research Methodology and Ethics	30	20	-	50
RTPBTG-1	Rural Waste Management	70	30	-	100
RTPBPG-1	Laboratory Course (Based on RTPBTG-1)	-	30	70	100
	OR				
RTPBTG-2	Soil and Water Conservation Engineering	70	30	-	100
RTPBPG-2	Laboratory Course (Based on RTPBTG-2)	-	30	70	100
	Total	240	200	210	650

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M. Sc. III SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPCTC-1	Drug Formulation and Extraction	70	30	-	100
RTPCLC-1	Laboratory Course (Based on RTPCTC-1)	-	30	70	100
RTPCTC-2	Geospatial Technology and its Application	70	30	-	100
RTPCLC-2	Laboratory Course (Based on RTPCTC-2)	-	30	70	100
RTPCTG-1	Mushroom Cultivation Technology	70	30	-	100
RTPCLG-1	Laboratory Course (Based on RTPCTG-1)	-	30	70	100
	OR				
RTPCTG-2	Beekeeping Techniques	70	30	-	100
RTPCLG-2	Laboratory Course (Based on RTPCTG-2)	-	30	70	100
RTPCTA-1	Instrumentation and Techniques	70	30	-	100
RTPCLA-1	Laboratory Course (Based on RTPCTA-1)	-	30	70	100
	*University elective/ tour/ sport/ industrial training/ others				
RTPCSA-1	Seminar	-	20	30	50
	Total	280	260	310	850

M. Sc. IV SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RTPDTG-1	Computer application	70	30	-	100
	OR				
RTPDTG-2	Entrepreneurship	70	30	-	100
RTPDDC-1	Dissertation/ Project work followed by seminar	300	Viva-voce 100		400
					500

Dissertation must be compulsory for all students. Students will have liberty to complete his dissertation work either in the Department or any other Department or Institution. If student desires to complete his dissertation work outside the Department, he/she will have bear all expenses.

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Syllabus
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M.Sc. I SEMESTER		
Course Code: RTPATC1	**Credit-4**	**Marks: 100**
Course Title: CONCEPTS OF STATISTICAL ANALYSIS		

Learning outcomes
On completion of the course, the students will be able to:
- Understand concepts of statistics and its applications in various fields.
- Analyze the data and interpret it in logical manner.

Introduction, concept, meaning, definition and importance of statistics, concept of variables, data coding and decoding, classification (parametric and non parametric), tabulation, graphical and diagrammatic representation of numerical data.

Measurement of central tendency- mean, mode, median, dispersion- Mean deviation, Standard deviation.

Probability Concept, various definition of probability, Addition theorem of probability, Probability distributions (viz. Binomial, Poisson and normal) and their applications.

Coefficient of Variation, Skewness and Kurtosis, Correlation and Regression Analysis, Analysis of variance (ANOVA).

Sampling Methods- Statistical Test Hypothesis, Barrier test- z, t, F and Chi square distribution.

M.Sc. I SEMESTER		
Course Code: RTPALC1	**Credit-1**	**Marks: 100**
Course Title: Laboratory Course (Based on RTPALC1**)**		

1. Coding and decoding of data.
2. Problems based measurement of central tendency.
3. Problems based measurement of dispersion
4. Testing of hypothesis.
5. Analysis of variance (ANOVA).
6. To study the statistical software.
7. Graphical representation of numerical data

Reference Books
An Introduction to Statistical Methods - Gupta C.B.
Quantitative approach to managerial decision- Hien, L.W.
Statistics for Business & Economics, Lawrene B. Morse.
Statistics for Management, Levin, Richard I. and David S. Rubin.
Fundamentals of Statistics- D.N. Elhance, Veena Elhance and B. M. Aggrawal
Basic concept in statistics, K.S. Kushwaha

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M.Sc. I SEMESTER		
Course Code: RTPATC2	**Credit-4**	**Marks: 100**
Course Title: INNOVATION, APPRAISAL AND ACTION FOR RURAL DEVELOPMENT		

Learning outcomes
On completion of the course, the students will be able to:
- Learn about the characteristic of innovation and diffusion process among the social system.
- Conduct PRA, RRA and formulate the social planning.

Innovation- Definition, Characteristic of innovation, importance of innovation in day today life, Technology diffusion –Definition, innovation decision process and factors that affect diffusion process.

Adoption process – concept, stages in adoption process, rate of adoption, adopter categories, adopter's characteristics, factor that affect adoption process.

Communication– Definition, concepts and various models of communication, types of communication, barriers in communication. Transfer of Technology – Concept of Technology, Appropriate Technology- Definition and characteristics, different Models of technology transfer, barriers in Transfer of Technology.

PRA- Definition, Principles and Approaches of PRA, PRA Tools- Mapping, Types of mapping- social resource/ land use pattern map, enterprise map, transect walk, time line, change and trends, Matrix ranking, Mobility map, Venn diagram. RRA and PLA: Introduction, foundation, process, difference between RRA and PRA, Project appraisal.

Course Code RTPALC2	**Credit-1**	**Marks:100**
Field based course (Based on RTPATC2)		

Field based exercises:

1. Exercise based on PRA Approaches
2. To study communication models.
3. To study adoption process.

Reference Books

Gandhian Thought – J. B. Kripalani.
Challenging the Professions - Robert Chambers
Human Problems in Technological Change – E. E. Russel
Communication of Technological innovations- O.P. Dhama
Participatory rural appraisal in agricultural animal husbandory- Shagufta Jamal and H. P. S. Arya
Participatory rural appraisal and questionnaire survey-Neela Mukharjee
Participatory rural appraisal methodology and application-Neela Mukharjee
Participatory learning and action- Neela Mukharjee
Participatory rural appraisal methods and application in rural planning- Amitava Mukharjee

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M.Sc. I SEMESTER		
Course Code: RTPATG1	**Credit-4**	**Marks:100**
Course Title: SERICULTURE		

Learning outcomes
On completion of the course, the students will be able to:
- Understand scientific method of silk production technique and management.
- Aware various Government schemes / programs related to sericulture.

General sericulture: Definition, silk types, history and importance of sericulture, Geographical distribution of various species and economic races of silkworms, Government schemes / programs related to sericulture.

Basic biology of silk insect: Silkworm taxonomy based on mulberry and non-mullberry silk worms-Tasar, Eri and Munga, life cycle including moulting and metamorphosis, Diseases of silkworm, Pests of silkworm.

Host plant management: Host plants for sericulture and their propagation, effects of agro–climatic conditions on the growth of host plants with special reference to mulberry, Diseases of mulberry plant, Mulberry pest management.

Silkworm rearing: Mud house rearing, silkworm rearing (C.S.B. proposed model rearing house), Rearing appliances, disinfection, disinfectants, bed cleaning, feeding of worms, Maintaining optimum condition of rearing, brushing, frequency of spacing, care during moulting, Mounting and mountage, process of spinning, cocoon harvesting, Rearing method: chawki rearing or young age worm rearing, Late age silkworm rearing (according to 100 dfl).

Post cocoon technology and silk technology: method of cocoon testing and grading, cocoon stifling, storage of cocoon, deflossing, cocoon riddling, mixing or blending, cocoon cooking, brushing, Concept of difference reeling machines, reeling operation, reeling end formation, testing and grading of raw silk, Degumming, bleaching, dyeing of silk yarn, Twisting, Reeling, Re-reeling, lacing, skeining, weaving of silk.

M.Sc. I SEMESTER		
Course Code: RTPALG1	**Credit-1**	**Marks:100**
Course Title: Laboratory Course (Based on RTPATG-1)		

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.
9. Comparative study of good and defective cocoons.

Reference Books:

Sericulture introduction - Ganga, G.
Seri Mannual - FAO Mannual
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

M.Sc. I SEMESTER		
Course Code: RTPATG2	Credit-4	Marks: 100
Course Title: LAC PRODUCTION TECHNICQUE		

Learning outcomes

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

- Understand economic importance of lac insect and lac produces.
- Enhance their knowledge and technical skills to produce lac in various host plants.

Lac insect: meaning, concept and economic importance of lac cultivation. Classification and morphology and life cycle of lac insect, types of lac insect, history of lac cultivation, area and geographical distribution of lac insect, natural habitat of lac insect, types of lac and its characteristics.

Lac production in *Butea monosperma*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Ziziphus mauritiana*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni and kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Schleichera oleosa*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management winter and summer crops, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

Lac production in *Flemingia semialata*: Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of kusmi lac insect, propagation and nursery management, planting and nutrient management, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management winter and summer crops, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.

M.Sc. I SEMESTER		
Course Code: RTPALG2	Credit-I	Marks: 100
Course Title: Laboratory Course (Based on RTPAGT2)		

1. Identification and preparation of different host plants for lac cultivation.
2. Selection and inoculation of broodlac in host plant.
3. Removal of used-up broodlac sticks from host plants.
4. Processing of lac.
5. Lac crop protection.
6. Study of equipments used in lac cultivation.
7. Identification of lac insect and lac crops.

Reference Books:

Chapman: The Insects: structure and function 94th ed, 1998, ELBS)
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)
Mcgavin: Essential Entomology 92001, Oxford Univ Press)
Srivastava: A textbook of applied entomology, vol.I & vol II (1993, Kalyani publishers)
The Insect. Ramesh Arora and G. S. Dariwal
Atlas of Indian Lac, Ajit Prasad Jain.
Lac cultivation in India. M.G.Kamath
A handbook of shellac Analysis. G.N.Bhattacharya and P.K.Bose.

M.Sc. I SEMESTER		
Course Code: RTPATO1	Credit-4	Marks: 100
Course Title: NATURAL PRODUCT AND PROCESSING TECHNIQUES		

Learning outcomes

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

- Understand different types of natural products and its importance.
- Learn processing of important natural products.

Natural products: Introduction, plants as a source of various products, types of natural products, natural products and tribal connection, dependence of tribes on forest, various method of collection, storage and marketing of natural products, .

Fibre: Introduction, classification of fibres, plant origin fibres, types, study of cotton, flax and jute fibre, various fibre industries and economic importance.

Gum and Resin: Introduction, classification, physical and chemical composition, plant origin gum and resins, collection techniques, processing and economic importance.

Dye: Sources, types of dyes, chemical nature, characteristics of natural dyes, preparation of natural dyes, extraction of dye, processing and uses.

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Course Code: RTPALO1	Credit-1	Marks 100
Laboratory course (Based on RTPATO1)		

Laboratory exercises:

1. Identification of fibre producing plants.
2. Study of fibre processing techniques.
3. Identification of gum producing plants & characteristics.
4. Tapping & collection of gums from various plant sources.
5. Study of various types of resin & their sources
6. Identification of dye producing plants.
7. Study on dye preparation techniques.
8. Microscopic study of fibres.
9. Preparation of herbaria.

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

Master of Science of Rural Technology
Second Semester

M.Sc. II SEMESTER		
Course Code: RTPBTC1	Credit-4	Marks: 100
Course Title: FUNDAMENTALS OF MEDICINAL PLANTS		

Learning outcomes

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

- Understand medicinal important of secondary metabolites of plants.
- Learn the Government policies and marketing potential of crude drugs.

Methods of plant classification, Taxonomic keys, Herbarium, Taxonomic study of important plant families of Chhattisgarh with special reference to family Asclepiadaceae, Apiaceae, Chenopodiaceae, Euphorbiaceae, Combretaceae, Liliaceae.

Medicinal plant found in Chhattisgarh: General aspects and Medicinal values of– *Aegle marmeloes, Cinnamomum sps., Gloriosa superba, Ipomoea nil, Mucuna pruriens, Piper nigrum, Vitex nigundo.*

Alkaloids: Properties, isolation and extraction, classification and alkaloid containing drug; Terpenes and Terpenoids: Properties, Isolation, classification and drugs containing terpenes and terpenoids.

Tannins: Properties, isolation and extraction, classification and tannin containing drugs. Marine drug: Properties, classification uses; Mineral drug: Sources, constituents and uses.

Legislation and policy of medicinal plants: National and State Medicinal Plant Board, Conservation of medicinal plants, Market potential of crude drugs, Goals of national policy, Future action plans.

Reference Books

Medicinal plants of India Vol 1 & 2 ICAR – Kirtikar & Basu.
Compendium of Indian Medicinal plants Vol 1-4 – R. P. Rastogi & B.N. Mahrotra.
Indigenous medicinal specialties - U.S. Narayan Rao.
Useful plant of Neotropical origin – Heing Brucher.
Cultivation and utilization of Aromatic plants - C.K. Atal and B.M. Kapoor.
Cultivation and utilization of medicinal plants - C.K. Atal and B.M. Kapoor.
Plant Taxonomy- O.P. Sharma
Essential of Plant Taxonomy and Ecology-M.P. Singh and S.G. Abbas

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RTPBLC1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBTC1)		

1. Study of locally available plants of families Asclepiadaceae, Apiaceae, Chenopodiaceae, Euphorbiaceae, Combretaceae, Liliaceae.
2. To study extraction process, chemical test to identify Alkaloids
3. To study extraction process, chemical test to identify Terpenes and Terpenoids.
4. To study extraction process, chemical test to identify Tennins.
5. To study source of mineral drugs and their uses.

M.Sc. II SEMESTER		
Course Code: RTPBTC2	Credit-4	Marks: 100
Course Title: CONCEPTS OF REMOTE SENSING AND GIS-I		

Learning outcomes

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

- Understand the concept and application of remote sensing and GIS software.
- Learn the basic of satellite images and toposheets.

Concepts of Remote Sensing with introduction, Early History, Energy Sources & Radiation Principles, Energy Interactions in atmosphere, Energy interactions with earth surface features, Spectral Reflectance of vegetation, Soil & water.

Satellite: Indian satellite, Earth Resource satellite, Ocean satellite, Resource-sat satellite, Carto-sat satellite etc. and their uses.

Photogrammetry-Introduction, Types of Aerial Photographs including UAV, Basic principles of Photogrammetry, Geometry of a vertical aerial photograph, photographic Scale, Applications of vertical aerial photograph. Thematic Cartography: Commitments, concern and solution. Influence of thematic Atlases, Influences of distant cartography, and Innovative trends in mapping.

Digital Image Processing (DIP)-Introduction, Pre-processing of image-Image interpretation, Geometric & Radiometric Correction, Resolution, Image Enhancement, Contrast Stretching, Filters, Edge Enhancement.

Microwave Remote Sensing-Introduction, sensors, instruments, radar operating principles, synthetic aperture RADAR, radar returns and image signatures, radar image characteristics, basics of LIDAR.

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Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RTPBLC2	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBTC2)		

1. Geometric and radiometric correction of satellite data, Image enhancement techniques, Principal component analysis,
2. Supervised classification, Supervised classification schemes (Maximum likelihood, nearest neighbor and artificial numeral net-work classification), Vegetation indices.
3. Creation of digital evaluation model through contour digitization and surface hydrology.
4. Digitization of different features of given topo-sheet. Editing attributes of geo-database features. Creating different features like polygon line, tic, polyline etc.
5. Creation of personal geo-database.

Reference Books

Remote Sensing – Principles & interpretation - F.F. Sabins
Digital Remote Sensing - Dr. P. Nag, Dr. M. Kudrat
Principles of Remote Sensing - P.J. Curran.
Basics of Remote Sensing – S. Joseph
Basics of remote sensing and photogrammetry – Lillisand

M.Sc. II SEMESTER		
Course Code: RTPBTA1	Credit-2	Marks: 50
Course Title: RESEARCH METHODOLOGY AND ETHICS		

Learning outcomes

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

- Understand the nature, types and importance of research methodology and ethics.
- Apply research methodology procedures according to their nature of research.

Research, types of research, Nature, scope of research and importance of research methodology, steps of scientific inquiry and study of social phenomenon, research problems, criteria for identification of research problems, formulations and statement of research objectives.

Hypothesis- Meaning and role in research, type of hypothesis, testing of hypothesis, method of data collection, level of measurement, data sources; observational and survey methods, case studies, types of schedule, questionnaires.

Research design- Exploratory, descriptive, and experimental research design, qualitative and quantitative research. Complete Randomized Block Design (CRD), Randomized Block Design (RBD), Latin Squares Design (LSD) and factorial design.

Research reporting and scientific writing- Preparation of research proposal, compilation of thesis, dissertation, compiling bibliography, reports, compilation of research paper, paper presentation, research ethics.

Reference Books

Survey Method
Exploring research
Guide to the successful thesis and dissertation V^th Edition
Fundamentals of Statistics

M.Sc. II SEMESTER		
Course Code: RTPBTG1	Credit-4	Marks: 100
Course Title: RURAL WASTE MANAGEMENT		

Learning outcomes

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

- Aware about sanitation and waste water management.
- Adopt different methods of waste management.

Introduction of Rural waste, Type of waste, different methods of systematic collection and disposal of waste, Types of sewer.

Concept of sewage treatment, principle of primary, secondary treatment and Tertiary treatment of wastewater, General composition of sewage, method of determination of B.O.D. and C.O.D.

Rural Sanitation- Provision of safe and potable water for domestic purposes, collection and disposal of dry refuse, collection and disposal of sullage, disposal of excretal waste, night soil disposal without water carriage, Construction of low cost latrines in rural areas- Septic tanks, soak pit, privy pit and bore hole privy, can privy, concrete vault privy, aqua privy, PRAI latrine.

Waste water management- performance criteria for waste water management system, house drainage plan, classification of traps- P-trap, Q-trap, S trap, floor trap, gully trap, intercepting trap, grease trap, principle for efficient drainage system.

Solid waste management- classification of solid waste, quantity and composition of refuse, collection and removal of refuse, transport of refuse, disposal of refuse- controlled tipping, landfill, trenching, dumping into sea, pulverization, incineration; composting- composting by trenching, open window composting, mechanical composting, composting adopted in India, Biogas technology-properties of biogas, types of biogas plant recognized by MNES (Ministry of Non-conventional Energy Sources).

M.Sc. II SEMESTER		
Course Code: RTPBPG1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPBTG1)		

1) To study types of waste material.
2) To study the physical treatment of waste water.
3) To study the biological treatment of waste water.
4) To study the chemical treatment of waste water.
5) Visit to sewage treatment plants.
6) To study biogas technology of solid waste management.
7) To study landfill method of solid waste management.
8) To study various model of privy.
9) To study biogas technology as solid waste management.

Reference Books

Rangwala S.C, Water Supply & Sanitary Engineering, Charotar Publishing House (P) Ltd., Anand.
Gurcharan Singh, Water Supply & Sanitary Engineering, Standard Publishers Distributors, Delhi.
Garg, S.K., Water Supply Engineering, Khanna Publishers, Delhi.
Gupta, D.V. Water Supply & Sanitary Engineering, Asian Publishers, Muzaffarnagar
Modi, P.N. Water Supply Engineering, Standard Book House, Delhi

M.Sc. II SEMESTER		
Course Code: RTPBTG2	Credit-4	Marks: 100
Course Title: SOIL AND WATER CONSERVATION ENGINEERING		

Learning outcomes

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

- Understand the soil formation, soil profile, soil structure and different type of soil nutrients.
- Understand the basic concept of soil water conservation and watershed management.

Soil- Definition, Soil as a three phase system, Soil-Plant-Water relationship, soil moisture content, soil profile, density, void ratio, porosity, soil texture, soil structure and degree of saturation.

Basic concept of soil erosion, control of soil erosion, soil loss estimation, concept of runoff and its estimation, water budgeting, estimation of rainfall erosivity and erodibility.

Planning, design, construction and maintenance of water harvesting structure, soil and water conservation structure, GIS application in Planning, designing, construction and maintenance of water harvesting structure.

Watershed management concept- objectives, characterization, type of watershed, planning, execution, integrated community participation and evaluation, GIS application in watershed management.

Irrigation- Definition, Types of irrigation, Source of irrigation water. Irrigation methods and efficiencies, Drainage - Definition, surface and sub-surface drainage, factors influencing drainage.

Course Code: RTPBTG2	Credit-1	Marks100
Laboratory course (Based on RTPBTG2)		

Laboratory exercises:
1. Study of different water harvesting structure.
2. Study of GIS Application in watershed management
3. Study of different components of sprinkler and drip irrigation system
4. Study of continuous and staggered contour trenches
5. Study of different components of farm pond
6. Water budgeting.

Reference Books

Introduction to soil and water conservation engineering, Mal, B C, Kalyani publishers
Irrigation Engineering-Agarwal G.D., B. Bharti Prakashan, Merrut.
Irrigation Engineering, -Modi P.N., Standard Book House, Delhi.
Irrigation Engineering- Dr. Bharat Singh, Nem Chand & Bros., Roorkee
Introductory Soil Science, Dilip Kumar Das, Kalyani Publishers.
Soil and water conservation engineering, R. Suresh
Irrigation: Theory and practices, A.M. Michael

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Semester-wise syllabus for PG Course

Master of Science of Rural Technology
Third Semester

M.Sc. III SEMESTER		
Course Code: RTPCTC1	Credit-4	Marks: 100
Course Title: DRUG FORMULATION AND EXTRACTION		

Learning outcomes

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

- Understand the constitution of drug and drug delivery system.
- Learn drug formulation and extraction phenomenon.

Introduction to Dosage forms- Desirable properties, classification and application of dosage forms, New drug delivery system.

Principles and methods of extraction, theory of drug extraction, Hydro-distillation, expression, quality assurance of essential oils maceration, digestion, percolation, soxhelation, super critical fluid extraction, other extraction methods.

Aromatic Plants- History, Revenue potential, industrial significance, medicinal uses; cultivation and management of aromatic plants – Camphor, Citronella, Eucalyptus, Lavender, Lemongrass, Mints, Palmarosa, Sandalwood.

Analytical pharmacognocy- Drug adulteration, Drug evaluation- morphological, microscopic, chemical. Phytochemical investigation, physical, biological evaluation, hepatoprotective activity, hypoglycemic activity, antifertility testing.

Drug formulation- Pharmacopoeial preparations, principles and methods of preparation of aromatic waters, spirits, elixirs, syrups, tincture solution and special preparation of mouthwashes.

M.Sc. III SEMESTER		
Course Code: RTPCLC1	Credit-1	Marks: 100
Course Title: Laboratory Course (Based on RTPCTC1)		

1. Study of traditional plant and their part used as folklore medicine.
2. Extraction and distillation of Eucalyptus, Lemongrass, Mints, Sandalwood.
3. Extraction of volatile oil, Extraction of tannin.
4. Formation of Aromatic water, spirits, tinctures.
5. Extraction of Alkaloids, Chemical test for tannin, alkaloid, maceration, percolation.
6. Extraction of medicinal plants by Soxhlet method, Distillation method.
7. Drug formulation- Antimicrobial activity of medicinal plant.

Reference Books

Medicinal plants of India Vol 1 & 2 ICAR by Kirtikar & Basu .
Indigenous medicinal specialties: U.S. Narayan Rao
Useful plant of Neotropical origin: Heing Brucher
Cultivation and utilization of Aromatic plants: C.K. Atal and B.M. Kapoor

Pharmacognocy - Trease & Evans.
Pharmacognocy- Gokhale, kokate & Purohit
Cultivation and Utilization of Aromatic plants - L.K. Atal& B.M. Kapoor.
Professional Pharmacy - Jain & Sharma.
Aromatic Plants- Baby S. Skaria, P.P. Joy, G. Mathew, A. Joseph and R. Joseph
Medicinal Plants- A.Kurian and M.A. Sankar
Medicinal Plants ethnobotanical Approach- P.C. Trivedi
Aromatic Plants- Baby S. Skaria, P.P. Joy, G. Mathew, A. Joseph and R. Joseph
Compendium of Indian Medicinal plants Vol 1-4 R.P. Rastogi& B.N. Mahrotra.

M.Sc. III SEMESTER		
Course Code: RTPCTC2	**Credit-4**	**Marks: 100**
Course Title: GEOSPATIAL TECHNOLOGY AND ITS APPLICATION		

Learning outcomes

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

- Understand the basic concept of GPS and GIS.
- Learn the data base management system and application.

Basics of GIS: Definition, components of GIS, DBMS: data base approach, advantage and disadvantage, data model – classic data model, hierarchical data model, network and relational data models, various interpolation techniques.

Types of data structure, raster and vector format, image data format – BSQ, BIL, BIP, advantage and disadvantage of various data structure, data input – digitization and scanning method, web GIS, map projection, elements of map, introduction to GPS and DGPS its application.

Application of remote sensing and GIS – Mapping and monitoring of land use land cover, forest resource management, principal and approaches of crop production forecasting, soil classification, surface hydrology analysis.

Urban and rural area planning – urban and rural area sprawl and change detection studies, population estimation, site suitability analysis for – settlement, transportation irrigation system, storage and other facilities.

M.Sc. III SEMESTER		
Course Code: RTPCLC2	**Credit-1**	**Marks: 100**
Course Title: Laboratory Course (Based on RTPCTC2)		

1. Practice based on ArcGIS and QGIS
2. To generate various Indices map – NDVI, NDWI, NDBI, SAVI
3. Data Collection and Interpolation methods for map layout.

4. Surface analysis.
5. Layout preparation.
6. Creation of personal and geo-data base.

Reference Books

Remote Sensing – Principles & interpretation - F.F. Sabins
Digital Remote Sensing - Dr. P. Nag, Dr. M. Kudrat
Principles of Remote Sensing - P.J. Curran.

M.Sc. III SEMESTER Elective (PG)		
Course Code: RTPCTG1	**Credit-4**	**Marks: 100**
Course Title: MUSHROOM CUTIVATION TECHNOLOGY		

Learning outcomes

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

- Understand the importance of Single Cell Protein.
- Learn the commercial production of mushroom and its marketing potential.

Introduction, General characteristics of Mushroom, history of mushroom cultivation; biology of mushrooms; Identification of mushroom, Nutritional and Medicinal value of mushrooms; Poisonous mushrooms and its poisoning; edible mushrooms and its cultivation in India and world.

Cultivation technology, infrastructure, equipments and substrates in mushroom cultivation, mushroom unit or mushroom house, pure culture, Spawn, preparation of spawn, raw materials for the cultivation of mushroom, Compost: materials used for compost preparation, compost technology in mushroom production; Casing; raw material used for casing, preparation of casing material.

Cultivation of important mushrooms: General process for the cultivation of *Agaricus bisporus*, *Pleurotus ostreatus*, *Calocybe indica*, *Volvariella volvaceae* and *Ganoderma lucidum*, Pests and Pathogens of mushrooms and their management.

Storage and food preparation from mushrooms: Methods of storage of mushroom, Long term and short term storage of mushrooms, Foods/recipes from mushrooms; Mushroom research centers/farms: National level and regional level, Marketing of mushrooms in India and world.

Course Code: RTPCLG1	**Credit-1**	**Marks:100**
Laboratory course (Based on RTPCTG1**)**		

Laboratory Exercises

1. Morphology and identification of local mushroom and preserved specimen of mushroom.
2. Sterilization of glassware, equipments, and culture media used in mushroom cultivation.

3. Preparation of culture media and mother culture.
4. Preparation of spawn: Grain spawn, Straw spawn, Sawdust spawn.
5. Preparation of compost and known compost formulations.
6. Cultivation procedure for *Agaricus bisporus.*
7. Cultivation procedure for *Pleorotus ostreatus.*
8. Criss-cross bed and out-door method for cultivation of *Volvariella volvaceae.*
9. Cultivation procedure for *Ganoderma lucidum.*
10. Cultivation procedure for *Calocybe indica.*
11. Storage and preservation of mushroom.

Reference Books:

The Mushroom Identifier- David Pegler & B. Sproner.
Mushroom Cultivation- B.Tripathi & H.P.Shukla
Mushroom Growing- S.C.Day
A handbook of Mushroom- Neeta Bhale

M.Sc. III SEMESTER		
Course Code: RTPCTG2	**Credit-4**	**Marks:100**
Course Title: BEEKEEPING TECHNIQUES		

Learning outcomes

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

- Understand economic importance and ecological benefits of beekeeping.
- Enhance their knowledge and technical skills on beekeeping.

Introduction: Introduction to beekeeping, beekeeping in India, benefits of beekeeping, honey bee products, potential market of bee products, nature of work, the world of honey bees: honey bee species of economic importance, bee biology, castes of bees, stages of development in honey bees, sex differential in honey bees, bee food plants, communication among bees.

Beekeeping equipments: Fixed comb hives, movable-comb hives, movable-frame hives, specifications of beehives-Langstroth ten-frame hive; Newton's bee hive; advantages of rearing bees in modern beehives, other beekeeping equipments- hive stand, smoker, protective equipments, comb foundation sheet, dummy division board/movable wall, porter bee escape board, drone excluder or drone trap, swarm trap, pollen trap, division board / sugar feeder and various hive tools.

Site selection and management: Selection of site, starting a colony, establishment of a beehive-capturing a swarm of bees, purchase a packaged bee colony, using nucleus; division of colony, inspecting the bee colony, safety measures; apiary management- colony inspection, cleaning in beehive, feeding bees with sugar syrup, addition of artificial comb foundation sheets, bee swarming and its management- control of swarming, collecting swarms; uniting bee colonies (newspaper method), crop management for beekeeping, extraction of honey; Seasonal management, precautions while handling the bees, beekeeping records, management of bee colonies for pollination, advantages of bee pollination.

Rearing and protection management: Bee breeding and queen rearing- bee breeding, rearing of queen bees, types of queen rearing, biological basis of queen rearing, selection of mother stock, production of better quality queens, methods of queen rearing- Alley's method, Miller's

method, grafting method (Doolittle method); queen rearing time table, queen cell builders, instrumental insemination, equipments, scope, benefits of bee breeding, migration of bee colonies, migratory beekeeping problems, various pests and diseases of honey bees and their management.

Harvesting, processing and marketing of bee products: Collection of nector and honey, harvesting of honey, composition of fully ripened honey, physical properties of honey, grading of honey, packaging and labelling, uses of honey, storage, honey standards, Indian honey regulations, bee wax- composition and property, processing, uses of bee wax; bee venom- properties, production, uses; propolis- propolis collection technology, properties and uses; royal jelly- properties, production and uses; pollen- composition, pollen collecting technology; marketing of bee products, constraints in honey production, government schemes and policies related to beekeeping.

M.Sc. III SEMESTER		
Course Code: RTPCLG2	**Credit-1**	**Marks:100**
Course Title: Laboratory Course (Based on RTPCTG2)		

1. Identification of honey bee.
2. Study of equipments used in bee keeping.
3. Study of methods of queen rearing techniques.
4. Study of extraction and processing of honey.
5. Microscopy of different pollens.
6. Study of different diseased condition of honey bees.
7. Identification of pests of honey bees.
8. Study of honey quality.

Reference Books:

Chapman: The Insects: structure and function 94th ed, 1998, ELBS)
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)
Mcgavin: Essential Entomology 92001, Oxford Univ Press)
Srivastava: A textbook of applied entomology, vol.I & vol II (1993, Kalyani publishers)
The Insect. Ramesh Arora and G. S. Dariwal
The World of Honey Bee. A.S.Atwal
Bee Keeping for pleasure and profit. Moh. Naim.
Honeybee Disease and Management. D.P.Abrol.
Perspective In Indian Apiculture. R.C.Mishra

M.Sc. III SEMESTER		
Course Code: RTPCTA1	Credit-4	Marks: 100
Course Title: INSTRUMENTATION AND TECHNIQUES		

Learning outcomes

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

- Understand principle and functioning of various instruments generally used in drug evaluations.
- Enhance their technical skills on slide preparation.

Principle, structure, functioning and applications. Type of microscopy- Light microscopy, Phase contrast microscopy, Fluorescence microscopy, Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM).

Electrophoresis- Principle of electrophoresis, types of electrophoresis, factors affecting migration, staining in gel electrophoresis, application of electrophoresis.

Centrifugation- Principle of centrifugation, Types of centrifuge, Types of rotors, Caring of rotors, Determination of centrifugal force, Sedimentation of cellular organs.

Spectrophotometry- Principle, Functioning and application of colorimetry, UV-Vis spectrophotometry, fluorimetry and atomic absorption spectrophotometry.

Microtomy and Histology- Handling of tissues for pathological studies, Rotary microtome and its working, Fixation and Staining, Histological localization and its significance.

Course Code RTPCLA1	Credit-1	Marks 100
Laboratory course (Based on RTPCTA1)		

Laboratory exercises:

1. Microscopic observations of Biological materials.
2. Separation of biological material using Centrifuge, paper chromatography and electrophoresis.
3. Biochemical analysis of samples using spectrophotometer.
4. Microtomy and preparation of permanent mounts.

Reference Books

Techniques in Microscopy and Cell Biology- VK Sharma
Stereo, Image processing and Quantitative Image Analysis in Biochemical Research- Shashi Wadhawa and Amit Dinda
Introduction to Eelectron Microscopy III[rd] Ed.-Soul Wischnitzer.
An introduction to Electrophoresis- K Anbalgan
Electrophoresis- Smith.

Instrumental Method of Chemical Analysis- BK Sharma
Principles and Techniques of Practical Biochemistry- Keith Wilson and John Walker
Laboratory Techniques- Swaroop and Pathak.
Instrumental Analysis for Science and Technology-W Faren
Instrumental Method of Analysis- Willard Merritt, Dean and Settle

M.Sc. III SEMESTER		
Course Code: RTPCSA1	Credit-1	Marks: 50
Course Title: SEMINAR		

M.Sc. IV SEMESTER		
Course Code: RTPDTG1	Credit-4	Marks: 100
Course Title: COMPUTER APPLICATION		

Learning outcomes

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

- Learn basics of Hardware and Software.
- Use the computer to prepare various documents.

Elementary knowledge of Computer, Characteristic of computers, Classification of Computers, functions and application, Limitations of computers.

Types of computers, Types of Processors, Input and Output Devices, Memory, volatile and non volatile and catch memory

Hardware and its component, software, network and network topology, Mesh network, star network, ring network, bus network.

Application- MS office: Creating, Editing and saving files; Use of inbuilt Statistical and other functions, Internet, email, video conferencing, e-learning, Edusat, power point presentation.

Computer Applications for Rural Development, constraints, Role of computer education in Rural Development.

Reference Books:

Computer organization and design-Pal Chaudhuri
Fundamental of Computors-4th Edition Raja Raman
Fundamental of Graphics and multimedia-Mukharjee
Programming in Basic-3rd edition Bala Guru samy
A Rural Computer consulting Business : John. D. Deans

M.Sc. IV SEMESTER		
Course Code: RTPDTG2	Credit-4	Marks: 100
Course Title: ENTREPRENEURSHIP		

Learning outcomes

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

- Understand entrepreneurship and qualities of an entrepreneur.
- Start SSI/ cottage industries along with the various sources of financial support.

Entrepreneurship- Meaning, Definition, Factors stimulating Entrepreneurship, Phases of Entrepreneurship Development, factors affecting Entrepreneurship growth, Entrepreneurial behavior. International Entrepreneurship- meaning, Difference between domestic and International Business.

Entrepreneurship Development in India- History, Entrepreneurship development Programme, Importance of Entrepreneurship Development, Object of EDP, Phases of EDP, Problems.

Women Entrepreneurship-Concept, Factors Influencing of Women Entrepreneurship, Male vs. Women Entrepreneurs, Problems of Women Entrepreneurs, Remedial Measures, Scope and Opportunities for Women Entrepreneurs.

Starting a MSME- Business idea, Preparation of Preliminary Project Report, Detailed Project Report, Location, Apply for Registration, Apply for loan, Apply for subsidy, place order for Machinery, Arrangement of Power, Insurance, Government Clearance, Procurement of Raw Material.

Start Ups- Introduction, Start- up Initiatives by Government, Mentors, Accelerators, Incubators, Sources of Finance for start- ups, Failure, Strategies for Success, Start- Up- Innovation in India. Forms for ownership Sole Proprietorship, partnership, co-operative organization.

Reference Books:

M.B. Shukla : Entrepreneurship and Small Business Management, Kitab Mahal
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
Nirmal K. Gupta: Small Industry – Challenges and Perspectives

M. Sc. IV SEMESTER

Subject Code: RTPDDC1	Credit-15	Marks: 400 (Thesis Evaluation 300+ Viva-voce 100)
Dissertation		

Dissertation must be compulsory for all students. Students will have liberty to complete his/her dissertation work either in the Department or any other Department or Institution. If student desires to complete his/her dissertation work outside the Department, he/she will have bear all expenses.