

## Minutes of Meetings (MoM) of Board of Studies (BoS)

**Academic Year : 2016-17**

**School : School of Natural Resources**

**Department : Rural Technology and Social Development**

**Date and Time : April 12, 2016 - 11:30 AM**

**Venue : Seminar hall**

**गुरु घासीदास विश्वविद्यालय**  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 का 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
**कोनी, बिलासपुर - 495009 (छ.ग.)**



**Guru Ghasidas Vishwavidyalaya**  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
**Koni, Bilaspur - 495009 (C.G.)**



**Department of Rural Technology and Social Development**  
**GURU GHASIDAS VISHWAVIDYALAYA**  
**Koni- BILASPUR 495009 (Chhattisgarh)**  
(A Central University established under No 25 of Central Universities Act, 2009)

### **Minutes of the Meeting of Board of Studies held on 12-04-2016**

A meeting of Board of Studies (BOS) of the Department of Rural Technology and Social Development had been held on 12-04-2016 with following members to discuss, review and modify the syllabus for the degrees of B.Sc. M.Sc. and Ph.D. programs in Rural Technology.

- I. Dr. R Mehta (Chairman)
- II. Prof Karuna Verma (External Expert)
- III. Dr. P. R. Singh (Member)
- IV. Dr. S. K. Nirala (Member)
- V. Dr. D. K. Patel (Member)
- VI. Dr. Alka Mishra (Member)
- VII. Dr. Dilip Kumar (Member)

The Chairman of BOS welcomed the BOS members and following resolutions were passed:

1. After due discussion with all the members of the BOS, the syllabus had been modified and prepared to run the course under choice based credit system (CBCS) implemented from B.Sc.-I Sem of session 2015-16 as per the instructions obtained from Guru Ghasidas Vishwavidyalaya and UGC.
2. The C.B.C.S. based syllabus for Integrated UG/PG B.Sc. III and IV semester is approved by the BOS for session 2016-17 and onward.
3. Minor changes / improvements in spelling errors in few papers have been done without changing their main theme.
4. In M.Sc. IV semester, course code 1002, title of paper was changed as **RS and GIS Applications in Natural Resource Management and Planning** in place of "GIS Applications in Natural Resource Management and Planning"
5. In Pre PhD course, Title of RT 202 course title was corrected as Rural Technology-II in place of Rural Technology-III.

Meeting ended with vote of thanks by BOS Chairman.

Prof Karuna Verma

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12.4.16

Dr. S. K. Nirala

*SN*  
12.4.16

Dr. Alka Mishra

Dr. P. R. Singh

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12.04.16

Dr. D K Patel

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Mr. Dilip Kumar

*DK*  
12.4.16

**The Board of Study of Rural Technology also decided to introduced the following new courses in the session 2017-18**

**List of New Course(s) Introduced**

**Department : Rural Technology and Social Development**

**Academic year: 2017-18**

***List of New Course(s) Introduced***

**B. Sc. Rural Technology**

FE-301	Environmental Studies-I
RT-302	Poultry Production Techniques
RT-303	Lac, Vermi and Apiculture Techniques
RT-304	Laboratory Course (RT-302+303)
RT-305	Mushroom Production Techniques
RT-306	Sericulture
RT-307	Laboratory Course (RT-305+306)
RT-308	Morphology and Anatomy of Phanaerogames
RT-309	Plant Physiology and Biochemistry
RT-310	Laboratory Course (RT-308+309)
RT-501	Introduction to Remote Sensing
RT-502	Laboratory Course (Based on RT-501)
RT-503	Introduction to Medicinal Plants
RT-504	Laboratory Course (Based on RT-503)
RT-505	Agricultural Equipments and Crop Production
RT-506	Introduction to Horticulture
RT-507	Laboratory Course (Based on RT-505 + 506)
RT-E-508	Computer and its Application for Rural Development
RT-E-509	Rural Energy Resources
RT-E-510	Entrepreneurship and Small Business Management
RT-601	Sensor and Digital image processing in Remote Sensing
RT-602	Laboratory Course (Based on RT-601)
RT-603	Ethnobotany and Indigenous Medicament
RT-604	Laboratory Course (Based on RT-603)
RT-605	Rural Infrastructure Engineering
RT-606	Watershed Management
RT-607	Laboratory Course (Based on RT-605+606)
RT-E-608	Rural Health Care
RT-E-609	Wooden Art
RT-E-610	Dhokra Art

**M. Sc. Rural Technology**

RT-901	Extraction and Analysis of Medicinal Plants
RT-902	Laboratory Course (Based on RT- 901)
RT-903	Remote Sensing and GIS Application

RT-904	Laboratory Course (Based on RT-903)
RT-905	Soil and Water Conservation Engineering
RT-E-906	Innovation in Indigenous Arts and Crafts
RT-E-907	Laboratory Course (Based on RT-906)
RT-E-908	Production Techniques of Natural Products
RT-E-909	Laboratory Course (Based on RT-908)
RT-1001	Drug Formulation and Evaluation
RT-1002	RS and GIS Applications in Natural Resource Management and Planning

**Ph. D. Rural Technology**

RT- 2001	Rural Technology-I
RT- 2002	Rural Technology-II
RT- 2003	Research Methodology

  
**HEAD**  
Department of Rural Technology  
& Social Development  
Guru Ghasidas Vishwavidyalaya  
Bilaspur (C.G.) 495009

**B. Sc. III SEMESTER**

Subject Code	Course	Type of Course	Credit Distribution		Credits	Marks Distribution			Marks
			Lecture (L)	Practical (P)		Theory	Sessional	Practical	
Third Semester: 21 Credits (Core Course- 11 Credits)									
FE-301	Environmental Studies-I	CC	1	-	1	30	20	-	50
RT-302	Protein Production Techniques	CC	2	-	2	30	20	-	50
RT-303	Lab. Yeast and Apiculture Techniques	CC	1	-	1	30	20	-	50
RT-304	Laboratory Course (RT-302+303)	CC	-	2	2	-	20	30	50
RT-305	Microbes Production Techniques	CC	2	-	2	30	20	-	50
RT-306	Sensitization	CC	2	-	2	30	20	-	50
RT-307	Laboratory Course (RT-305+306)	CC	-	2	2	-	20	30	50
RT-308	Morphology and Anatomy of Phasmatoptera	CC	1	-	1	30	20	-	50
RT-309	Plant Physiology and Biochemistry	CC	1	-	1	30	20	-	50
RT-310	Laboratory Course (RT-308+309)	CC	-	2	2	-	20	30	50
Total			15	06	21	210	200	90	500

CC= Core Course

**B. Sc. IV SEMESTER**

Subject Code	Course	Type of Course	Credit Distribution		Credits	Marks Distribution			Marks
			Lecture (L)	Practical (P)		Theory	Sessional	Practical	
Fourth Semester: 21 Credits (Core Course- 11 Credits)									
FE-401	Environmental Studies-II	CC	1	-	1	30	20	-	50
RT-402	Land Surveying, Levelling and Drawing Techniques	CC	2	-	2	30	20	-	50
RT-403	Building Construction Materials	CC	2	-	2	30	20	-	50
RT-404	Laboratory Course (RT-402+403)	CC	-	2	2	-	20	30	50
RT-405	Agricultural Microbiology	CC	2	-	2	30	20	-	50
RT-406	Apiculture	CC	2	-	2	30	20	-	50
RT-407	Laboratory Course (RT-405+406)	CC	-	2	2	-	20	30	50
RT-408	Economic Botany	CC	2	-	2	30	20	-	50
RT-409	Nursery Management Techniques	CC	2	-	2	30	20	-	50
RT-410	Laboratory Course (RT-408+409)	CC	-	2	2	-	20	30	50
Total			15	06	21	210	200	90	500

CC= Core Course

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**B. Sc. V SEMESTER**

Subject Code	Course	Type of Course	Credit Distribution		Credits	Marks Distribution			Marks
			Lecture (L)	Practical (P)		Theory	Sessional	Practical	
V Semester: 14 Credits (Core Course- 14 Credits)									
RT-501	Introduction to Remote Sensing	CC	1	-	1	30	20	-	50
RT-502	Laboratory Course (Based on RT-501)	CC	-	1	1	-	20	30	50
RT-503	Introduction to Molecular Plant	CC	3	-	3	30	20	-	50
RT-504	Laboratory Course (Based on RT-503)	CC	-	3	3	-	20	30	50
RT-505	Agricultural Equipments and Crop Production	CC	3	-	3	30	20	-	50
RT-506	Introduction to Horticulture	CC	2	-	2	30	20	-	50
RT-507	Laboratory Course (Based on RT-505+506)	CC	-	2	2	-	20	30	50
RT-508	Computers and its Application for Rural Development	EC	2	-	2	30	20	-	50
RT-509	Rural Energy Resources	EC	2	-	2	30	20	-	50
RT-510	Entrepreneurship and Small Business Management	EC	2	-	2	30	20	-	50
Total			14	00	28	280	180	180	450

CC= Core Course, EC= Elective Course. \*Out of three elective papers any two elective papers may be chosen.

**B. Sc. VI SEMESTER**

Subject Code	Course	Type of Course	Credit Distribution		Credits	Marks Distribution			Marks
			Lecture (L)	Practical (P)		Theory	Sessional	Practical	
VI Semester: 14 Credits (Core Course- 14 Credits)									
RT-601	Senior and Digital image processing in Remote Sensing	CC	1	-	1	30	20	-	50
RT-602	Laboratory Course (Based on RT-601)	CC	-	1	1	-	20	30	50
RT-603	Ethnobotany and Indigenous Medication	CC	1	-	1	30	20	-	50
RT-604	Laboratory Course (Based on RT-603)	CC	-	1	1	-	20	30	50
RT-605	Rural Infrastructure Engineering	CC	3	-	3	30	20	-	50
RT-606	Watershed Management	CC	2	-	2	30	20	-	50
RT-607	Laboratory Course (Based on RT-605+606)	CC	-	2	2	-	20	30	50
RT-608	Rural Health Care	EC	2	-	2	30	20	-	50
RT-609	Waste Art	EC	2	-	2	30	20	-	50
RT-610	Waste Art	EC	2	-	2	30	20	-	50
Total			14	00	28	280	180	180	450

CC= Core Course, EC= Elective Course. \*Out of three elective papers any two elective papers may be chosen.

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SEMESTER						
Subject Code	Course	Type of Course	Marks Distribution			Marks
			Theory	Sessional	Practical	
RT-701	Research Methodology		60	40	-	100
RT-702	Concepts of Statistical Analysis		60	40	-	100
RT-703	Instrumentation and Techniques		60	40	-	100
RT-704	Laboratory Course (Based on RT-703)		-	40	60	100
RT-E-705	Rural Development Programme and Social Structure	EC	60	40	-	100
RT-E-706	Innovation and Transfer of Technology	EC	60	40	-	100
	Total		240	200	60	500

\*Out of two elective papers, any one elective paper may be chosen.

M. Sc. II SEMESTER						
Subject Code	Course	Type of Course	Marks Distribution			Marks
			Theory	Sessional	Practical	
RT-801	Fundamentals of Medicinal Plant		60	40	-	100
RL-802	Laboratory Course (Based on RT-801)		-	40	60	100
RT-803	Fundamentals of Remote Sensing		60	40	-	100
RT-804	Laboratory Course (Based on RT-803)		-	40	60	100
RT-805	Rural Waste Management Engineering		60	40	-	100
RT-E-806	Natural Products Management	EC	60	40	-	100
RT-E-807	Appraisal and Action for Rural Development	EC	60	40	-	100
	Total		240	240	120	600

\*Out of two elective papers, any one elective paper may be chosen.

M. Sc. III SEMESTER						
Subject Code	Course	Type of Course	Marks Distribution			Marks
			Theory	Sessional	Practical	
RT-901	Extraction and Analysis of Medicinal Plants		60	40	-	100
RT-902	Laboratory Course (Based on RT-901)		-	40	60	100
RT-903	Remote Sensing and GIS Application		60	40	-	100
RT-904	Laboratory Course (Based on RT-903)		-	40	60	100
RT-905	Soil and Water Conservation Engineering		60	40	-	100
RT-E-906	Innovation in Indigenous Arts and Crafts	EC	60	40	-	100
RT-E-907	Laboratory Course (Based on RT-906)	EC	-	20	30	100
RT-E-908	Production Techniques of Natural Products	EC	60	40	-	100
RT-E-909	Laboratory Course (Based on RT-908)	EC	-	20	30	100
	Total		240	260	150	650

EC= Elective Course \*Out of two elective papers and their lab course, any one elective and its lab course may be chosen.

M. Sc. IV SEMESTER						
Subject Code	Course	Type of Course	Marks Distribution			Marks
			Theory	Sessional	Dissertation	
RT-1001	Drug Formulation and Evaluation	CC	60	40	-	100
RT-1002	RS and GIS Applications in Natural Resource Management and Planning	CC	60	40	-	100
RT-1003	Dissertation		-	-	200	200
	Total		120	80	200	400

Dissertation must be compulsory for all students.

*Handwritten signatures and dates:*  
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 12.04.16  
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Department of Rural Technology & Social Development  
Guru Ghosidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for UG-PG Integrated Course

Course Code: FE 301

B.Sc. III SEMESTER  
Credit: Credit:03  
Course Title: Environmental Studies-I

Marks: 50

Multidisciplinary nature of environmental studies, Definition, scope and importance. Need for public awareness. Ecosystems: Concept of ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers.

Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem. Aquatic ecosystems (ponds, rivers, oceans).

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, forest and tribal people.

Water resources: Use and over-utilization of surface and ground water. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, and salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

**Reference Books:**

Ecology and Environment: P.D. Sharma  
Biodiversity & Sustainable Conservation: Darshan Kumar  
Environmental Pollution and Management: P.C. Trivedi  
Ecology, Environment and Resource Conservation - J.S. Singh, S.P. Singh & S.R. Gupta

Course Code: RT- 302

B.Sc. III SEMESTER  
Credit:02

Marks: 50

Course Title: Poultry Production Techniques

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

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

Breeding and production 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.

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

Poultry health management: Symptoms, treatment/control and vaccination strategies of: Viral disease (New castle disease/ranikhet, 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 Code: RT- 303

B.Sc. III SEMESTER  
Credit:02

Marks: 50

**Course Title: Lac, Vermi and Apiculture Techniques**

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.

Introduction to Vermiculture: Manure worms, morphology and anatomy of manure worm techniques of vermin-compost production, chemical composition and uses of vermicompost; Vermiwash: Preparation, chemical composition and uses.

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.

B.Sc. III SEMESTER

Course Code: RT- 304

Credit:02

Marks: 50

**Course Title: Laboratory Course (Based on 302+303)**

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.
6. Preparation of vermiwash and vermicompost.

**Reference Books:**

Chapman: The Insects: structure and function 94<sup>th</sup> ed, 1998, ELBS)  
Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house)  
Megavin: Essential Entomology 92001, Oxford Univ Press)

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

Srivastava: A textbook of applied entomology, vol I & vol II (1993, Kalyani publishers)  
The Insect. Ramesh Arora and G. S. Darsiwal  
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  
Atlas of Indian Lac. Ajit Prasad Jain.  
Lac cultivation in India. M.G. Kanath  
A handbook of shellac Analysis. G.N. Bhattacharya and P.K. Bose.  
Prayogic kenchna Khad Sandarshika- D. Singh  
Earthworm-R.K. Bhatnager  
Vermicomposting for sustainable agriculture- R.K. Gupta  
Vermi resource technology- G. Tripathi  
Unified Zoology for IIIyr.- J.K. Awasthi (Shivlal Agrawal & Co., Indore)  
Vermi culture and organic farming- T.V. Sathe (Daya Pub. house).

Course Code: RT- 305

B.Sc. III SEMESTER  
Credit: 02

Marks: 50

Course Title: Mushroom Production Techniques

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

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

Equipments used in spawn preparation and mushroom production, Culture preparation, spawn production technique and their management.

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

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

Course Code: RT- 306

B.Sc. III SEMESTER  
Credit: 02

Marks: 50

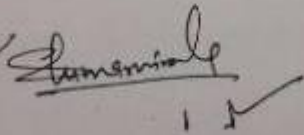
Course Title: Sericulture

Introduction to Sericulture: Definition, history and importance of sericulture, sericulture industry in India, prospects and problems.

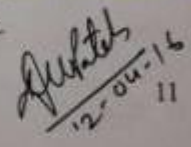
Biology of silk moth: Study of mulberry and non-mulberry silk worms- Tasar, Eri and Munga including classification, geographical distribution, hosts plants and silk characteristics produced, anatomy of mulberry silk worm- Digestive system including mouth parts.

Reproductive system, life cycle including moulting and metamorphosis, silk glands, spinning of silk threads, factors influencing silk worm growth and silk production, diseases and pests of mulberry silk worm.







  
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Department of Rural Technology & Social Development  
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Semester-wise syllabus for UG-PG Integrated Course

Mulberry cultivation: Types of host plants for sericulture and their propagation, effects of agro-climatic conditions on the growth of host plants with special reference to mulberry, mulberry cultivation and its management, diseases, pests & 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, filature & mulbind, processing of raw silk.

B.Sc. III SEMESTER

Course Code: RT- 307

Credit:02

Marks: 50

Course Title: Laboratory Course (Based on RT- 305 + 306)

1. Identification of different mushroom species.
2. Culture preparation and Spawn preparation.
3. Paddy straw and oyster mushroom production.
4. Plantation techniques (pit and row) of Mulberry plants.
5. Study of propagation techniques of Mulberry plants.
6. Study of host plants of mulberry and non-mulberry silk worms.
7. Study of morphological characters of mulberry silk worm.
8. Identification of pests and predators of mulberry silk worm.
9. Dissection of alimentary canal and silk gland and study of their various parts.
10. Visit to nearest mulberry silk worm rearing centers.
11. Visit to rearing centers to observe the silk worm diseases and collection of diseased worms.
12. Comparative study of good and defective cocoons.

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  
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).

B.Sc. III SEMESTER

Course Code: RT- 308

Credit:02

Marks: 50

Course Title: Morphology and Anatomy of Phanaerogames

Gymnosperm- General Characteristics and classification, General account of Cycas and Pinus; economic importance of gymnosperms.

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

9. Morphological study of cultivable crustaceans and Pearl oysters.  
10. Studies of fishing gears.

**Reference Books:**

- Nigam: Biology of Non-chordates (1985, S. Chand)  
Jordon and Verma: Invertebrate Zoology (1995, S. Chand)  
Barrington: Invertebrate Structure and Function (1967, Nelson)  
Moore: An introduction to the Invertebrate (2001, Cambridge)  
Ekambaranath Ayar: A manual of Zoology, Part I-Invertebrates, (1973, Vishwanathan)  
Kotpal, R. L.: Modern Textbook of Zoology: Invertebrates (1976, Rastogi)  
Marshall: Parker and Haswell Textbook of Zoology, Vol. I (7<sup>th</sup> ed. 1972, Macmillan)  
Pisciculture, Apiculture and Sericulture - S. Sachan  
A Text Book of Fish and Fisheries - G.S. Sandhu  
Machhali Palan - M.L. Aron  
Fresh water Fish Culture - V.R.P. Sinha & V. Ramchandran  
Text Book of Fish Processing and Technology - K. Goopkumar  
Pond and Fish Culture - C.B. Hall  
Toxicology- P.D. Sharma (Rastogi Pub.)  
Environmental Biology and Toxicology- P.D. Sharma (Rastogi Pub., Meerut).  
Fishes (An introduction to Ichthyology)- Moyle (PHI, Bhopal)  
Essentials of Ecology & Environ. Sc.- S.V.S. Rana (PHI, Bhopal)  
Animal Behaviour- Reena Mathur (Rastogi Pub., Meerut).  
A text book of fish biology and fisheries- Khanna and Singh (Narendra Pub. House, N.Delhi).

Course Code: RT- 408

B.Sc. IV SEMESTER  
Credit:02  
Course Title: Economic Botany

Marks: 50

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

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

Non-alcoholic Beverages- Tea, Coffee, Cocox, 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; Wood- Teak, Sal and Sissoo, Rubber- *Hevea brasiliensis*, Fire wood, Bamboo.

Course Code: RT- 409

B.Sc. IV SEMESTER  
Credit:02  
Course Title: Nursery Management Techniques

Marks: 50

Importance of Nursery, Types of nursery system, Physical and Financial resources for Nursery. Capital components of Nursery, Nursery Expenditure, Income and Profit analysis.

Plant propagation material, integrated nutrient management, irrigation system, Plant propagation

18

Angiosperm - General characteristics, Systems of classification- Artificial, Natural and Phylogenetic, Detail study of Bentham and Hooker's system and Hutchinson's classification system.

Types of Tissue and cells: Meristematic and permanent tissues, Gland and ducts; Modification of stem and root, Anatomy of angiosperm (monocot and dicot) stem and root; secondary growth and abnormal secondary growth.

Vegetative and floral morphological features: Leaf morphology (terminology)- Arrangement- Phyllotaxy, and Venation; Inflorescence: Racemose, Cymose and Mixed types with examples.

Reproductive behaviour in angiosperm: Pollen grains, Microsporogenesis, Megasporogenesis, Types of embryo sac, Pollination, double fertilization; Endosperms; Fruits: Simple, Aggregate and Multiple types.

Course Code: RT- 309

B.Sc. III SEMESTER

Credit:02

Marks: 50

Course Title: Plant Physiology and Biochemistry

Introduction to Plant physiology, Plant and water relationship, water uptake, transpiration, factors affecting transpiration, Essential nutrients: Macro, and micronutrients, their role, deficiency and toxicity symptoms.

Photosynthesis: Photosynthetic pigments, Photo-phosphorylation, CO<sub>2</sub> fixation - C3- C4 and CAM plants.

Respiration: aerobic and anaerobic respiration, respiratory pathways- glycolysis, kreb's cycle, electron transport system, photorespiration.

General aspects of phytohormones, inhibitors-auxins, kinetin, gibberellins, and ethylene: action and their application; photoperiodism and vernalization, parthenocarpy, abscission and senescence.

Classification, properties and biological role of carbohydrates, Protein and lipids: Characteristics of enzymes, concepts of holoenzyme, apoenzyme, coenzyme and cofactors. Regulation of enzyme activity, Mechanism of action.

Course Code: RT- 310

B.Sc. III SEMESTER

Credit:02

Marks: 50

Course Title: Laboratory Course (Based on RT- 308+309)

1. *Cycas*: Preparation of temporary double stained slides of T.S. of Coralloid root, leaflet, identification of slides/specimen of micro and mega sporophyll, male cone V. S., entire and V. S. of ovule.
2. *Pinus*: Preparation of temporary double stained slides of T.S. of needle, identification of slides/specimen of male and female cone V. S. of male and female cone.
3. Study of types of tissues: Temporary and Permanent.

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Course Code: RT- 401

B.Sc. IV SEMESTER  
Credit:03

Marks: 50

Course Title: Environmental Studies-II

Biodiversity and its conservation: Introduction – Definition, genetic, species and ecosystem diversity, Biogeographical classification of India, Value of biodiversity, consumptive use, productive use, social, ethical, aesthetic values.

Biodiversity at global, National and local levels: India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity, habitat loss, Endangered and endemic species of India, Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity.

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management, Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Disaster management: floods, earthquake and cyclone.

Social Issues and the Environmental Ethics: From Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people, its problems and concerns.

Wasteland reclamation, Consumerism and waste products, Environment Protection Act., Air Prevention and Control of Pollution Act, Water (Prevention and control of Pollution) Act Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

**Reference Books:**

1. Agrawal, K.C.2001 Environmental Biology Nidhi Publication Ltd
2. Miller T.G. Environmental Science, Wadsworth Publishing Co.(TB)
3. Sharma B.K. (2001) Environmental Chemistry, Goel Publication House, Meerut.
4. Environmental Biotechnology (Industrial Pollution Management) (2006) Himalaya Publishing House.
5. D. Sharma (2008) Environmental Biology, Rastogi publications

B.Sc. IV SEMESTER

Course Code: RT- 402

Credit:02

Marks: 50

Course Title: Land Surveying, Leveling and Drawing Techniques

Concept of surveying for rural development, objective, 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 tabling, Errors in plane table survey and precautions to use.

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

15

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.

**Reference Books:**

- 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.

Course Code: RT- 403

B.Sc. IV SEMESTER

Credit:02

Marks: 50

Course Title: Building Construction Concepts

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

Building construction materials, lime, brick, properties of brick, manufacturing of bricks, Sand, Properties of good sand, components and specification.

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

Roof, arches, wall, lenti, scaffolding, doors, windows, ventilators.

**Reference Books:**

- Building Materials: Gurcharan Singh, , Standard Publishers Distributors, Delhi.  
Engineering Materials: Rangwala S.C., Charotar Publishing House Pvt. Ltd., Adand.  
Engineering Materials: Mittal D.C.,  
Engineering Materials: S. Kulkarni G.J.,

B.Sc. IV SEMESTER

Course Code: RT- 404

Credit:02

Marks: 50

Course Title: Laboratory Course (based on RT-402+403)

1. Study of Building materials.
2. Study of various types of bricks and cement.
3. Chain survey for the measurement of the area.
4. GPS use for point selection.
5. DGPS operations in the survey area.
6. Design and drawing of selected planes.

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7. Field visit to understand the different survey techniques.

Course Code: RT- 405

B.Sc. IV SEMESTER  
Credit:02

Course Title: Agricultural Microbiology

Marks: 50

Soil as a habitat for microorganisms. Soil microbes: algae, bacteria, actinomyceetes, bacteriophages, protozoa, fungi and nematodes. Factors affecting soil microbial population.

Microbial balance, Rhizosphere and Rhizoplane microorganisms. Reasons for increased microbial activity in rhizosphere. Organic matter decomposition. Nutrient cycles.

Biofertilizers: Importance and its Classification of biofertilizers. Symbiotic and non-symbiotic nitrogen fixers.

Production of bacterial bio fertilizers. Green manuring, Mass cultivation of cyanobacteria, Mass cultivation of *Azolla*. Biodegradation of pesticides. Use of microorganisms in pest control.

Early concepts of air, Vedic technology for air purification, aero microbiology in India. Phylloplane microflora, phylloplane pathogens and microflora of floral parts.

Course Code: RT- 406

B.Sc. IV SEMESTER  
Credit:02

Course Title: Aquaculture

Marks: 50

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

Types of fins and scales, colouration, digestive system and feeding behavior, respiratory organs, aquatic and air breathing, swim bladder, excretion and osmoregulation, endocrine glands, reproductive system and development, breeding of fish, fish seeds.

Chemical composition of fish, preparation and maintenance of aquarium, plankton and their importance, economic value of fish, common disease of fish and their cure.

Definition and classification of fisheries, fish culture in ponds, composite fish farming and air breathing fish culture, fishing crafts and gears, fish preservation and processing, government schemes related to fish culture.

Prawn culture and its economic importance, pearl culture and its economic importance.

B.Sc. IV SEMESTER

Course Code: RT- 407

Credit:02

Marks: 50

Course Title: Laboratory Course (Based on RT- 405 + 406)

1. Gram staining of bacteria.
2. Culture preparation of bacterial biofertilizers.
3. Mass cultivation of Cyanobacteria.
4. Mass cultivation of *Azolla*.
5. Morphological studies of different fish types.
6. Study and mounting of fish scales and fins.
7. Identification of fish by fin formula.

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

method- Sexual and Asexual propagation, Vegetative Propagation- Budding, Layering and Grafting, Micro-propagation and hardening, Packing and transport of nursery plants.

Plant propagation structures in Plant nursery- Quonset, Gutter connected, Glass House, plastic Film Green House, Rigid Panel Greenhouses and Greenhouse with Double-Layer Covering.

Plantation Techniques: Site selection, preparation and management, soil analysis, species selection, pit formation, distance between plant to plant and row to row, pit filling.

Planting time and planting method- entire plant planting and stump planting, clonal plantation, irrigation, management of planted plant, pre and post activity in plantation.

**Reference Books:**

Plantation Forestry : R.K. Luna  
Nursery Technology: S.S. Negi  
Plant Propagation and Nursery Husbandry: J.S. Yadav  
Introductory Horticulture: E.P. Christopher

**B.Sc. IV SEMESTER**

Course Code: RT- 410

Credit:02

Marks: 50

Course Title: Laboratory Course (Based on RT-408+ 409)

1. Preparation of herbaria of food, oil producing, fibre yielding plants.
2. Visit to field for identification of different crop insects-pest and their nature of damage.
3. Visit to field for identification of different crop diseases and their symptoms.
4. Preparation of herbarium for different disease symptoms.
5. Preparation of soil mixture for nursery bags.
6. Mass propagation of ornamental plants.

**Reference Books:**

Economic Botany Pandey-  
Medicinal Plants: Conservation, Cultivation and Utilization Chopra, Khanna, Prasad, Malik, Bhutiani  
Daya Publication, NewDelhi  
Medicinal Plants Robert Bentley, Henri Trimen-  
Plantation Forestry : R.K. Luna  
Nursery Technology: S.S. Negi  
Plant Propagation and Nursery Husbandry: J.S. Yadav  
Introductory Horticulture: E.P. Christopher  
Plantation Forestry : R.K. Luna

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Course Code: RT-601

B.Sc. VI SEMESTER

Credit:03

Marks: 50

Course Title: Sensor and Digital image processing in Remote Sensing

Sensor – Active and passive sensor, imaging and non –imaging sensor. Sensors used in satellites. Image resolution and its type.

Specific features of Indian remote sensing satellites series, some other countries satellite.

Microwave remote sensing: Radar principle, SLAR, SAR. Geometrical characterization. Slope foreshortening, Layover, Aspects, Radar shadow.

Introduction to Digital Image Processing(DIP), Image Structure, Preprocessing of image, Image Enhancement, Vegetative index, Supervised & Unsupervised Classification.

Introduction to GIS, Components of GIS, Data Structure- Raster & Vector formats. Data Encoding & Storage, Data Manipulation & Data Output, Introduction to Data Base management.

**Reference Books:**

- Remote Sensing – Principles & interpretation: F.F. Sabins  
Digital Remote Sensing, Concept Publishing company: Dr. P.Nag, Dr. M. Kudrat  
Principles of Remote Sensing, Longman: P. J. Curran  
Digital Image Processing in Remote Sensing: J. A. Richards Springer  
Remote Sensing – Principles & interpretation: F. F. Sabins  
Remote Sensing & Image interpretation: Lillesand & Keifer  
Remote Sensing – Principles & interpretation: F.F. Sabins

B.Sc. VI SEMESTER

Course Code: RT-602

Credit:01

Marks: 50

Course Title: Laboratory Course (Based on RT-601)

1. Creating different features like polygon, Line, tic (point), Polyline, Creation of personal geo database,
2. Digital Image Processing (DIP)
3. Techniques such as PCA, HIS.

B.Sc. VI SEMESTER

Course Code: RT-603

Credit:03

Marks: 50

Course Title: Ethnobotany and Indigenous Medicament

Ethnobotany- Definition and scope, Traditional and alternative systems of medicines- Ayurveda, Unani, Homeopathy, Sidha & Aromatherapy, Classification of crude drugs- Alphabetical, Taxonomical, morphological, chemical and Pharmacological.

Ethnomedicinal plant- *Allium sativum*, *Aloe vera*, *Azadirachta indica*, *Ricinus communis*, *Terminalia arjuna*, *T. bellarica*, *T. chebula*, *Oscimum sanctum*, *Withania somnifera*, *Commiphora wightii* (Googul).

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25





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

Mittal D.C., Engineering Materials  
S. Kulkarni G.J., Engineering Materials  
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

Course Code: RT-606

B.Sc. VI SEMESTER  
Credit:03

Marks: 50

Course Title: Watershed Management

Concept of land and water management, LULU pattern, Soil erosion, Water erosion, runoff erosivity factor.  
Hydrological cycle, rainfall and its measurement, Meteorological data analysis, ground and surface recharge, water conservation and recycling.  
Watershed management concept- objectives, types, characterization, planning and execution, suitable plants and crops for watershed area.  
Introduction to integrated watershed management programme and their impact, Application of Remote Sensing & GIS in watershed management for Natural Resource Management.

Reference Books:

Integrated watershed management: Rajesh Rajora  
Watershed management: E.M. Tidema  
Soil erosion and conservation: R.P. Tripathi and S.P. Singh  
Land and Water Management: V.V.N. Murti

B.Sc. VI SEMESTER

Course Code: RT-607

Credit:02

Marks: 50

Course Title: Laboratory Course (Based on RT-605+606)

1. Visit of bridges.
2. To study about cross section of the road.
3. Visit to watershed area and identification of problems.
4. Preparation of various models for watershed management.
5. Watershed Map preparation through remote sensing.

B.Sc. VI SEMESTER

Course Code: RT-E-608

Credit:02

Marks: 50

Course Title: Rural Health Care

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.

27

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

**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, zoonosis and others. Characteristics of common communicable diseases.

**Rural Health Management 1:** Prevention and control of communicable diseases.

**Rural Health Management 2:** Health care services- (a) general services, (b) Maternal and child health services (c) services provided under national health program

**Reference Books:**

Health Care in Rural Areas: J. Cyril Kanmony

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

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

Course Code: RT-E-609

B.Sc. VI SEMESTER

Credit:02

Marks: 50

Course Title: Wooden Art

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

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

Marketing of wooden art in various levels, status of wooden market in India and Chhattisgarh, problems related with rural market.

Socio-economic status of wooden artesian, relationship between forest department and rural 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 Code: RT-E-610

B.Sc. VI SEMESTER

Credit:02

Marks: 50

Course Title: Dhokra Art

**Fundamental of Dhokra art:** Introduction, distribution in India and Chhattisgarh, Scope, Objectives, Vision.

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28

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

Types of raw material used, raw material availability, tools used, traditional and modern design technique used in Dhokra art, methodology used for preparation of Dhokra art.

Marketing of Dhokra art at local, national and international level, status of Dhokra artesian in India and Chhattisgarh.

Socio-economic status of Dhokra artesian. Entrepreneurship and sustainable development of Dhokra artesian.

Contribution of Government and Non-government organizations for development and publicity of Dhokra art.

Reference Books:

Metal Craftmen in India, Meera Mukherjee  
Tribal Heritage of Madhy Pradesh, H.L. Shukla  
Baster Blusan, K.N.Thakur

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Course Code: RT-901

M.Sc. III SEMESTER

Marks: 100

Course Title: Extraction and Analysis of Medicinal Plants

**Aromatic Plants-** History, Revenue potential, Industrial significance, Medicinal uses; Cultivation and management of aromatic plants – Camphor, Citronella, Eucalyptus, Lavender, Lemongrass, Mints, Palmarosa, Sandalwood.

**Extraction of aromatic plants-** Hydro-distillation, extraction with volatile solvent, super critical fluid extraction, expression, quality assurance of essential oils.

**Principles and methods of extraction,** Theory of drug extraction, maceration, digestion, percolation, Soxhlet, other extraction methods.

**Enzyme and Protein Drugs:** Enzymes- diastase, pepsin, renin, trypsin, fungal lipase; Protein drugs- malt extract, collagen, casein, yeast.

**Analysis - Principles of Chromatography-** Paper chromatography, Thin layer chromatography, Gas chromatography, HPLC, HPTLC

**Reference Books**

- Medicinal plants of India Vol 1 & 2 ICAR by Kirtikar & Basu .
- Compendium of Indian Medicinal plants Vol 1-4 R.P. Rastogi & B.N. Mahotra.
- 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

M.Sc. III SEMESTER

Course Code: RT-902

Marks: 100

Course Title: Laboratory Course (Based on RT-901)

1. Study of traditional plant and their part used as folklore medicine.
2. Extraction and distillation of Citronella, Japani pudina (Mentha), Sarpaganda, Ashwagandha, Safed Musli, Tulsi, Butch.
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.

M.Sc. III SEMESTER

Course Code: RT-903

Marks: 100

Course Title: Remote Sensing and GIS Application

**Basics of GIS:** Definition, Components of GIS, Data Structure-Types of data structure, Raster & Vector formats, Image data format-BSQ, BIL, BIP, Advantages & Disadvantages of various data structure.

**Data base management (DBM):** Data base approach, advantages and disadvantages. Introduction to GPS and its Application.

36

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

Data Models- classic data models, Hierarchical data models, network and relational data models,  
Maps and GIS: Introduction, Cartographic data, Map scale, Classes of maps, Map Projection.

Data Input: digitization & Scanning methods, Data storage, Data output, Hard copy and soft copy devices.

Role of GIS in resource management and other interdisciplinary applications.

**Reference Books**

Digital Image Processing in Remote Sensing  
Remote Sensing - Principles & interpretation.  
Remote Sensing & Image interpretation.

**M.Sc. III SEMESTER**

Course Code: RT-904

Marks: 100

Course Title: Laboratory Course (Based on RT-903)

1. Familiarization with GPS.
2. Visual interpretation of satellite data and identification of broad land use categories.
3. Geometric correction and radiometric correction.
4. Mosaicing and Sub setting.
5. Stacking of Image.
6. Image classification - Supervised and Unsupervised.
7. Feature digitization from Toposheet.
8. Creation of Slope, aspect and digital elevation model.

**M.Sc. III SEMESTER**

Course Code: RT-905

Marks: 100

Course Title: Soil and Water Conservation Engineering

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

Water resources of India and their utilisation, Water cycle, Water law, basic concept of water quality assessment.

Concept of Irrigation, Types of irrigation, Source of irrigation water. Water lifting devices, Irrigation methods and efficiencies, water measuring devices and Conveyance systems.

Design of irrigation canals, Various types of canal lining - Advantages & Disadvantages, Canal Head Works- Definition, object, general layout, functions of different parts.

Surface drainage of agriculture land, sub surface drainage, basic concept of Aqueduct, Siphon, Super passage, Level crossing, inlet and outlet. Principles of water erosion control of water erosion.

**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.

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Course Code: RT-E-906

M.Sc. III SEMESTER

Marks: 100

Course Title: Innovation in Indigenous Arts and Crafts

Introduction to Indian art, Art scope in India and Chhattisgarh, Various traditional arts and its importance in India and Chhattisgarh, Origin of Chhattisgarh traditional art, Technique related with Chhattisgarh traditional art.

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

Bamboo art- type of bamboo, materials, process, technique, equipments and application.

Innovation in Design and Process- Mixing of traditional art into modern art, Creativity development in traditional art, required improvement in raw materials and addition of modern equipment.

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

**Reference Books**

Bamboo Research in India: Gaur R.C.

Timber Bamboo: Soori S.K. and Chauhan R.S.

Monograph on Bamboo: Tiwari D.N.

M.Sc. III SEMESTER

Course Code: RT-E-907

Marks: 50

Course Title: Laboratory Course (Based on RT-E-906)

1. Making of soil for Terracotta art.
2. Making of articles from bamboo.
3. Training or workshop or exposure for Terracotta art and Bamboo art.

M.Sc. III SEMESTER

Course Code: RT-E-908

Marks: 100

Course Title: Production Techniques of Natural Products

Lac Production Technique- Insect morphology, History of lac production, Important host for lac production, Lac cultivation practices.

Mushroom Production- Introduction, Medicinal and Poisonous mushroom, Production technology of Oyster mushroom, Paddy Straw mushroom and Button mushroom.

Apiculture- honey bees and their types, bee colony organization, area of distribution, bee equipments, management of pests and disease, honey formation and characterization.

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38

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

Mulberry and non-mulberry sericulture- Species of silk worms, Production of mulberry and non-mulberry silk in India, Rearing of tasar and mulberry silk worm, pest predators of tasar and mulberry silk worm, tasar and mulberry industries in Chhattisgarh, problem of tasar and mulberry culture.

Vermiculture- Species, morphology of verms, growth feature of verms and climatic effect and production of vermi-compost. Bio-gas generation and management.

Reference Books

Mori-culture, instructional cum practical Manual, Vol - I, Dr. A.K. Dhote.

Development of Sericulture: M. Laxmi Narasiah

An introduction of Sericulture, G & J Sulochana

Tropical Tasar culture. P. Mohanty

Mushroom Culture in India - Neeta Bhal

Lac cultivation - C.R. Negi

Lac production technique - ILRI Publication Ranchi

A Monograph on Lac - Roonwal M.L.

M.Sc. III SEMESTER

Marks: 50

Course Code: RT-E-909

Course Title: Laboratory Course (Based on RT-E-908)

1. Study of equipments used in spawn preparation and mushroom production.
2. Study of equipments used in apiculture and sericulture

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M.Sc. IV SEMESTER

Course Code: RT-1001

Course Title: Drug Formulation and Evaluation

Marks: 100

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

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

Analytical pharmacognocny- 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.

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

Reference Books:

Pharmacognocny - Tyler

Pharmacognocny - Trease & Evans.

Pharmacognocny- Gokhale, kokate & Purohit

Cultivation and Utilization of Aromatic plants - L.K. Atal & B.M. Kapoor.

Herbal & Drug Industry - R.D. Ghoudhary

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

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Course Code: RT-1002

M.Sc. IV SEMESTER

Marks: 100

Course Title: RS and GIS Application in Natural Resource Management and Planning

Remote sensing in agriculture- Introduction, conventional survey, vegetation types, spectral properties of vegetation, crop identification, crop yield, acreage estimation.

Land use/ land-cover: Basic concept & criteria of land-use classification, methodology, classification system, level of classification. Land use and land cover mapping.

Remote sensing in forestry: Introduction, conventional classification, forest covermapping, forest fire mapping, forest density determination. Vegetation indices.

Remote sensing in urban planning - Population estimates, growth perception, suitability analysis for public places, identification of suitable site for recreation, transportation and other facilities. Change detection analysis through time series data.

Remote sensing in rural planning -rural population distribution, growth perception, identification of suitable site for settlement, transportation, storage, irrigation systems and other facilities. Change detection analysis through time series data

**Reference Books**

- Digital Image Processing in Remote Sensing - J.A. Richards.
- Remote Sensing - Principles & interpretation - F.F. Sabins.
- Remote Sensing & Image interpretation - Lillesand & Keifer.
- Remote Sensing of Natural Resources - Guang xing wang, Quihao wang
- NRSC book on Remote Sensing Applications.
- Digital Image Processing in Remote Sensing - J.A. Richards.
- Remote sensing for Natural Resource Management and Environmental Monitoring: Susan Ustin

Course Code: RT-1003

M.Sc. IV SEMESTER

Marks: 300

Course Title: Dissertation

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Department of Rural Technology & Social Development  
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)  
Semester-wise syllabus for Pre-Ph.D. Coursework

Course Code: RT-2001

Pre Ph.D.

Course Title: Rural Technology-I

Marks: 100

Rural technology: Definition, concept and scope of rural technology in present scenario, Appropriate Technology, characteristics of technology, characteristics of innovation, concept and factor related to the technology transfer.

Scope, development and future prospect of medicinal plants- cultivation techniques of medicinal plant, brief discussion about useful part of medicinal plant, factors influencing variability of drugs, indigenous drug, plant protection technique and disease of medicinal plant, their identification and control measures.

History and scope of edible Mushrooms, Nutritional value of Mushrooms, Features of poisonous mushrooms, Innovation technique in spawn production, mushroom production and their management, Description of lac insects, life cycle, lac glands, Innovation in cultivation technology and processing technique of lac. Properties and uses of lac.

Sources of energy, classification of energy. Energy requirements in rural and urban sector, future energy challenges and energy demands, socio-culture and environmental impact of various renewable energy sources, appropriate technology for rural energy development in India.

Concepts & fundamentals of Remote Sensing, photogrammetry, Stereophotogrammetry, digital image processing, satellite remote sensing, Raster & vector formats, Remote Sensing and its application in natural resource management, GPS and its Applications.

Course Code: RT-2002

Pre Ph.D.

Course Title: Rural Technology-II

Marks: 100

Non timber forest products, Classification- grasses, bamboos and canes. Essential oils- grass, wood, leaf, root and flower oils. Methods of extraction of essential oils, distillation principles and method of extraction, Dyes- wood, bark, flower and fruit, root dyes. Wild edible roots, spices. Natural poisons and insecticides.

Bee and their races. Social organization, communication in honey bees. scope of apiculture. Innovation in artificial bee keeping (Apiary), Collection technique of honey at natural sites, physical and chemical properties of honey, Utilization of honey and wax in different commercial products.

Definition, history and scope of sericulture. Introduction to mulberry and non-mulberry silk worm. Innovation in propagation or cultivation techniques of different host plants for sericulture. Innovation in silk production techniques from rearing to weaving industries.

Study of indigenous traditional drugs, plant in alternative system of medicine, industrial importance of medicinal plant, resins & combinations. Tannins & tanning containing drugs, terpenoid drugs, alkaloids. Methods of extraction and distillation principles of various natural products.

G.I.S. concepts, components of G.I.S. data base management. Data models, linkages between remote sensing and GIS, Introduction to ERDAS, BSR1 and Glevis software.

42

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