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1.1.2

List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	Yellow	

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List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department	: *Rural Technology and Social Development*
Programme Name	: *M.Sc. Rural Technology*

Academic Year : 2019-20

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
1.	RT-105	Instrumentation and Techniques
2.	RT-106	Laboratory Course (Based on RT-105)
3.	RT-107	Innovation, Appraisal and Action for Rural Development
4.	RT-201	Fundamentals of Medicinal Plants
5.	RT-202	Laboratory Course (Based on RT- 202)
6.	RT-203	Application of Remote Sensing and GIS
7.	RT-204	Laboratory Course (Based on RT- 203)
8.	RT-205	Rural Waste Management
9.	RT-206	Laboratory Course (Based on RT-205)
10.	RT-301	Drug Formulation and Extraction
11.	RT-302	Laboratory Course (Based on RT-301)
12.	RT-303	Geospatial Technology and its application
13.	RT-304	Laboratory Course (Based on RT-304)
14.	RT-307	Lac and Apiculture
15.	RT-308	Laboratory Course (Based on RT-307)

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Scheme and Syllabus

SEMESTER SCHEME
Master of Science of Rural Technology
2019-20

M. Sc. I SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RT-101	Soil and Water Conservation Engineering	60	40	-	100
RT-102	Laboratory Course (Based on RT-101)	-	20	30	50
RT-103	Natural Product Processing Techniques	60	40	-	100
RT-104	Laboratory Course (Based on RT-103)	-	20	30	50
RT-105	Instrumentation and Techniques	60	40	-	100
RT-106	Laboratory Course (Based on RT-105)	-	20	30	50
RT-107	Innovation, Appraisal and action for Rural Development	60	40	-	100
RT-108	Field Work/ Survey (Based on RT-107)	-	20	30	50
	Total	240	240	120	600

M. Sc. II SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RT-201	Fundamentals of Medicinal Plant	60	40	-	100
RL-202	Laboratory Course (Based on RT-201)	-	20	30	50
RT-203	Application of Remote Sensing and GIS-I	60	40	-	100
RT-204	Laboratory Course (Based on RT-203)	-	20	30	50
RT-205	Rural Waste Management	60	40	-	100
RT-206	Laboratory Course (Based on RT-205)	-	20	30	50
RT-207	Research Methodology	60	40	-	100
RT-208	Laboratory Course (Based on RT-207)	-	20	30	50
	Total	240	240	120	600

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Semester-wise syllabus for PG Course

M. Sc. III SEMESTER

Subject Code	Course	Theory	Sessional	Practical	Marks
RT-301	Drug Formulation and Extraction	60	40	-	100
RT-302	Laboratory Course (Based on RT-301)	-	20	30	50
RT-303	Geospatial Technology and its application	60	40	-	100
RT-304	Laboratory Course (Based on RT-303)	-	20	30	50
RT-305	Concepts of Statistical Analysis	60	40	-	100
RT-306	Laboratory Course (Based on RT-305)	-	20	30	50
RT-307	Lac and Apiculture	60	40	-	100
RT-308	Laboratory Course (Based on RT-307)		20	30	50
RT-309	Seminar	-	20	30	50
	Total	240	260	150	650

Not included
- Drug formulation & evaluation
- RS & GIS application in Nat. res. management & planning

M. Sc. IV SEMESTER

Subject Code	Course	Dissertation	Marks
		Marks Distribution	
RT-401	Dissertation	250	250
	Total		250

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 ... will have bear all expenses.

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Course Code	INSTRUMENTATION AND TECHNIQUES	Marks
RT-105		100

General Object: To learn about the equipment's their principle and uses.

Specific Object: During research practical student must aware of instrument and their working. They also know how to interpretation of the result.

Outcomes: Student become aware of handling and working of instruments

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Semester-wise syllabus for PG Course

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, cluorimetry and atomic absorption apectrophotometry.

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

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electrophoresis.
3. Biochemical analysis of samples using spectrophotometer.
4. Microtomy and preparation of permanent mounts.

Course Code	INNOVATION, APPRAISAL AND ACTION FOR RURAL	Marks
RT-107	DEVELOPMENT	100

General Object: To learn the concept of technology, innovation Adoption of technology. Learn the communication and familiar with the model of communication.

Specific Object: Students aware with the technology and its development and Improvement of technology also which is the need of today. It develops the skill among the student.

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Semester-wise syllabus for PG Course

Outcomes: Student will know the technology diffusion and Adoption of technology. Student identify the adopters and their categories (3) Straight way war able to the students will attached with the rural sectors.

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, identification of adopters.

Communication Definition, concepts and model of communication, types of communication Barriers. 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.

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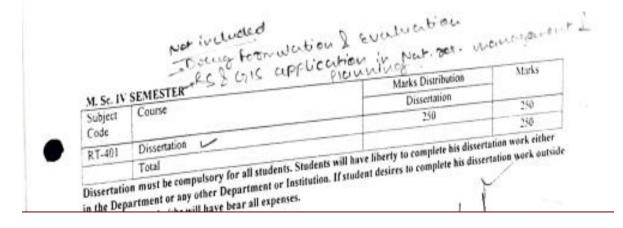**कोनी, बिलासपुर – 495009 (छ.ग.)**

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Master of Science in Rural Technology

Second Semester

M.Sc. II SEMESTER

Course Code: RT-201	Marks: 100
Course Title: FUNDAMENTALS OF MEDICINAL PLANTS	

General objective: As Chhattisgarh in biodiversity rich state and lot of Medicinal plant occurs naturally in forest area. The main object of this course is to study the plant and Their uses found in Chhattisgarh, along with their family.

Specific Object: Preservation strategies and cultivation of medicinal plant Which promote the economic status of farmer.

Outcomes: The student who belong to village can start new cultivation pattern and earn money.

Methods of plant classification, Taxonomic keys, Herbarium, Taxonomic study of important 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 marmelocs, 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

Course Code: RT-202	**M.Sc. II SEMESTER**	
Course Title: Laboratory Course (Based on RT- 201)		Marks: 50

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 Tannins.
5. To study source of mineral drugs and their uses.

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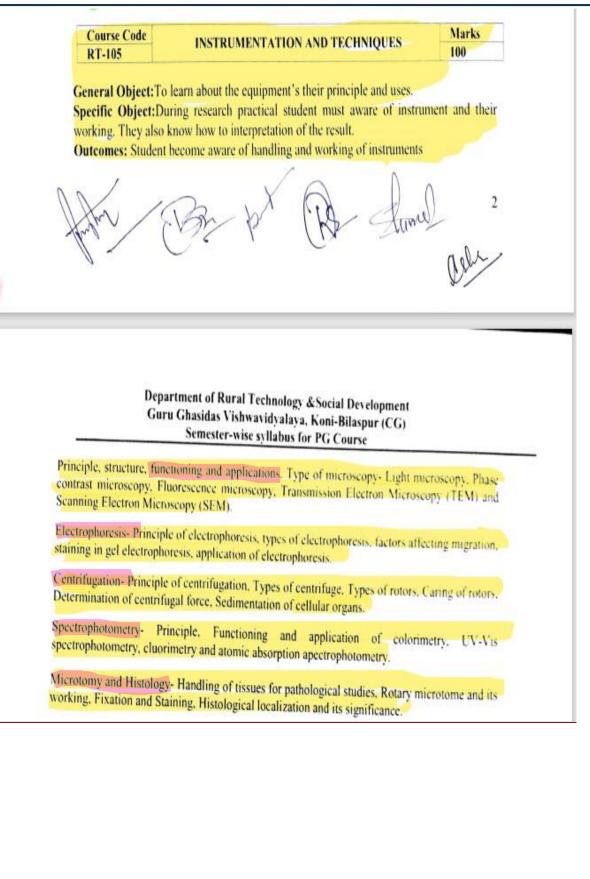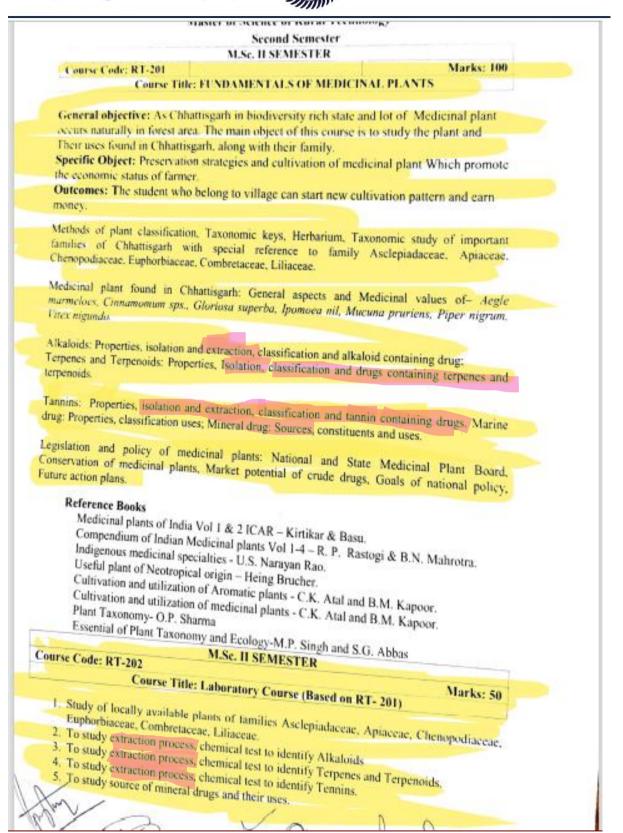Semester-wise syllabus for PG Course

M.Sc. II SEMESTER	
Course Code: RT-203	Marks: 100
Course Title: APPLICATION OF REMOTE SENSING AND GIS-I	

General Object: To attain a fundamental knowledge of remote sensing and gain basic experience in hands on application of remote sensing.

Specific object: Student must aware with the prospect and potential of remote sensing and its application in the field of rural development.

Outcomes: Students will have understanding in using s/w to carryout remote sensing and gis application in the field of rural development.

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.

Photogrammetry-Introduction, Types of Aerial Photographs, 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, NNRMS activates and thematic mapping.

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

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

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

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. II SEMESTER	
Course Code: RT-204	
Course Title: Laboratory Course (Based on RT- 203)	Marks: 50

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), Modeling- Vegetation indices.
3. Creation of digital evaluation model through contour digitization.
4. Digitization of different features of given topo-sheet. Editing attributes of geo-database features. Creating different features like polygon line, tie, polyline etc.
5. Finding the correcting topology. Creation of personal geo-database.

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Semester-wise syllabus for PG Course

M.Sc. II SEMESTER		
Course Code: RT-205		**Marks: 100**
Course Title: RURAL WASTE MANAGEMENT		

General object: To know the problems related to the waste management and, To find out their mode of appurtenances.

Specific Object: To initiate the awareness toward the cleanliness and waste disposal in rural area.

Outcomes: The small group of student can promote the rural people by teaching them about the waste disposal.

Introduction of Rural waste, Type of waste, Necessity of systematic collection and disposal of waste, Types of sewerage systems.

Sewage Treatment concept, Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trickling filters, General composition of sewage, importance & method of determination of B.O.D. and C.O.D.

Disposal of night soil, Village latrines- collection and disposal of garbage and refuse. Construction of low cost latrines in rural areas. Septic tanks, cess pools/soak pit, privy pit and bore hole latrines.

Waste water management, Drainage, topography, storm water, natural passage, development of drains. Technological options at household level management leach pit, soakage pit, soakway channel, plantation with intercepting chamber.

Solid waste management, Prospects and problems of solid waste management in rural areas, approach and steps for effective management of solid waste through composting, biogas technology and landfills.

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: RT-206		**Marks: 50**
Course Title: Laboratory Course (Based on RT- 205)		

1. Visit to sewage treatment plants.
2. To study types of waste material.
3. To study various method of solid waste management.
4. To study various model of latrines.
5. To study biogas technology and landfills.
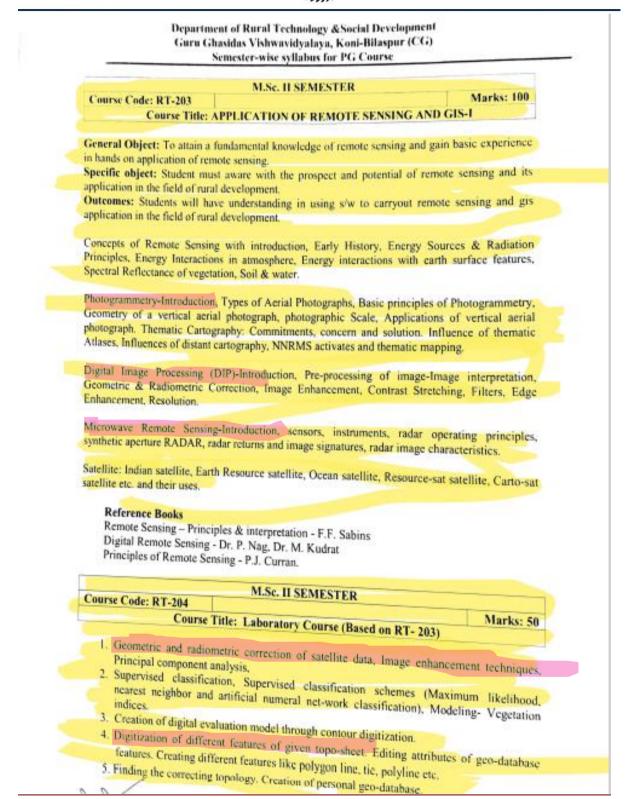6. To study the construction detail of various waste management models.

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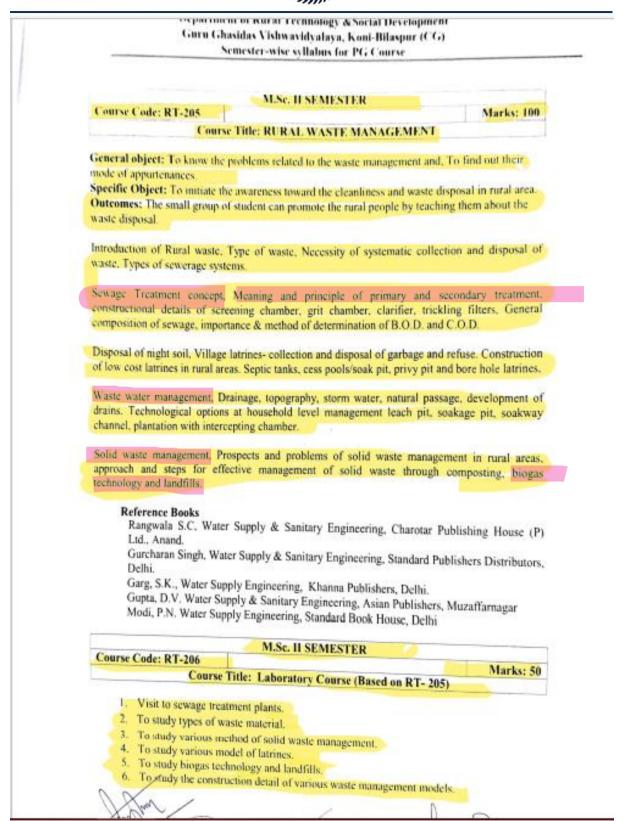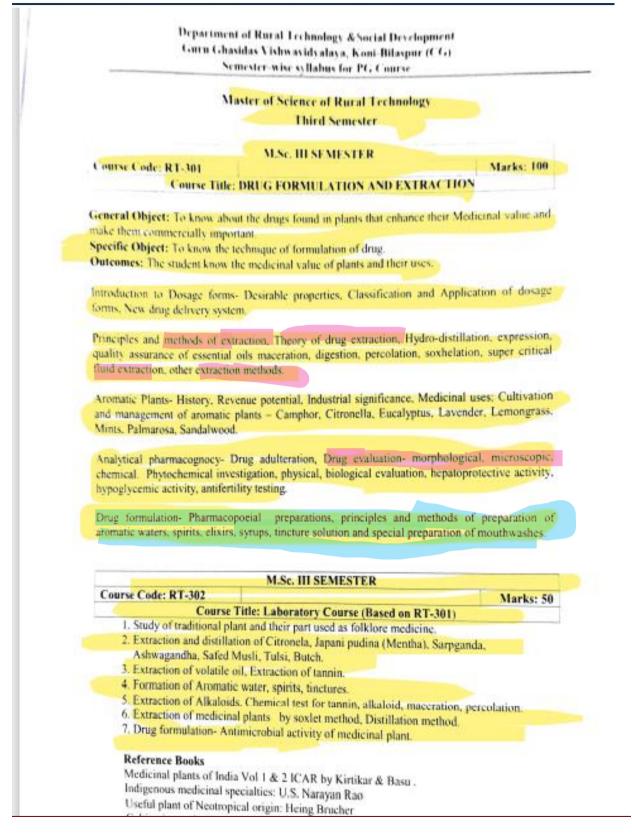कोनी, बिलासपुर – 495009 (छ.ग.)

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Semester-wise syllabus for PG Course

Master of Science of Rural Technology
Third Semester

M.Sc. III SEMESTER	
Course Code: RT-301	Marks: 100
Course Title: DRUG FORMULATION AND EXTRACTION	

General Object: To know about the drugs found in plants that enhance their Medicinal value and make them commercially important.
Specific Object: To know the technique of formulation of drug.
Outcomes: The student know the medicinal value of plants and their uses.

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: RT-302	Marks: 50
Course Title: Laboratory Course (Based on RT-301)	

1. Study of traditional plant and their part used as folklore medicine.
2. Extraction and distillation of Citronela, Japani pudina (Mentha), Sarpganda, 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 soxlet 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

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M.Sc. III SEMESTER	
Course Code: RT-303	Marks: 100
Course Title: GEOSPATIAL TECHNOLOGY AND ITS APPLICATION	

General Object: To know about Remote Sensing and its uses in various sector like agriculture, forest, wild life and rural area planning.

Specific Object: To get knowledge of study area through remote sensing Software.

Outcomes: Analysis and interpretation of data of study area at different time Interval can be done for research purpose.

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.

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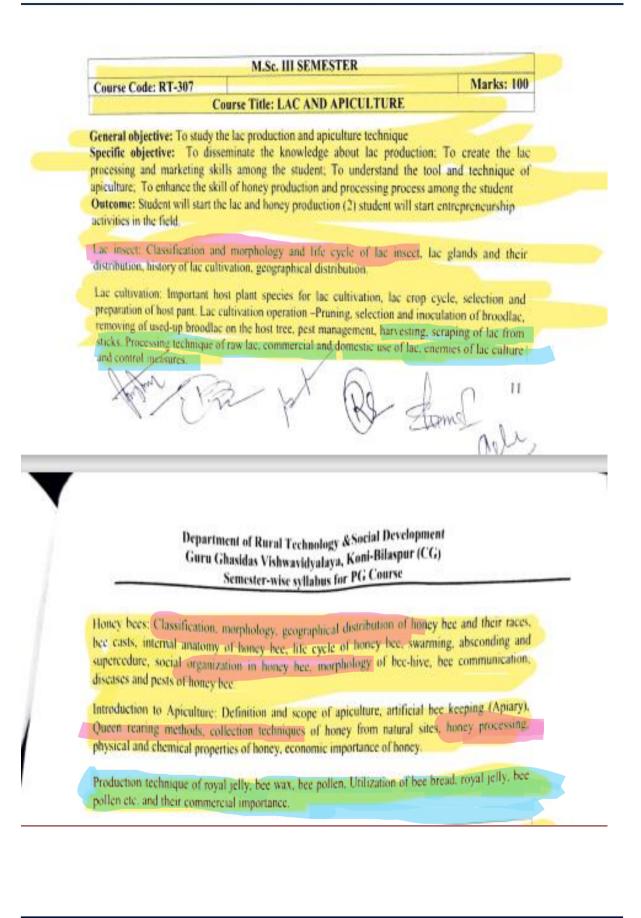
Urban and rural area planning – urban and rural area sprawl and change detection studies, population estimation, site suitability analysis for – settlement, transportation irrigation system, storage and other facilities.

M.Sc. III SEMESTER	
Course Code: RT-304	Marks: 50
Course Title: Laboratory Course (Based on RT-303)	

1. Practice based on ArcGIS and ERDAS
2. To generate various Indices map – NDVI, NDWI, NDBI, NDSI
3. Interpolation methods
4. Surface analysis
5. Layout preparation

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.

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M.Sc. III SEMESTER		
Course Code: RT-307		Marks: 100
Course Title: LAC AND APICULTURE		

General objective: To study the lac production and apiculture technique

Specific objective: To disseminate the knowledge about lac production; To create the lac processing and marketing skills among the student; To understand the tool and technique of apiculture; To enhance the skill of honey production and processing process among the student

Outcome: Student will start the lac and honey production (2) student will start entrepreneurship activities in the field.

Lac insect: Classification and morphology and life cycle of lac insect, lac glands and their distribution, history of lac cultivation, geographical distribution.

Lac cultivation: Important host plant species for lac cultivation, lac crop cycle, selection and preparation of host pant. Lac cultivation operation –Pruning, selection and inoculation of broodlac, removing of used-up broodlac on the host tree, pest management, harvesting, scraping of lac from sticks. Processing technique of raw lac, commercial and domestic use of lac, enemies of lac culture and control measures.

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Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Semester-wise syllabus for PG Course

Honey bees: Classification, morphology, geographical distribution of honey bee and their races, bee casts, internal anatomy of honey bee, life cycle of honey bee, 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), Queen rearing methods, collection techniques of honey from natural sites, honey processing, physical and chemical properties of honey, economic importance of honey.

Production technique of royal jelly, bee wax, bee pollen, Utilization of bee bread, royal jelly, bee pollen etc. and their commercial importance.