



**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

Department : Rural Technology and Social Development

Programme Name : M.Sc. Rural Technology

Academic Year : 2016-17

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
1.	RT-702	Concepts of Statistical Analysis
2.	RT-703	Instrumentation and Techniques
3.	RT-704	Laboratory Course (Based on RT-703)
4.	RT-E-706	Innovation and Transfer of Technology
5.	RT-E-806	Natural Products Management
6.	RT-E-807	Appraisal and Action for Rural Development
7.	RT-901	Extraction and Analysis of Medicinal Plants
8.	RT-902	Laboratory Course (Based on RT- 901)
9.	RT-903	Remote Sensing and GIS Application
10.	RT-904	Laboratory Course (Based on RT-903)
11.	RT-E-906	Innovation in Indigenous Arts and Crafts
12.	RT-E-907	Laboratory Course (Based on RT-906)
13.	RT-E-908	Production Techniques of Natural Products
14.	RT-E-909	Laboratory Course (Based on RT-908)
15.	RT-1001	Drug Formulation and Evaluation
16.	RT-1002	RS and GIS Applications in Natural Resource Management and Planning



Scheme and Syllabus

M. Sc. I 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	560

*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
RT-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.



M.Sc. I SEMESTER

Course Code: RT- 702

Marks: 100

Course Title: Concept of Statistical Analysis

- Introduction and Definition of statistics, Concept of Variables, Collection, Classification, tabulation, graphical and diagrammatic representation of numerical data.
- Central Tendencies- Mean, Median, Mode; Dispersion- Mean deviation, Standard deviation.
- 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.
- Probability Concept, various definition of probability, Addition theorem of probability, Probability distributions (viz. Binomial, Poisson and normal) and their applications.

Reference Books

- An Introduction to Statistical Methods - Gupta C.B.
- Quantitative approach to managerial decision- Hien, L.W.
- Statistics for Business & Economics, Lawrence 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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Semester-wise syllabus for UG-PG Integrated Course

M.Sc. I SEMESTER

Course Code: RT- 703

Marks: 100

Course Title: Instrumentation and Techniques

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.

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 Electron Microscopy IIIrd 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

M.Sc. I SEMESTER

Course Code: RT- 704

Marks: 100

Course Title: Laboratory course (Based on RT-703)

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.



Rural Development, G. R. Madan
Rural Sociology, A. R. Desai
Panchayati Raj Institution, G. S. Bal

M.Sc. I SEMESTER

Course Code: RT- E-706

Marks: 100

Course Title: Innovation and Transfer of Technological

Title clear

Transfer of Technology - Concept of Technology, Appropriate Technology- Definition and characteristics, different Models of technology transfer, barriers in Transfer of Technology.

Innovation- Definition, Characteristic of innovation, importance of innovation in day today life, stimuli related to innovation development.

Technology diffusion -Definition, process, effect of social system, time, culture and norm of society in diffusion.

Adoption process - concept, stages in adoption process, sources of information related to adoption stages, rate of adoption, Adopter categories, identification of adopters.

Communication- Definition, concepts and model of communication, individual, group and mass communication channel. Barriers related with communication channel.

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
Adoption and Diffusion process- Robert Chambers.

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M.Sc. II SEMESTER

Course Code: RT-E-806

Marks: 100

Course Title: Natural Products Management

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. Grass, root and flower oils. Role of oils and waxes in rural economy.

Tannins and its uses - Wood tannins, bark tannins, fruit tannins and leaf tannins, 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 gums, hard resins, oleo resins, utilizations of gums and resins, gum and resin tapping. Manufacturing of turpentine, katha, cutch and charcoal.

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

Reference Books

Non - Timber Forest Product - S. Negi.
Forest Non - Wood Resources - A.P. Dewadi.
Indian Forest Utilization Vol.- II, FRI Edition

Not mentioned
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M.Sc. II SEMESTER

Not given
in 2014

Course Code: RT-E-807

Marks: 100

Course Title: **Appraisal and Action for Rural Development**

PRA- Definition, Principles and Approaches of PRA, Steps of PRA- Direct observation, Rapport building, DIY, SSI and FGI.

Features of PRA- Triangulation, Learning in the community, Onsite analysis, Multidisciplinary Team, Uses of appropriate tools.

Types of PRA- Deductive PRA, topical PRA, exploratory PRA, planning and implementing of PRA, monitoring and evaluative PRA.

PRA Tool- 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.

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Semester-wise syllabus for UG-PG Integrated Course

RRA: Introduction, foundation, process, difference between RRA and PRA, PLA: introduction, foundation, PLA process, opportunities for learning, extending the basic PLA process, experience and issues.



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Semester-wise syllabus for UG-PG Integrated Course

M.Sc. III SEMESTER

Course Code: RT-901

Marks: 100

Course Title: **Extraction and Analysis of Medicinal Plants**

Title change

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, soxhlation, 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. Mahrotra.

Indigenous medicinal specialties: U.S. Narayan Rao

Useful plant of Neotropical origin: Heing Brucher



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 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.

M.Sc. III SEMESTER

Course Code: RT-903

Marks: 100

Course Title: Remote Sensing and GIS Application

Title changed

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.

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Course Code: RT-903

Course Title: Remote Sensing and GIS Application

Marks: 100

Title changed

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.

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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

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

Marks: 100

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-E-906

Marks: 100

Course Title: Innovation in Indigenous Arts and Crafts

Title etc

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.

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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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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 Narasaiah
An introduction of Sericulture, G & J Sulochana



M.Sc. III SEMESTER

Course Code: RT-E-909

Marks: 50

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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Semester-wise syllabus for UG-PG Integrated Course

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