Minutes of the Meeting of Board of Studies held on 07-07-2018

A meeting of Board of Studies (BOS) of the Department of Rural Technology and Social Developmentwas held on 07-07-2018 with the following members to discuss, review and modify the syllabus for the degrees of B.Sc. and M.Sc. Programs in Rural Technology.

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

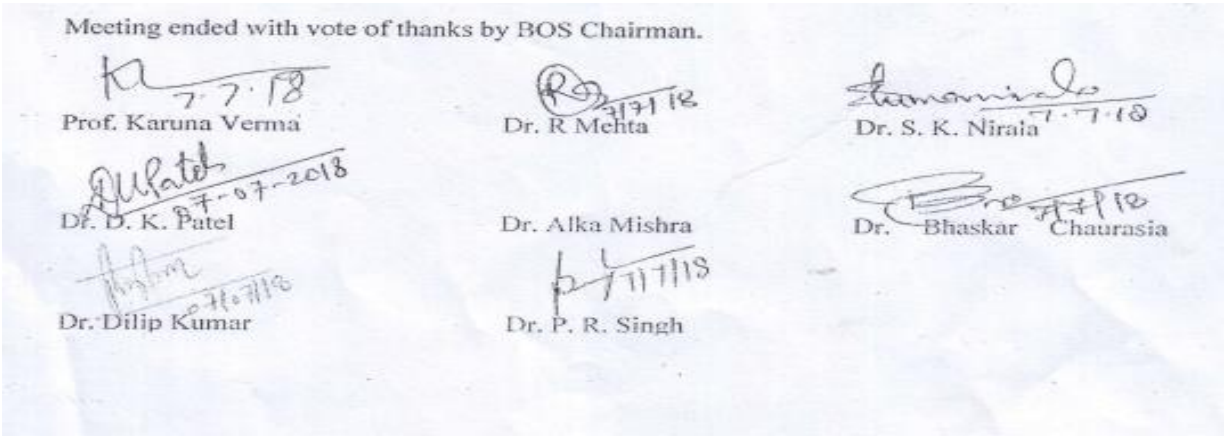
The chairperson of BOS welcomed the BOS Members and following resolutions were passed:

1. After the discussion with all the members of BOS, the syllabus had been modified and prepared to run the course run under choice based credit system (CBCS) to be implemented from B.Sc. - I Sem of session 2018-19 as per the instructions obtained from Guru Ghasidas Vishwavidyalaya and UGC.
2. The CBCS based Scheme for B.Sc. Rural Technology for 1st and 2nd Semesters were approved by the BOS to be implemented from session 2018-2019 and onwards (Scheme is attached herewith).
3. Due to robust modification and changes made in B.Sc. (Rural Technology) syllabus according to CBCS pattern as proposed by UCG, a need was felt to receive course curriculum of M.Sc. Rural Technology)to make better coordination between these two courses. Thus, the old syllabus of M.Sc. Rural Technology was regorously reviewed and modifeid, which will be implemented from the session 2018-2019 and onwards. Scheme of M.Sc. Rural Technology were approved by the BOS to be implemented from session 2018-2029 and onwards (Scheme is attached herewith).

Sr. No.	Course Code	Name of the Course
		B.Sc. Rural Technology Courses
1.	NR/RT/C-101L	Organic Manure Production Techniques
2.	NR /RT/C-101P	Practicals based on theory
3.	NR /RT/C-102L	Elementary Biology
4.	NR /RT/C-P-102P	Practicals based on theory
5.	NR /RT/GE-101/LS	Soil and Fertilizers
6.	NR /RT/GE-P-101/LS	Practicals based on theory
7.	NR /RT/AE-101/EC	English Communication / MIL (Hindi Communication)
8.	ECA	ECA-Extra-curricular activity/ Tour, Field visit/ Industrial

		training/ NSS/ Swachchhta/ Vocational Training/ Sports/ others
9.	NR /RT/C-203	Microbial Technology
10.	NR /RT/CP-203	Practicals based on theory
11.	NR /RT/C-204	Dairy Management and Products
12.	NR /RT/CP-204	Practicals based on theory
13.	NR /RT/GE-202/LS	Plant Propagation and Nursery Management
14.	NR /RT/GE-P-202/LS	Practicals based on theory
15.	NR /RT/AE-201/ES	Environmental Science
16.	ECA	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachchhta / vocational Training/ Sports/ others
17.	Summer Internship 15 Days	**Swayam Swachchhta / NSS / Industrial/ others**
		M. Sc. Rural Technology
18.	RT-101	Soil and Water Conservation Engineering
19.	RT-102	Laboratory Course (Based on RT-101)
20.	RT-103	Natural Product Processing Techniques
21.	RT-104	Laboratory Course (Based on RT-103)
22.	RT-105	Instrumentation and Techniques
23.	RT-106	Laboratory Course (Based on RT-105)
24.	RT-107	Innovation, Appraisal and action for Rural Development
25.	RT-108	Field Work/ Survey (Based on RT-107)
26.	RT-201	Fundamentals of Medicinal Plant
27.	RL-202	Laboratory Course (Based on RT-201)
28.	RT-203	Application of Remote Sensing and GIS-I
29.	RT-204	Laboratory Course (Based on RT-203)
30.	RT-205	Rural Waste Management
31.	RT-206	Laboratory Course (Based on RT-205)
32.	RT-207	Research Methodology
33.	RT-208	Laboratory Course (Based on RT-207)
34.	RT-301	Drug Formulation and Extraction
35.	RT-302	Laboratory Course (Based on RT- 301)
36.	RT-303	Application of Remote Sensing and GIS-II
37.	RT-304	Laboratory Course (Based on RT-303)
38.	RT-305	Concepts of Statistical Analysis
39.	RT-306	Laboratory Course (Based on RT-305)

40.	RT-307	Lac and Apiculture
41.	RT-308	Laboratory Course (Based on RT-307)
42.	RT-309	Seminar


Meeting ended with vote of thanks by BOS Chairman.

Prof. Karuna Verma

Dr. R Mehta

Dr. S. K. Nirala

Dr. D. K. Patel

Dr. Alka Mishra

Dr. Bhaskar Chaurasia

Dr. Dilip Kumar

Dr. P. R. Singh

School of Sciences: Natural Resources, Department of Rural Technology

2018-19

B.Sc. Hon's (Syllabus Scheme)

Semester	Course Opted	Course Code	Name of the course	Credit	
I	Core-1	NR/RT/C-101L	Organic Manure Production Techniques	4	4
	Core -1 Practical	NR /RT/C-101P	Practicals based on theory	2	4
	Core -2	NR /RT/C-102L	Elementary Biology	4	4
	Core -2 Practical	NR /RT/C-P-102P	Practicals based on theory	2	4
	Generic Elective -1 (GE- IA)	NR /RT/GE-101/LS	Soil and Fertilizers	4	4
	Generic Elective - Practical	NR /RT/GE-P-101/LS	Practicals based on theory	2	4
	Ability Enhancement Compulsory Course (AECC)	NR /RT/AE-101/EC	English Communication / MIL (Hindi Communication)	4*	4
	ECA		ECA-Extra-curricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachchhta/ Vocational Training/ Sports/ others	2	(2)
			TOTAL	24	28
II	Core-3	NR /RT/C-203	Microbial Technology	4	4
	Core -3 Practical	NR /RT/CP-203	Practicals based on theory	2	4
	Core -4	NR /RT/C-204	Dairy Management and Products	4	4
	Core -4 Practical	NR /RT/CP-204	Practicals based on theory	2	4
	Generic Elective -2 (GE-IB)	NR /RT/GE-202/LS	Plant Propagation and Nursery Management	4	4
	Generic Elective - Practical	NR /RT/GE-P-202/LS	Practicals based on theory	2	4
	Ability Enhancement Compulsory Course (AECC)	NR /RT/AE-201/ES	Environmental Science	4*	4
	ECA		ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachchhta / vocational Training/ Sports/ others	2	(2)
			TOTAL	24	28
SUMMER Internship: 15 days			**Swayam Swachchhta / NSS / Industrial/ others**	2	100

7/7/2018

DEPARTMENT OF RURAL TECHNOLOGY & SOCIAL DEVELOPMENT,
GURU GHASIDAS VISHWAVIDALAYA

SEMESTER SCHEME

Master of Science of Rural Technology

M. Sc. I SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
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

07-07-2018

M. Sc. III SEMESTER

Subject Code	Course	Marks Distribution			Marks
		Theory	Sessional	Practical	
RT-301	Drug Formulation and Extraction	60	40	-	100
RT-302	Laboratory Course (Based on RT- 301)	-	20	30	50
RT-303	Application of Remote Sensing and GIS-II	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

M. Sc. IV SEMESTER

Subject Code	Course	Marks Distribution	Marks
		Dissertation	
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 the Department, he/she will have bear all expenses.

SYLLABUS as per CBCS	
B.Sc. I SEMESTER	
Course Title: ORGANIC MANURE PRODUCTION TECHNIQUES	
Course Code: NR/RT/C-101L	Credit: 04

Organic manure- Types of manures, methods for preparation of manures, farm yard manure, vermicompost, chemical composition of manures, precaution needed for compost preparation.

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

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

Organic Farming-Introduction, concept, principle and importance of organic farming, green manuring, recycling of organic residues, application of manures.

Reference Books:

Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvark-
S.S. Reddy- Principles of Agronomy
Joseph C. Gilman- A manual of soil fungi-
Dilip Kumar Das- Introductory Soil Science-
Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvark-
S.S. Reddy- Principles of Agronomy
A manual of soil fungi- Joseph C. Gilman
Dushyant Malhotra- Jav Urvarak
Arun K. Sharma- Jaivik Kheti
Das- Manures and fertilizers
Basak- Fertilizers A Text Book
Gustafson- Handbook of fertilizers

Course Title: Laboratory Course	
Course Code NR/RT/C-P-101/P	Credit: 02

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

Course Title: ELEMENTARY BIOLOGY	
Course Code: NR/RT/C-102L	**Credit: 4**

Life: Definition and characteristics of life, Chemical organisation of cell: Molecular basis of life, inorganic and organic constituents, micro and macromolecules in the cell.

Cell: Prokaryotic and eukaryotic cell, structural organization of typical plant cell. Structure and function of mitochondria, chloroplast, Endoplasmic Reticulum, Golgi body, Ribosomes, Lysosomes, Nucleus & Nucleolus.

Chromosomes: Structure, chemical composition, Cell cycle: Interphase nucleus, mitosis, meiosis; genetic significance of meiosis.

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

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

Course Title: Laboratory Course	
Course Code: NR/RT/C-102P	**Credit:02**

Laboratory Course

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

Reference Books:

Mayer & Ashlock: Principles of Systematic Zoology (1991, McGraw Hill)
Boolotian & Stiles: College Zoology (10th ed 1981, Macmillan)
Nigam: Biology of Non-chordates (1997, S. Chand).
Nigam: Biology of Chordates (1997, S. Chand)
Purves *et al*.: Life-the Science of Biology, (7th ed. 2004, Sinauer)
S.S. Lal: Invertebrates-Practical Zoology (Rastogi Pub.).
S.S. Lal: Vertebrates- Practical Zoology (Rastogi Pub.)
E.L. Jordan and P.S. Verma: Chordate zoology (S. Chand and Comp., N. Delhi.).
P.S. Verma: Invertebrates- A Manual of Practical Zoology (S. Chand & Co., N. Delhi).
R.L. Kotpal: Vertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
R.L. Kotpal: Invertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
Cell Biology CB Power
Singh V., Pandey P.C. and Jain D.K. 1998, A Text book of Botany for Undergraduate Students:, Rastogi Publications

Course Title: ELEMENTARY BIOLOGY	
Course Code: NR/RT/C-102L	**Credit: 4**

Life: Definition and characteristics of life, Chemical organisation of cell: Molecular basis of life, inorganic and organic constituents, micro and macromolecules in the cell.

Cell: Prokaryotic and eukaryotic cell, structural organization of typical plant cell. Structure and function of mitochondria, chloroplast, Endoplasmic Reticulum, Golgi body, Ribosomes, Lysosomes, Nucleus & Nucleolus.

Chromosomes: Structure, chemical composition, Cell cycle: Interphase nucleus, mitosis, meiosis; genetic significance of meiosis.

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

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

Course Title: Laboratory Course	
Course Code: NR/RT/C-102P	**Credit:02**

Laboratory Course

1. Study of various plant cell-types
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6. To study meiosis through permanent slides.
7. Study of permanent slides of invertebrates materials.
8. Study of permanent slides of vertebrates materials.
9. Study of museum specimen of invertebrates.
10. Study of museum specimen of vertebrates.

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Nigam: Biology of Chordates (1997, S. Chand)
Purves *et al.*: Life-the Science of Biology, (7th ed. 2004, Sinauer)
S.S. Lal: Invertebrates-Practical Zoology (Rastogi Pub.).
S.S. Lal: Vertebrates- Practical Zoology (Rastogi Pub.)
E.L. Jordan and P.S. Verma: Chordate zoology (S. Chand and Comp., N. Delhi.).
P.S. Verma: Invertebrates- A Manual of Practical Zoology (S. Chand & Co., N. Delhi).
R.L. Kotpal: Vertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
R.L. Kotpal: Invertebrates- Modern Text Book of Zoology (Rastogi Pub., Meerut).
Cell Biology:CB Power
Singh V., Pandey P.C and Jain D.K 1998, A Text book of Botany for Undergraduate Students:, Rastogi Publications

Course Title: SOIL AND FERTILIZERS	
Course Code: NR/RT/GE-101/LS	**Credit: 04**

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

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

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

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

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

Reference Books:

Dilip Kumar Das- Introductory Soil Science
Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvark
S.S. Reddy-Principles of Agronomy-
Dushyant Malhotra- Jaiv Urvarak
Arun K. Sharma- Jaivik Kheti
Das- Manures and fertilizers
Basak- Fertilizers A Text Book-
Gustafson- Handbook of fertilizers
Hand book of Fertilizer Association of India, New Delhi, 1998.
Slack A.V- Chemistry & Technology of Fertilizers, Interscience, New York, 1967.
N S Subba Rao-Bio fertilizers in Agriculture,Oxford & IBH Publishing Company

Course Title: Laboratory Course	
Course Code: NR/RT/GE-P-101/LS	**Credit:02**

1. Study of different types of rocks.
2. Study of different types of soil.
3. Measurement of soil moisture, pH, bulk and particle density.
4. Identification of various fertilizers.
5. Calculation of fertilizers doses for crops.
6. Study of nitrogen fixing bacteria in soil and root nodule.
7. Preparation of biofertilizers using microbes- *Azolla*, Blue Green Algae (BGA).

SYLLABUS as per CBCS	
B.Sc. II SEMESTER	
Course Title: MICROBIAL TECHNOLOGY	
Course Code: NR/RT/C-203L	Credit:04

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

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

Introduction to fermentation technology- Definition of fermentation, fermenter configuration, general aspects of enzymes production, Production of Streptomycin, Citric acid, Ethyl alcohol and vitamin B_{12} by microbial fermentation.

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

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

Reference Books:

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

Course Title: Laboratory Course	
Course Code: NR/RT/C-203P	Credit:02

Laboratory course-

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

Course Title: DAIRY MANAGEMENT AND PRODUCTS	
Course Code: NR/RT/C-204L	**Credit: 4**

Introduction of important breeds of cows, buffaloes and goats.

Dairy farm management: Location of different farm buildings, Design and structure of sheds/shelters materials used for shed/shelters, essential appliances and hygiene, types of barns, housing systems.

General caring practices: Caring of goats, disbudding and dehorning, castration, exercise, hoof trimming, care of bucks. Care of dry and milch cows and maintenance of different dairy cattle registers.

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

Animal Diseases: Foot and mouth disease, Anthrax, Black Quarter, Rinderpest, Mastitis and Haemorrhagic septicemia -their diagnosis, treatment, precautions, vaccination schedule. Health management in goats

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

Reference Books:

Amlendu Chakerbarti Handbook of Animal Husbandary"
Jagdish Prasad: Poultry Production and Management"
R.A. Singh: Poultry production"
Jagdish Prasad:. Principle and practice of Dairy Farm Management"
B. Panda & B.R. Reddy: Feeding of poultry
Eiri Board of Consultant & Engineers: Hand Book of Dairy Farming
D. Ramaswamy :Dairy Technology Hand Book
P.N. Bhatt and B.U. Khan: Goat Production

Course Title: Laboratory Course	
Course Code: NR/RT/C-P-204P	**Credit:02**

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

Course Title: PLANT PROPAGATION AND NURSERY MANAGEMENT	
Course Code: NR/RT/GE-202/LS	**Credit: 04**

Concept of Nursery, Importance of nursery, Types of nursery system, Physical and financial resources for nursery. Capital components of nursery, Nursery expenditure, Cost and profit analysis.

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

Course Title: Laboratory Course	
Course Code: NR/RT/GE-P-202/LS	**Credit:02**

1.Preparation of various types of soil mixture for nursery bags.
2.Mass propagation of plants.
3.Propagation of plants through underground part, aerial part and through seeds.
4.Propagation of plant through cutting, grafting and budding.
5.Establishment of Nursery stock of ornamental plants.

Course Title: SOIL AND FERTILIZERS	
Course Code: NR/RT/GE-101/LS	Credit: 04

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

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

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

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

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

Reference Books:

Dilip Kumar Das- Introductory Soil Science
Dr. N. L. Sharma & Dr. T. B. Singh- Mrida Vigyan Ayum Khad Urvark
S.S. Reddy-Principles of Agronomy-
Dushyant Malhotra- Jaiv Urvarak
Arun K. Sharma- Jaivik Kheti
Das- Manures and fertilizers
Basak- Fertilizers A Text Book-
Gustafson- Handbook of fertilizers
Hand book of Fertilizer Association of India, New Delhi, 1998.
Slack A.V- Chemistry & Technology of Fertilizers, Interscience, New York, 1967.
N S Subba Rao-Bio fertilizers in Agriculture,Oxford & IBH Publishing Company

Course Title: Laboratory Course	
Course Code: NR/RT/GE-P-101/LS	Credit:02

Laboratory course

1. Study of different types of rocks.
2. Study of different types of soil.
3. Measurement of soil moisture, pH, bulk and particle density.
4. Identification of various fertilizers.
5. Calculation of fertilizers doses for crops.
6. Study of nitrogen fixing bacteria in soil and root nodule.
7. Preparation of biofertilizers using microbes- *Azolla*, Blue Green Algae (BGA) .

SYLLABUS as per CBCS	
B.Sc. II SEMESTER	
Course Title: MICROBIAL TECHNOLOGY	
Course Code: NR/RT/C-203L	**Credit:04**

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

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

Introduction to fermentation technology- Definition of fermentation, fermenter configuration, general aspects of enzymes production, Production of Streptomycin, Citric acid, Ethyl alcohol and vitamin B_{12} by microbial fermentation.

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

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

Reference Books:

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

Course Title: Laboratory Course	
Course Code: NR/RT/C-203P	**Credit:02**

Laboratory course-

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

Course Title: DAIRY MANAGEMENT AND PRODUCTS	
Course Code: NR/RT/C-204L	Credit: 4

Introduction of important breeds of cows, buffaloes and goats.

Dairy farm management: Location of different farm buildings, Design and structure of sheds/shelters materials used for shed/shelters, essential appliances and hygiene, types of barns, housing systems.

General caring practices: Caring of goats, disbudding and dehorning, castration, exercise, hoof trimming, care of bucks. Care of dry and milch cows and maintenance of different dairy cattle registers.

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

Animal Diseases: Foot and mouth disease, Anthrax, Black Quarter, Rinderpest, Mastitis and Haemorrhagic septicemia -their diagnosis, treatment, precautions, vaccination schedule. Health management in goats

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

Reference Books:

Amlendu Chakerbarti Handbook of Animal Husbandary"
Jagdish Prasad: Poultry Production and Management"
R.A. Singh: Poultry production"
Jagdish Prasad:. Principle and practice of Dairy Farm Management"
B. Panda & B.R. Reddy: Feeding of poultry
Eiri Board of Consultant & Engineers: Hand Book of Dairy Farming
D. Ramaswamy :Dairy Technology Hand Book
P.N. Bhatt and B.U. Khan: Goat Production

Course Title: Laboratory Course	
Course Code: NR/RT/C-P-204P	Credit:02

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

Course Title: PLANT PROPAGATION AND NURSERY MANAGEMENT	
Course Code: NR/RT/GE-202/LS	Credit: 04

Concept of Nursery, Importance of nursery, Types of nursery system, Physical and financial resources for nursery. Capital components of nursery, Nursery expenditure, Cost and profit analysis.

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

Course Title: Laboratory Course	
Course Code: NR/RT/GE-P-202/LS	Credit:02

1. Preparation of various types of soil mixture for nursery bags.
2. Mass propagation of plants.
3. Propagation of plants through underground part, aerial part and through seeds.
4. Propagation of plant through cutting, grafting and budding.
5. Establishment of Nursery stock of ornamental plants.

7/7/18 7.7.18 07/07/18 7/7/18 7/7/18 07-07-2018 7.7.18

M.Sc. II SEMESTER	
Course Code: RT-201	Marks: 100
Course Title: Fundamentals of Medicinal Plants	

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 marmeloes, Cinnamomum sps , Gloriosa superba, Ipomoea nil, Mucuna pruriens, Piper nigrum, Vitex nigundo*

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

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

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.
Plant Taxonomy- O.P. Sharma
Essential of Plant Taxonomy and Ecology-M.P. Singh and S.G. Abbas

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

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

M.Sc. II SEMESTER	
Course Code: RT-203	Marks: 100
Course Title: Application of Remote Sensing and GIS-I	

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	**Marks: 50**
Course Title: Laboratory Course (Based on RT- 203)	

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, tic, polyline etc.
5. Finding the correcting topology. Creation of personal geo-database.

M.Sc. II SEMESTER	
Course Code: RT-205	**Marks: 100**
Course Title: Rural Waste Management	

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

Course Code: RT-206	M.Sc. II SEMESTER	
Course Title: Laboratory Course (Based on RT- 205)		Marks: 50

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.

Course Code: RT-207	M.Sc. II SEMESTER	
Course Title: Research Methodology		Marks: 100

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

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

Hypothesis- Meaning and role in research, Hypothesis testing methods. Method of data collection and its measurement. Data sources, primary and secondary- Observational and survey methods. Case studies, schedule and questioner,

Research reporting and scientific writing- Preparation of research proposal, compilation of thesis, dissertation, reports.

Compilation of research paper, paper presentation, compiling bibliography.

Reference Books

Survey Method
Exploring research
Guide to the successful thesis and dissertation Vth Edition
Fundamentals of Statistics

Course Code: RT-208	M.Sc. II SEMESTER	
Course Title: Laboratory Course (Based on RT-207)		Marks: 50

1. To study the identification of research problems.
2. To study the objective formation process.
3. To formulation and testing the hypothesis process.
4. To study the review and references writing styles.
5. To study the dissertation/thesis writing style/research paper/manual.
6. Research paper presentation skills.

Department of Rural Technology &Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Syllabus for Ph.D. Entrance Test

Pre Ph.D.
Course : Ph. D Entrance Test
Course Title: Rural Technology

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.

Medicinal Plants: cultivation techniques of medicinal plant, useful part of medicinal plant, factors influencing variability of drugs. 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.

Non timber forest products, Essential oils- grass, wood, leaf, root and flower oils. Dyes- wood, bark, flower and fruit, root dyes. Wild edible roots, spices. Bee and their races. Social organization, communication in honey bees, scope of apiculture, physical and chemical properties of honey, Utilization of honey and wax in different commercial products.

Description of lac insects, life cycle, lac glands, lac cultivation technology and processing technique of lac. Properties and uses of lac. Edible Mushrooms, Nutritional value of Mushrooms, Features of poisonous mushrooms. Spawn production, mushroom production. Sericulture: Introduction to mulberry and non-mulbery silk worm.

Sources of energy, classification of energy, energy requirements in rural and urban sector, future energy challenges and energy demands, renewable energy sources. Concepts & fundamentals of Remote Sensing, photogrammetry, Stereophotogrammetry, digital image processing, satellite remote sensing. Raster & vector formats. Remote Sensing and its application in natural recourse management. GPS and its Applications.

Department of Rural Technology & Social Development
Guru Ghasidas Vishwavidyalaya, Koni-Bilaspur (CG)
Syllabus for Ph.D. Entrance Test

Course Title: Research Methodology

Fundamental of Research Aims and Objective of research, Type of Research – Basic, Novel and applied research. Tools for searching research topics – Books, journals, internet, discussions etc. Research hypothesis, steps in research design, Problems encountered by researchers. Review of literature, concept of bibliography and reference, software of literature search, types of report.

Research Aptitude Qualities of a researcher, Logical reasoning, test for intelligence, Basic mathematic. Ethics in research- plagiarism Need for research Design, Features of God design, Important concepts relating to research design, different research designs, Basic principles of experimental design. Randomized block, complete randomized block, latin square and split plot designs, Sampling design, Implication of sample design, criteria of selecting a sampling procedure, Different types of sample design

Data collection ,processing and analysis Types of data, various methods of data collection- observation, schedule and questionnaires, Survey, case study, data sources, measurement, scaling and surveying techniques, processing and analysis of data determination of the sample size, sampling and non sampling tests.

Hypothesis Introduction to hypothesis, procedure for hypothesis testing, parametric and nonparametric hypothesis test, Testing of hypothesis using various tests like Analysis of Variance and Covariance (ANOVA and ANOCOVA), chi square test multivariate analysis.

Interpretation and Report Writing Scientific communication- Basics of communication skills, writing- research reports, research papers, research proposals and review articles, Importance of research proposal and research papers. Methods of research presentations, communication with editors, handling referee's comments, galley proof citation & acknowledgements.

Pre Ph.D.

Course Code: RT-2001 **Marks: 100**

Course Title: Rural Technology-I

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

Medicinal plant: Useful part of medicinal plant, factors influencing variability of drugs, indigenous drug, Medicinal systems-Traditional and Modern

Mushroom: Innovation technique in spawn production, mushroom production and their management. Lac insects: Life cycle, Innovation in cultivation technology and processing technique of lac. Properties and uses of lac.

Energy: Future energy challenges and energy demands, socio-culture and environmental impact of various renewable energy sources, appropriate technology for rural energy development.

Remote Sensing and its application in natural recourse management, GPS and its applications, Geospatial technology and its application in environment and natural disaster management.

Pre Ph.D.

Course Code: RT-2002 **Marks: 100**

Course Title: Rural Technology-II

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.

Scope of apiculture. Innovation in artificial bee keeping (Apiary). Collection technique of honey at natural sites. Economic importance of honey bee wax.

Innovation in propagation or cultivation techniques of different host plants for sericulture. Innovation in silk production techniques from rearing to weaving industries.

Methods of extraction and distillation principles of various natural products, Resins & rasin combinations. Tannins & tanning containing drugs, terpenoid drugs, alkaloids.

G.I.S. concepts, components of G.I.S. data base management system, Application of GIS in natural resource management. Water conservation practices and related government policies.

12-7-19 12/7/19 12/07/19

Pre Ph.D.

Course Code: RT-2003 **Marks: 100**

Course Title: Research Methodology

Meaning of research, Motivation in research, Statement of research objectives, Types of research, Defining and formulating research problem, Hypothesis for research, Research process, Criteria of good research, Problems encountered by researchers. Research designs- Exploratory, Descriptive and Experimental research designs.

Types of data, Various methods of data collection- Observation, Schedule and Questionnaires, Survey, Case study, Data sources. Literature survey. Measurement and scaling techniques.

Processing and analysis of data, Sampling designs- Meaning, Types and Utility. Determination of the sample size, sampling and non-sampling tests.

Statistical quality control- Causes of variations in quality characteristic, Quality control chart, purpose and logic, Computing control limits. Process under control and out of control. Statistical tools and analysis, measures of dispersion.

Scientific communication- Basics of communication skills, Writing- research reports, research papers, research proposals and review articles. Importance of research proposal and research papers. Methods of research presentations. Communication with editors. Handling referee's comments, Galley proof. Avoiding plagiarism, indexing services, common measurements of quality scientific work. Important publishing agencies for research articles and books.

Pre Ph.D.

Course Code: RT-2004 **Marks: 100**

Course Title: Seminar

In addition to above mentioned three theory papers, one seminar with power point presentation will be delivered by the scholar on any theme of his area of research interest which will include all sequences of research, development of communication skill and presentation analysis.