

SCHOOL OF STUDIES IN RURAL TECHNOLOGY

Choice Based Credit System (CBCS)

As per

National Education Policy-2020

**Master of Science
In
Rural Technology
Syllabus -(Semester wise)**

Proposed from the academic session 2024-25 onwards



**Shaheed Mahendra Karma Vishwavidyalaya,
Jagdalpur, Bastar, Chhattisgarh**

Introduction

The Master of Rural Technology is a two-year postgraduate degree program that focuses on preparing students to bring about positive changes at various levels, starting from local communities and extending up to policymaking. The program combines classroom teaching with practical fieldwork to develop the necessary skills and knowledge in students.

This degree is widely recognized and opens-up professional opportunities in both government and non-government sectors. Career opportunities with Rural Technology sector includes as human resource managers, welfare officers, development professionals, experts in rural and urban development and welfare, counsellors and other positions.

Moreover, this degree also provides opportunities for students to work in international organizations like the UN, UNICEF, ILO, and WHO etc. They can also become Rural Technology educators in universities and colleges. The program emphasizes creating a diverse learning environment that values the dignity and worth of all individuals and promotes an understanding of different circumstances.

Mission

Rural Technology program aims to train competent professionals who can effectively address the everyday challenges faced by people and help them meet their unmet needs while promoting ecological balance.

Vision

SoS in Rural Technology envisions becoming a leading institution in the field of Rural Technology through developing competent rural technology professionals for sustainable development and just society.

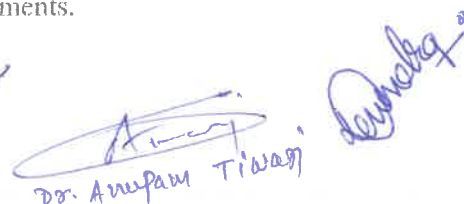
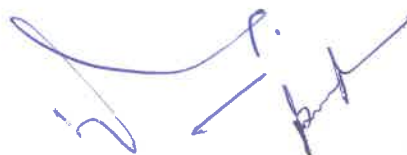
Program Objectives (PO):

Holistic Understanding of Rural Systems: Graduates will have an in-depth understanding of the multifaceted nature of rural systems, including socio-economic, environmental, and technological aspects. They will be able to integrate this knowledge to analyse and develop sustainable solutions tailored to the unique challenges of rural areas.

Innovative Problem-Solving Skills: Graduates will be equipped with the skills to identify, analyse, and solve the complex problems specific to rural community. They will be adept at using both traditional methods and modern technologies to innovate and implement effective solutions in areas such as rural energy, waste management, and infrastructural development.

Proficiency in Rural Technology Applications: Graduates will have hands-on experience and technical proficiency in various rural technologies, including agricultural engineering, aquaculture, medicinal plant production, and food science technology. They will be capable of applying these technologies to enhance productivity and sustainability in rural communities.

Leadership and Entrepreneurial Competence: Graduates will develop leadership qualities and entrepreneurial skills necessary for driving rural development initiatives. They will be able to manage small businesses, foster community development projects, and lead efforts in promoting financial inclusion, rural banking, and cooperative movements.



Dr. Anupam Tiwari

Commitment to Ethical and Sustainable Practices: Graduates will have a strong ethical foundation and a commitment to sustainable practices. They will be prepared to advocate for and implement environmentally friendly, socially equitable, and economically viable development strategies that benefit rural populations while preserving natural resources and cultural heritage.

Programme Outcomes:

Upon Successful completion of the Master of Rural Technology Program, students are be expected to attain the following graduate attributes of Rural Technology programme as per the guidelines of NHQF:

PO-1	Knowledge: Graduates will have extensive theoretical and practical understanding of rural technology, enabling them to address the unique challenges and opportunities within rural settings effectively. They will be well-versed in sustainable practices, advanced agricultural techniques, and innovative rural development strategies.
PO-2	Critical Thinking and Reasoning: The program fosters critical thinking and reasoning skills, enabling graduates to evaluate complex situations, assess diverse perspectives, and develop strategic solutions for rural development. They will be adept at analysing the socio-economic and environmental impacts of various rural technologies.
PO-3	Problem-solving: Equipped with a robust problem-solving toolkit, graduates will be able to identify issues, formulate and implement effective solutions in areas such as rural waste management, energy sustainability, and small business growth. They will be skilled in applying scientific methods to real-world rural problems.
PO-4	Advanced Analytical and Computational Skills: Graduates will possess advanced analytical and computational skills, essential for utilizing modern tools like Remote Sensing and GIS for rural planning. They will be capable of performing sophisticated data analysis and leveraging technology for informed decision-making.
PO-5	Effective Communication: The program emphasizes the development of strong communication skills. Graduates will be proficient in conveying complex technical information to diverse audiences, including rural communities, stakeholders, and policymakers, facilitating better understanding and collaboration.
PO-6	Social/Interdisciplinary Interaction: Graduates will be trained to work effectively in interdisciplinary teams, integrating knowledge from various fields such as agronomy, engineering, and social sciences. They will excel in collaborative environments, promoting holistic approaches to rural development.
PO-7	Self-directed and Long-term Learning: The curriculum encourages a culture of self-directed learning and continuous professional development. Graduates will be prepared to adapt to new technologies and methodologies, ensuring their skills remain relevant and up-to-date.
PO-8	Effective Citizenship, Leadership, and Innovation: The program nurtures leadership qualities and a sense of responsible citizenship. Graduates will be innovators and leaders in their communities, driving positive change and sustainable development through informed and ethical practices.
PO-9	Ethics: Ethical considerations are integral to the program. Graduates will uphold high ethical standards in all their professional endeavours, ensuring that their work benefits rural communities and respects cultural and environmental integrity.
PO-10	Future Education or Employment: The program prepares graduates for further education and diverse career opportunities. They will be well-equipped for roles in academia, government, NGOs, and private sectors, both nationally and internationally.

Dr Anupam Tiwari

PO-11	Global Perspective: Graduates will have a global perspective on rural development, understanding international best practices and their applicability in local contexts. They will be capable of contributing to global discussions on rural sustainability and development.
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Programme Specific Outcomes (PSOs)

At the end of the program, the student will be able to:

PSO 1	Understand the holistic approach to professional knowledge. Graduates have opportunities for employment in both the public and private sectors, both within the country and abroad.
PSO 2	Obtain knowledge on specialized fields like NGO, Counselling, Rural Family related Work, Gerontology, Human Resource Management and Industrial relations that provides an employment opportunity in various fields.
PSO 3	Carryout evidence-based research on contemporary issues and applies suitable interventions to solve the problems of the rural people.
PSO 4	Identify various Policies and programmes of State, National and International levels related to welfare and recommend future policies for implementation for up-liftmen of rural society. Acquire professional skills and abilities that train them challenges to tackle in their own life and career.

Programme Description

- **Degree:** Degree means Post Graduate degree.
- **Title of the Degree:** The title of the degree shall be '**Master of Rural Technology**' abbreviated as Rural Technology.
- **Duration of the Programme:** Duration of the Master of Rural Technology course shall be of two academic years spread in four semesters.

The programme shall be consisting 80 credits over four semesters in two academic sessions including 4 Core Courses (16 Credits), 9 Discipline Specific Elective (36 Credits), 3 Laboratory Course (Based on DSEs) (12 Credits), 4 Discipline Specific Research Methodology (Research Methodology, Focused Group Discussion, Research Work, Research Thesis).

Pedagogy of the Programme

During the two years Master of Rural Technology, lecture cum discussion, brain storming, case study analysis and discussion, interactive/facilitated discussions, class instruction, individual & group conferences (students' seminars), visits, non-credit trainings, orientation programme, extension, field based assignments or experience sharing/field instruction/lectures by guest or visiting faculties and practitioners, exposure iours of information technology in teaching-learning process, skill workshops, opportunity to attend seminar and conferences, career guidance, induction/exit/follow-up meeting etc. will constitute the pedagogy of the course.

In addition, the Department will organize seminars, workshops, cultural programmes, special lectures etc. for the students to develop professional competencies among them.

Admission Procedure: Admission of the students to the Master of Rural Technology Programme will be done University rules.

Fee Structure

The fees structure as decided by university will be applicable.

Eligibility Criteria

Admission to the Master of Rural Technology programme will be open to the applicants having a Bachelor Degree in any discipline from this University or from any other statutory recognized University. The eligibility criteria for admission areas follows-

- Any person with minimum 50% marks in the aggregate of graduation examination or its equivalent examination recognized by University of SMKV in any discipline shall be eligible to apply for this course.
- Candidates belonging to SC/ST and Persons with Disability categories shall be allowed 5% relaxation in the eligibility requirement, and
- Reservation of seats for various categories shall be as per the State Government/ University rules and regulations.

Seats and Reservations:

Total 30 seats allocated for Master of Science in Rural Technology program. The Department of Rural Technology is providing equal opportunity to all students and there is no discrimination on the basis of race, religion, caste, gender, marital status, age or physical disability. As per Government of India directives, there is reservation under the following categories:

- a) Scheduled Caste/Scheduled Tribe/Other Backward Classes
- i. Scheduled Caste : 15% of the total intake in each course
 - ii. Scheduled Tribe : 7.5% of total intake in each course
 - iii. Other Backward Classes: 27% of the total intake in each course

The seats reserved for the SC / ST shall be filled by the SC / ST candidates only. However, in the case of non-availability of the eligible candidates there reserved seats may be interchanged between the SC and ST. If still any seat remains un-filled, the same shall be left vacant.

If the seats reserved for the OBCs remain vacant, the said seats shall be filled with OBC students. Only if OBC candidates possessing the minimum eligibility marks are not available then the vacant OBC seat shall be converted into General Category seats in accordance with the admission schedule notified by the University.

b) Supernumerary Seats:

- i. PWD category : 3% of the total intake
- ii. CW category : 5% of total intake
- iii. Foreign Nationals : 5% of the total intake
- iv. Sports/ECA : 5% of the total intake
- v. Sponsored/Deputed Category : Not more than 5 seats

Total	General	SC	ST	OBC	FF	PWD
30	10	10	04	04	01	01



Assessment of Students' Performance and Scheme of Examinations:

- English and Hindi shall be the medium of instruction and examination.
- Examinations shall be conducted at the end of each Semester as per the Academic Calendar notified by the Shaheed Mahendra Karma Vishwavidyalaya, Bastar.
- Examination/Evaluation: A student will be evaluated out of 2000 marks during the course (1200 for theory papers, 300 for Laboratory course and 500 Research Work).

Method of evaluation: Class Test, Assignment, Presentations and Skill Based Evaluations and Attendance.

Evaluation Pattern:

For all courses irrespective of their credit weight, the evaluation pattern will be as follows:

Evaluation	Marks
Mid Semester Class Test	10
Assignment/Presentation/ Review/Skill Engagement	15
Attendance	05
End-Semester Examination	70
Total	100

- The remaining marks in each paper (70 Marks) shall be awarded on the basis of a theory examination. The duration of written examination for each paper shall be three hours.

Programme Name: M.Sc Rural Technology 2 Years (IV Semester)

Summary

Year	Semester	Course Work (Credits)	Research (Credits)	Total (Credits)	Min. Credits required to programme
1	I	20		20	Min. 40
	II	20		20	
2	III	20		20	Min. 40
	IV		20	20	
		total			80

Programme Structure

Sem.	Level of Courses	DSC	DSE	practical	DS Research Methodology (DRSM)	Total Credits
I	400	DSC1(4)	DSE4(4) (Four DSEs from a pool of courses)	Practical of each subject will carry 50 marks (Based on DSC and DSEs)		20
II	400	DSC1(4)	DSC4(4) (Four from a pool of courses)	Practical of each subject will carry 50 marks (Based on DSC and DSEs)		20
III	500	DSC1(4)	DSC3(4) (Three from a pool of courses)	Practical of each subject will carry 50 marks (Based on DSC and DSEs)	DSRM-1(4)	20
IV	500	DSC1(4)	Research Thesis/Project/Patent-(16)			20

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RT Semester I

Code	Course Levels	Course	Course Title	Credit	L:T:P	Teaching Hours	Marks		
							CIA	ESE	Total
RT 101C	80	DSC	Innovation, Appraisal and Action for Rural Development Planning and Voluntary Action	4	4:0:0	60 Hours	30	70	100
RT 101C Prctical		DSC	Innovation, Appraisal and Action for Rural Development Planning and Voluntary Action		0:0:2	30 Hours		50	50
	320	DSE	Four DSEs from the pool of DSEs for the I semester	4 × 4 = 16	4:0:0	60 Hours	30	70	100 × 4 = 400
Practical		DSE	Four DSEs from the pool of DSEs for the I semester		0:0:2	30 Hours		50	50 × 4 = 200
	400		Total	20 Credit					750

List of DSEs in the First Semester

Code	Course Title
RT102E	Rural Energy Sources
RT103E	Statistical Analysis and Computer Application for Rural Development
RT104E	Natural Product Management
RT105E	Aquaculture
RT106E	Rural infrastructural Engineering
RT107E	Soil and Water Conservation Engineering

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RT Semester II

Code	Course Levels	Course	Course Title	Credit	L:T:P	Teaching Hours	Marks		
							CIA	ESE	Total
RT201C	80	DSC	Entrepreneurship and Small Business Technology and Management	4	3:1:0	60 Hours	30	70	100
RT201C Practical		DSC	Entrepreneurship and Small Business Technology and Management		0:0:2	30 Hours		50	50
--	320	DSE	Four DSEs from the pool of DSEs for the II semester	4 × 4 = 16	3:1:0	60 Hours	30	70	100 × 4 = 400
Practical		DSE	Four DSEs from the pool of DSEs for the II semester		0:0:2	30 Hours		50	50 × 4 = 200
	400		Total	20					750

List of DSEs in the Second Semester

Code	Elective Course Title
RT202E	Vermi Culture
RT203E	Fundamentals of medicinal plants
RT204E	Drug Formulation and extraction
RT205E	Instrumental and Techniques
RT206E	Mushroom Culture
RT207E	Beekeeping Techniques

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RT Semester III

Code	Course Levels	Course	Course Title	Credit	L:T: P	Teaching Hours	Marks		
							CIA	ESE	Total
RT301C	100	DSC	Remote Sensing and GIS for Rural Planning	4	3:1:0	60 Hours	30	70	100
Practical		DSC	Remote Sensing and GIS for Rural Planning		0:0:2	30 Hours		50	50
RT301 TE -- RT305TE	300	DSE	Three DSEs from the pool of DSEs for the III semester	3 × 4 = 12	3:1:0	60 Hours	30	70	100 × 3 = 300
Practical		DSE	Selected three DSEs from the pool of DSEs for the III semester		0:0:2	60 Hours	30	50	50 × 3 = 150
RT309R	100	DSR M	Research Methodology	4	4:1:0	60 Hours	30	70	100
Practical		DSR M	Research Methodology					50	50
	500		Total	20					750

List of DSE of Third Semester

Code	Course Title
RT302E	Medicinal Plant Production Techniques and Extraction
RT303E	Food Science Technology and Value Addition in Natural Product
RT304E	Lac Production Technique
RT305E	Rural Waste management
RT306E	Rural Banking And Financing
RT307E	History and ideology for Rural Development

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RT Semester IV

Code	Course Levels	Course	Course Title	Credit	L:T:P	Teaching Hours	Marks		
							CIA	ESE	Total
RT401C	100	DSC	Indigenous Art and Its Management	4	3:1:0	60 Hours	30	70	100
Practical		DSC	Indigenous Art and Its Management		0:0:2	30 Hours		50	50
RT 402R	100	RES	Focussed Group Discussion, Analysis, and Report	4	0:0:4	120 Hrs	30	70	100
RT 403R	100	RES	Formulation of Research Problem and Review of Literature, Synopsis Presentation, Research Work	4	0:0:16	60 Hrs	30	70	100
RT - 404R	200	RES	Research Thesis	8	4:0:0	240 Hrs	--	200	200
	500		Total	20					550

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- I Semester 750
- II Semester 750
- II Semester 750
- IV Semester 550

- Grand Total 2800

Unit	Contents	Bloom's Correspondence	COs
Unit 1	Innovation-Definition, Characteristic of innovation, importance of innovation in day today life, Technology diffusion Definition, innovation decision process and factors that affect diffusion process.	U	CO1
Unit 2	Adoption process concept, stages in adoption process, rate of adoption, adopter categories, adopter's characteristics, factor that affect adoption process,	U	CO2
Unit 3	Communication Definition, concepts and various models of communication, types of communication, barriers in communication. Transfer of Technology Concept of Technology, Appropriate Technology- Definition and characteristics, different Models of technology transfer, barriers in Transfer of Technology.	Ap	CO3
Unit 4	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.	Ap	CO4

Reference

Text Books/ Reference Books	<ul style="list-style-type: none"> ✓ Gandhian Thought- J. B. Kripalani. ✓ Challenging the Professions-Robert Chambers ✓ Human Problems in Technological Change-E. B. Russel ✓ Communication of Technological innovations-O.P. Dhama ✓ Participatory rural appraisal in agricultural animal husbandry Shagufta ✓ Jamal and H. P. S. Arya ✓ Participatory rural appraisal and questionnaire survey-Neela Mukharjee Participatory rural appraisal methodology and application- Neela Mukharjee ✓ Participatory learning and action- Neela Mukharjee Participatory rural appraisal methods and application in rural planning- Amitava Mukharjee
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Semester - I

Course Code: RT 101PC	Course Title: Innovation, Appraisal and Action for Rural Development Planning and Voluntary Action-Practical	Max. Marks			
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA 30	ESE 70	Total 100
	<ol style="list-style-type: none"> 1. visit the villages and develop the social/recourse map 2. Find out the trend change and time line with the help of villagers. 3. Organised transect walk with the help of villagers to find out the field-based problems and their possible solution as per perception of villagers. 4. Identify the technologies used by the villagers and choose the appropriate cost-effective technologies <p>Identify the communication sources and their reliability in visited village.</p>				



Cos and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	2	1	2	3	1	-	2	-	2	1	-	-	3
CO2	3	2	2	2	3	1	3	1	-	1	-	2	1	-	-	3
CO3	3	3	2	2	2	1	3	2	-	2	-	2	1	-	-	3
CO4	3	2	1	2	3	2	3	2	-	1	-	2	1	-	-	3

Semester – I						
Course Code: RT101TE		Course Title: Rural Energy Sources			Max. Marks	
Type: Elective	Credit: 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs		CIA	ESE	Total
				30	70	100
CO1	Understand various energy resources and find out the rural energy demand and challenges. To Able to select the appropriate energy technology for rural areas.					
CO2	Understand the bio-fuel. energy crops and biogas generation and there uses.					
CO3	Aware the various solar appliance and there uses in the rural area.					
CO4						
Unit	Contents				Bloom's Correspondence	COs
Unit 1	Introduction, Sources of energy, classification of energy, Energy demand in rural and urban Sector, future energy challenges,				U	CO1
Unit 2	Various renewable energy sources, appropriate technology for rural energy, Barriers in Rural Energy Sector. Energy crisis and its mitigation. Importance of energy Conservation.				U	CO2
Unit 3	Bio-gas technology, anaerobic fermentation process, hydrolysis acidification and methanol genesis, factors affecting gas yield, retention time, composition and characteristics of bio - gas, bio - gas uses, bio - gas model.- Bio-Fuel: Properties, Characteristics, Principle energy crops - sugarcane and starch bearing plants. Characteristics of Biodiesel, Economic feasibility of bio-diesel.				Ap	CO3
Unit 4	Solar Energy- Solar radiation, solar water heating, solar drying, solar greenhouse, solar energy use in rural areas. Solar cell, PV Cells, Efficiency of solar cells, application of solar photovoltaic, Wind Energy.				Ap	CO4
Reference						
Text Books/ Reference Books	Non-conventional energy - G.D. Rai Energy security - D. Bhaskaran Rao					



Semester – I						
Course Code: RT101PE	Course Title: Rural Energy Sources-Practical				Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours :32 hrs			
			CIA 30	ESE 70	Total 100	
Field/Instrument based exercises: <ol style="list-style-type: none"> 1. Identify the various energy resources used by villagers. 2. Use and operate the various solar equipment in the lab. <p style="text-align: center;">Visit the biogas units, identify the models and find the associated problems.</p>						

Cos and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	-	1	-	3	1	-	1	-	2	1	-	-	3
CO2	3	2	1	-	3	-	3	1	-	1	1	2	1	-	-	3
CO3	3	3	2	-	2	-	3	-	-	1	-	2	1	-	-	3
CO4	3	2	1	-	3	-	3	1	-	1	-	2	1	-	-	3

Semester – I						
Course Code: RT102TE	Course Title: Statistical Analysis & Computer Application for Rural Development				Max. Marks	
Type: Elective	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs			
			CIA 30	ESE 70	Total 100	
CO1	Understand concepts of statistics and various analyses tools					
CO2	Able to formulate the hypotheses, find out sample size and analyse the data and interpret it in logical manner.					
CO3	Understand the function the computers and its applications in various fields.					
CO4	Able the present the statically data in different graphical forms through power points.					
Unit	Contents				Bloom's Corresp ondence	COs
Unit 1	Introduction and Definition of statistics, Concept of Variables, Collection, Classification, fabulation, graphical and diagrammatic representation of numerical data. Central Tendencies Mean, Median, Mode; Dispersion-Mean deviation, Standard deviation. Coefficient of Variation, Skew ness and Kurtosis.				U	CO1
Unit 2	Hypothesis, type of hypothesis, Sampling Methods, Statistical Test, Barrier test- z, t, F and Chi square distribution. Correlation and Regression Analysis. Analysis of Variance (ANOVA). Scales- Need for scales, scaling procedures, Thurston scale, Likert scale, Bogardus scale, Semantic differentials scale. Probability, Concept of random experiment, various definition of probability, Addition theorem of probability, Probability				U	CO2

	distributions (viz. Binomial, Poisson and normal) and their applications.		
Unit 3	Elementary knowledge of computer. Terminology of Related to Computer, Generations of Computer, Windows operating System. Need and scope of Computer Applications for Rural Development. Types of Computers. Computer Hardware, Hardware and Software. Network, Internet Operating System & Internet Email, Viruses.	Ap	CO3
Unit 4	Word Processing: Introduction and working with MS - Word in MS Office, Word basic commands, formatting text and documents, sorting and tables. Spread sheet: Working with Excel, formatting function chart features, working with graphics in excel. Presentation with power point: Power point basics, creating presentations the easy way, working with graphics in power point, show time, sound effects and animation effects.	Ap	CO4
Reference			
Text Books/Reference Books	An Introduction to Statistical Methods - Gupta C.B. Statistics for Management, Levin, Richard L. and David S. Rubin. Fundamentals of Statistics- D.N. Elhance, Veena Elhance and B. M. Agrawal Computers concepts and uses - Summer, M.		


Semester – I						
Course Code: RT102 PE		Course Title: Statistical Analysis & Computer Application for Rural Development-Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours :32 hrs		CIA	ESE	Total
				30	70	100
Computer based exercises: <ol style="list-style-type: none"> Analyze statistical data using measures of central tendency, dispersion and ANOVA. Analyze statistical data graphically using frequency distributions and cumulative frequency distributions. Find out the suitable sampling technique and research tests Organize, analysis, manage and presentation of collected data. 						

Cos and POs/PSOs mapping and Co relational matrix

Course/ Outcome	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	2	3	1	3	1	-	-	1	-	1	-	2	1	-	-
CO2	2	2	2	3	1	-	3	1	-	1	1	2	1	-	-
CO3	3	2	2	3	1	-	2	-	-	1	1	2	1	-	-
CO4	2	2	1	3	2	-	1	-	1	-	-	2	1	-	-

Semester – I					
Course Code:RT103TE		Course Title: Aquaculture		Max. Marks	
Type: Elective	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs		CIA 30	ESE 70 Total 100
CO1	Knowledge about deferent local carps and ornamental fishes.				
CO2	Develop the understanding about common fish disease and their cure.				
CO3	Aware about the commercial fish production and artificial fish keeping.				
CO4	Able to fish culture and integrated fish farming.				
Unit	Contents			Bloom's Correspondence	COs
Unit 1	Ichthyology and its scope, types of carp fishes and their characteristic features, common major and minor carps found in Chhattisgarh, larvivorous fishes, ornamental fishes. Prawn culture and processing; Pearl culture; technical and economic aspects			U	CO1
Unit 2	Exoskeloton: scales, coloration, Lateral line system, Food, feeding behaviour and digestion in fish, respiratory organs: aquatic and air breathing, swim bladder, breeding of fish, fish seed resources and their transportation; Common disease of fish and their cure.			U	CO2
Unit 3	Chemical composition of fish; economic value of fish; fish preservation and processing; preparation and maintenance of aquarium, planktons and their importance:			Ap	CO3
Unit 4	Fisheries and its various classification: Overview of Inland, Estuaring and Marine fisheries; Fish culture in ponds and management; Composite fish farming, cage culture and use of sewage for fish culture; Integrated fish farming; fishing crafts and gears; Government schemes/programs related to fish culture.			Ap	CO4
Reference					
Text Books /Reference Books	Aquaculture Desk Reference- R Leroy Handbook of Fisheries and Aquaculture- ICAR, New Delhi Aquaculture- Robert Stichney Fish and Fisheries – Q.J. Shamuni Handbook of Freshwater Aquaculture- B. Santosh Aquaculture- Principle and Practices- T.V.R. Pillai				

Semester – I					
Course Code:RT103PE		Course Title: Aquaculture-Practical		Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours :32 hrs		CIA 30	ESE 70 Total 100
Field/Laboratory based exercises: <ol style="list-style-type: none"> 1. Identification of deferent carps. 2. Find out common carp disease and their prevention. 3. Preparation and maintenance of aquarium. 4. Preparation of fish seed and fish culture in small ponds. 					



Cos and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	-	1	1	-	-	-	2	-	2	1	-	-
CO2	3	2	1	-	1	-	2	1	-	1	1	2	1	-	-
CO3	2	2	2	-	2	-	-	1	-	2	1	2	1	-	-
CO4	3	2	1	-	1	1	2	1	-	1	1	2	1	-	-

Semester – I							
Course Code: RT104TE		Course Title: Rural Infrastructural Engineering			Max. Marks		
Type: Elective	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs		CIA 30	ESE 70	Total 100
CO1	Understanding about drawing, surveying and levelling methods.						
CO2	Able to deferent building materials and rural housing patterns.						
CO3	Knowledge about types of roads and material of used for road construction.						
CO4	To know the suitable drinking water and their traditional purification practises						
Unit	Contents					Bloom's Corresp ondence	COs
Unit 1	Rural Infrastructural Engineering: Nomenclatures and their meanings, Role and Responsibilities of Construction Supervisor. Introduction to drawing-Importance of Drawings, Types & Scales of Drawing, Types of Surveying and Levelling.					U	CO1
Unit 2	Building Construction Work - Introduction to Building Material, Need of foundation Site, Inspection and Marking, Digging and Filling (Earthwork), Brick Work, Concrete Work, Roof Work. Cost estimation of building. Drainage and Sewer Construction, Finishing and Polishing, Flooring, Wood and Iron Work, Type of Rural Housing: Brief study about design, pattern of bamboo house, mud house, wooden house, and other low cost housing structure					U	CO2
Unit 3	Road work - Formation level of roads, Main part of the roads, Sub grade and compaction, Types of roads, Construction of cement concrete road. Condition of rural roads, Govt. Schemes for rural road.					Ap	CO3
Unit 4	Rural administrative department work: project work related with Panchyat, rural engineering, service and PHE department. Govt. Schemes for Rural Health, Sanitation and rural housing. Purification of water to make it suitable for drinking.					Ap	CO4
Reference							
Text Books	Gurcharan Singh, Building Materials. Standard Publishers Distributors, Delhi Rangwala S.C. , Engineering Materials, Charotar Publishing House Pvt. Ltd. , Adand.						



/Refer ence Books	Mittal D.C. , Engineering Materials. Rangwala S.C, Water Supply & Sanitary Engineering, Charotar Publishing House (P) Ltd. , AnandGurcharan 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. Gurcharan Singh, Building Materials, Standard Publishers Distributors, Delhi Rural Socieology - B.D.Tyagi Social Development -V. S. Parthasarathi Gore M.S. Introduction of Rural settlement- R.B. Mandel Rural Develoment: Some Factors, NIRD Hyderabad.
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Semester – I						
Course Code: RT104PE		Course Title: Rural Infrastructural Engineering-Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours :32 hrs	CIA	ESE	Total	
			30	70	100	
Field/Lab. based exercises:						
<ol style="list-style-type: none"> 1. Identify the Rural housing patterns of surrounding villages. 2. Draw the deferent rural housing pattern needs. 3. Visit of flash bricks and Clay brick unit and report submission. 4. Study of different standard grades of building material. 						

Cos and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	2	-	1	-	2	-	-	1	-	2	1	-	-
CO2	3	2	1	2	2	1	3	1	-	-	-	2	1	-	-
CO3	3	2	2	-	2	-	-	-	-	1	1	2	1	-	-
CO4	2	3	2	-	1	-	2	1	-	1	-	1	1	-	-

Semester – I						
Course Code: RT105TE		Course Title: Soil and Water Conservation Engineering			Max. Marks	
Type: Elective	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA	ESE	Total	
			30	70	100	
CO1	Understanding the different type of soil texture and soil structure.					



CO2	Aware about the methods of soil erosion and conservation practises.
CO3	Knowledge about water shade program, planning and GIS applications in watershed management
CO4	Understanding the different methods of irrigations and drainages.

Unit	Contents	Bloom's Correspondence	COs
Unit 1	Soil Definition, Soil as a three-phase system, Soil-Plant-Water relationship, soil moisture content, soil profile, density, porosity, soil texture, soil structure and degree of saturation.	U	CO1
Unit 2	Basic concept of soil erosion, control of soil erosion, soil formation, concept of runoff and its estimation, water budgeting, estimation of rainfall erosivity and erodibility. Planning, design, construction and maintenance of water harvesting structure, soil and water conservation structure, GIS application in Planning, designing, construction and maintenance of water harvesting structure.	U	CO2
Unit 3	Watershed management concept- objectives, characterization, type of watershed, planning. Execution, integrated community participation and evaluation, GIS application in watershed management.	Ap	CO3
Unit 4	Irrigation- Definition, Types of irrigation, Source of irrigation water. Irrigation methods and efficiencies, Drainage Definition, surface and sub-surface drainage, factors influencing drainage.	Ap	CO4

Reference	
Text Books /Reference Books	<ul style="list-style-type: none"> ✓ Introduction to soil and water conservation engineering, Mal. B C. Kalyani publishers ✓ Irrigation Engineering-Agarwal G.D., B. Bharti Prakashan, Merrut. ✓ Irrigation Engineering, -Modi P.N., Standard Book House, Delhi. ✓ Irrigation Engineering-Dr. Bharat Singh, Nem Chand & Bros., Roorkee ✓ Introductory Soil Science, Dilip Kumar Das, Kalyani Publishers. ✓ Soil and water conservation engineering, R. Suresh ✓ Irrigation: Theory and practices, A.M. Michael

Semester – I						
Course Code: RT105 PE		Course Title: Soil and Water Conservation Engineering- Practical		Max. Marks		
Type	Credit : 4	Teaching Hours :32 hrs		CIA	ESE	Total
Core	L:T:P= 0:0:4			30	70	100
Field based/Laboratories exercises: <ol style="list-style-type: none"> 1. Study of different water harvesting structure. 2. Study of GIS Application in watershed management 3. Study of different components of sprinkler and drip irrigation system 4. Study of different water conservation practises. 						

Cos and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	2	2	1	1	1	2	2	2	2	2	1	-	-
CO2	2	3	2	2	1	1	2	1	2	2	1	2	1	-	-
CO3	2	3	2	2	2	1	2	2	2	1	2	2	1	-	-
CO4	3	2	2	2	1	1	2	1	2	2	2	2	1	-	-

Semester – II							
Code: RT 201TC	Title :Fundamentals of medicinal plants				Max. Marks		
Type: Core	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs		CIA	ESE	Total
					30	70	100
CO1	Identify medicinal plant and collection of botanical information.						
CO2	Understand cultivation technique of medicinal plants.						
CO3	Understand various processing of crude drugs.						
CO4	Create documentation of medicinal knowledge and conservation.						
Unit	Contents					Bloom's Corresp ondence	COs
Unit 1	Methods of plant classification. General Characteristics of Root, Rhizome, Stem, leaf, fruit and Seeds, plant Taxonomy with special reference to the study of Asclepiadaceae, Apiaceae, Chenopodiaceae, Euphorbiaceae, Combretaceae, Liliaceae families. Medicinal plant found in Chhattisgarh.					U	CO1
Unit 2	Propagation of Medicinal Plants- Relation between Nursery & Environmental factors Organization and development of Nursery, components, operations, propagation through cutting, budding, layering, grafting.					U	CO2
Unit 3	General aspects & Medicinal values of Kalanchoepinnata, Ipomoea nil, Mucunapruiens, Piper nigrum, Plumbagozeylanica, Aconitum nepalus, loriosasuperba, Aeglemarmeloes, Vitisvinifera, Cinnanomumsp., <i>Crocus sativus</i> , <i>TinosporaCardifolia</i> (Frei). Ecological Management of Pest, Habitat diversification, Water management, Physical and Biological Control of pest, Bio-pesticides and its types.					U	CO3
Unit 4	Market potential of crude drugs, legislation and policy of medicinal plants - National and State Medicinal Plant Board, Conservation of medicinal plants, Goals of national policy, Future action plan. WHO guidelines for assessment of herbal drugs, objective for improvement, and its strategy.					Ap	CO4

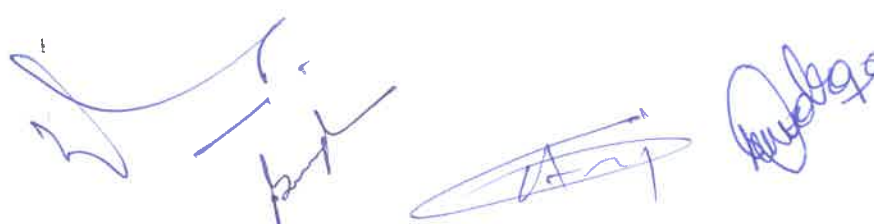


References	
Text/Reference Books	Medicinal plants of India Vol 1 & 2 ICAR – Kartikar & Basu. Compendium of Indian Medicinal plants Vol 1-4 -R. P. Rastogi & B.N. Mahrotra. Indigenous medicinal specialties - U.S. Narayan Rao. Useful plant of Neotropical origin – Heing Brucher. , Plant Taxonomy- O.P. Sharma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

Semester – II						
Course Code: RT 201PC	Course Title: Fundamentals of medicinal plants- Practical			Max. Marks		
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs		CIA 30	ESE 70	Total 100
Field based/Laboratory exercises:						
1. Acquire operative knowledge and be able to carry out technical regarding medicinal plants.						
2. Learn about the medicinal plants and their derivatives for use in herbal, food and cosmetic products.						
3. Learn the skill of recognition, collection and preservation of medicinal plants						

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	1	1	1	2	1	-	1	-	2	1	-	-
CO2	3	2	1	1	1	1	2	1	-	1	1	2	1	-	-
CO3	2	3	1	1	2	1	2	1	-	1	1	2	1	-	-
CO4	3	2	1	1	1	1	2	1	-	1	1	2	1	-	-



Semester –II				
Code: RT201TE	Title :Vermi Culture		Max. Marks	
Type: Core	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA 30	ESE 70 Total 100
CO1	Knowledge about the earth worm and its ecology.			
CO2	Understanding the vermin- culture and its utility.			
CO3	Able to develop and produce the vermin-compost.			
CO4	Aware the different methods of vermin-compost preparation.			
Unit	Contents		Bloom's Correspo ndence	COs
Unit 1	Basic body structure of earthworm (General body plan, Prostomium, Peristomium, Metamerism, Cuticle, Setae, Different body pores, Clitellum, Digestive system). Earthworm Ecology: Distribution; Food habit and habitat; Ecological requirements: moisture, temperature, pH, organic matter etc.; Ecological categories: Epigeic, Endogic and Anecicearthorms; Ecosystem services i.e. role played by earthworms in soil ecosystem. Reproduction: Hermaphroditism, Copulation and cocoon formation, Cocoon structure, Incubation period of cocoon in vermin-composting earth-worm, Fecundity in surface dwelling (epigeic) and soil dwelling (endogeic and anecic) earth-worm.		U	CO1
Unit 2	Vermi-culture: Definition, Difference between vermin-culture and vermin-composting, Selective features of earthworms for venniculture and vermin-composting, Method of vermin-culture of phytophagous and geo-phagous earthworm, Utility of vermin-culture (protein source for pisci-culture, poultry farming, piggery etc., application in vermin-composting).		U	CO2
Unit 3	Vermi-composting: Definition, Habitat of vermin-composting earthworms, Scientific names of native and exotic vermin-composting earthworms (Native Indian earth-worms Perionyx excovatus, Perionyx ceylanensis, European earthworms'. Eisenia fetida, Eisenia andrei, South African earthworms. Eudriluseugeniae). Selective features of earthworm species for Vermen-composting, Principle of vermin-composting, Components of the vermin-composting System (Appropriate species of earthworms with suitable population characteristics, proper substrate, optimum environmental factors under Indian condition, Design and operations to be implemented).		Ap	CO3

Unit 4	Methods of vermin-composting * (a) Low cost floor beds, (b) Tank system; Management during vermin-composting; Products of vermin-composting: earthworm biomass (vermin-protein) and vermin-compost. Definition of vermin-compost; Physicochemical features of vermi-compost; Role of earthworm and vermin-compost in growth of plants; Vermi-wash and its utility in agriculture.	Ap	CO4
References			
Text/Reference Books	<p>Chaudhuri, P.S. (2005). Vermi-culture and vermin-composting as biotechnology for conversion of organic wastes into animal protein and organic fertilizer. Asian Jr. of Microbial. Biotech. Env. Sc.. 7(3):359-37</p> <p>Chaudhuri, P.S. (2006). Kenchor Jeevan Baichitra: KenchoProjukti. Jyan BichitraPrakashani, Tripura, ISBN: 81-8266-088-2, 128 pages. 1 ll.</p> <p>Das, M.C. QAD). Charles Darrvin's Plough. Tools for Vermitechnology. I K International Publishing House. ISBN: 978-93-81 141-27 , 182 pages.</p> <p>Isrnail, S.A. (j997). Vermicology - The Biology of Earthworms. Orient Longman ,92 pages.</p> <p>Kals; R.D. (1998). Earthworms: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore;</p>		

Semester – II						
Course Code: RT201PE		Course Title: Vermi Culture- Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA	ESE	Total	
			30	70	100	
Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. Identification of species and different part of earth warm. 2. Production system and procedure of vermin culture. 3. Production technique of vermin-compost. 						

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	2	1	1	-	-	-	1	-	2	1	-	-
CO2	3	2	1	1	1	-	2	1	-	1	1	2	1	-	-
CO3	2	3	2	2	2	-	-	1	-	1	-	2	1	-	-
CO4	3	2	1	1	1	1	2	1	-	1	1	2	1	-	-

Semester –II						
Code: RT202TE	Title :Drug Formulation and extraction			Max. Marks		
Type: Core	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs		CIA 30	ESE 70	Total 100
CO1	Understand the constitution of drug and drug delivery system.					
CO2	Learn drug formulation and extraction phenomenon					
CO3	Carry out evaluation of marketed ayurvedic and herbal formulations.					
CO4	Conduct parameters and in vitro assays for correlation with biological efficacy of drugs.					
Unit	Contents			Bloom's Corresp ondence	COs	
Unit 1	Introduction to Dosage forms- Desirable properties, classification and application of dosage forms, New drug delivery system. Drug formulation Pharmacopeial preparations, principles and methods of preparation of aromatic waters, spirits, elixirs, syrups, tincture solution and special preparation of mouthwashes.			U	CO1	
Unit 2	Principles and methods of extraction, theory of drag extraction, Hydro-distillation, expression, quality assurance of essential oils maceration, digestion, percolation, soxhclation, super critical fluid extraction, other extraction methods			U	CO2	
Unit 3	Aromatic Plants History, Revenue potential, industrial significance, medicinal uses cultivation and management of aromatic plants-Camphor, Citronella, Eucalyptus, Lavender, Lemongrass, Mints, Palmarosa, Sandalwood.			U	CO3	
Unit 4	Analytical pharma-cognosy Drag adulteration, Drug evaluation- morphological, microscopic chemical Phytochemical investigation, physical, biological evaluation, hepatoprotective activity, hypoglycaemic activity, antifertility testing			Ap	CO4	
Reference						
Text/Refer ence Books	<ul style="list-style-type: none"> ✓ Medicinal plants of India. Vol 1 & 2 ICAR by Kirtikar& Basa ✓ Indigenous medicinal specialties: 11.8. Naraysa Rao ✓ Useful plant of Neotropical origin: Heing Bruscher ✓ Cultivation and utilization of Aromatic plant C.K. Atal and B.M Kapoor 					



Semester – II						
Course Code: RT202PE		Course Title: Drug Formulation and extraction- Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours : 32 hrs			
	CIA	ESE	Total			
	30	70	100			
Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. Study of traditional plant and their part used as folklore medicine. 2. Extraction and distillation of Eucalyptus, Lemongrass, Mints, Sandalwood, 3. Extraction of volatile oil, Extraction of tannin. 4. Formation of Aromatic water, spirits. 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 						

COs and POs/PSOs mapping and C_e relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	2	-	1	1	-	1	-	1	1	2	1	-	-
CO2	3	2	1	-	1	1	2	2	-	1	1	2	1	-	-
CO3	3	2	2	-	1	1	-	2	-	1	1	2	1	-	-
CO4	3	2	1	-	1	1	2	1	-	1	1	2	1	-	-

Semester –II						
Code: RT203TE		Title :Instrumental and Techniques			Max. Marks	
Type: Core	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs			
	CIA	ESE	Total			
	30	70	100			
CO1	Understand principle and functioning of various instruments generally used in drug evaluations.					
CO2	Enhance their technical skills on slide preparation.					
CO3	Understand biotechniques used in drug evaluations					
CO4	Enhance their technical skills on slide preparation for histomorphology					

Unit	Contents	Bloom's Correspondence	COs
Unit 1	Principle, structure, functioning and applications. Type of microscopy- Light microscopy, Phase contrast microscopy, Fluorescence microscopy, Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM).	U	CO1
Unit 2	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.	U	CO2
Unit 3	Spectrophotometry Principle, Functioning and application of colorimetry, UV-Vis spectrophotometry, fluorimetry and atomic absorption spectrophotometry.	U	CO3
Unit 4	Microtomy and Histology- Handling of tissues for pathological studies, Rotary microtome and its working, Fixation and Staining, Histological localization and its significance. Innovation and up gradation for agricultural instruments	Ap	CO4
Reference			
Text/Reference Books	<ul style="list-style-type: none"> ✓ Techniques in Microscopy and Cell Biology- VK Sharma ✓ Stereo, Image processing and Quantitative Image Analysis in Biochemical Research-ShashiWadhawa and Amit Dinda ✓ Introduction to Electron Microscopy III Ed.-Soul Wischnitzer, ✓ An introduction to Electrophoresis- K. Anbalgan ✓ Electrophoresis- Smiths 		

Semester – II						
Course Code: RT203PE		Course Title: Instrumental and Techniques- Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA	ESE	Total	
			30	70	100	
Field based/Laboratory exercises: <ol style="list-style-type: none"> 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. 						



COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	-	1	-	-	-	-	1	-	2	1	-	-	3
CO2	3	2	1	-	1	-	2	1	-	1	1	2	1	-	-	3
CO3	2	3	2	-	2	-	-	-	-	1	1	2	1	-	-	2
CO4	3	2	1	-	1	1	2	1	-	1	1	2	1	-	-	3

A collection of handwritten blue ink marks, including several signatures and scribbles, located below the table.

Semester – II				
Code: RT204TE	Title : Mushroom Culture		Max. Marks	
Type: Core	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA 30	ESE 70
			Total 100	
CO1	Identify edible and non-edible mushrooms.			
CO2	Learn mushroom production techniques and their management.			
CO3	Build up the efficiency of mushroom production, management and marketing.			
CO4	To identify edible types of mushroom. Gain the knowledge of cultivation of different types of edible mushrooms and spawn production To manage the diseases and pests of mushrooms and to evolve themselves towards self-employment and income generation.			
Unit	Contents	Bloom's Corresp ondence	COs	
Unit 1	Introduction- Distribution, History and scope of Mushrooms, Characteristic features of Basidiomycotina fungi.	U	CO1	
Unit 2	Identification of commonly grown mushroom species, Edible mushroom and their characteristics, Nutritional value of Mushrooms, Features of poisonous mushrooms, Medicinal mushrooms and their properties.	U	CO2	
Unit 3	Spawn production technique- Equipments, mother culture preparation technique and their management. Production Techniques of Oyster Mushroom, Paddy Straw Mushroom, White Button Mushroom and White Milky Mushroom.	Ap	CO3	
Unit 4	Post-harvest handling of mushrooms, Problems related to mushroom production, Management of pests and diseases.	Ap	CO4	
Reference				
Text/Refer ence Books	The Mushroom Identifier- David Pegler & B. Sproner. Mushroom Cultivation- B. Tripathi & H.P. Shukla Mushroom Growing- S.C. Day			

Semester – II							
Course Code: RT204PE		Course Title: Mushroom Culture- Practical			Max. Marks		
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours : 32 hrs		CIA	ESE	Total
						30	70
Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. Identification of different mushroom species. 2. Equipment's used in mushroom production. 3. Culture preparation and Spawn preparation. 4. Different types of mushroom production. 5. Different types of Mushroom bed preparation. 6. Mushroom hut management. 7. Study of different types of pests and diseases of mushroom. 							

COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	1	1	1	1	2	2	1	1	-	1	2	1	-	-
CO2	3	1	1	1	2	2	2	1	1	-	1	2	1	-	-
CO3	3	1	1	1	2	2	1	-	1	-	1	2	1	-	-
CO4	3	1	1	1	3	2	1	1	1	1	1	2	1	-	-

Semester – II							
Code: RT205TE		Title :Beekeeping Techniques			Max. Marks		
Type: Core	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs		CIA	ESE	Total
						30	70
CO1	Understand the different species of honey bee.						
CO2	Aware about economic importance and ecological benefits of beekeeping						
CO3	Enhance their knowledge and technical skills on beekeeping.						
CO4	Understand about artificial bee keeping and various commercial products of honey and beeswax.						

Unit	Contents	Bloom's Correspondence	COs
Unit 1	Introduction: Introduction to beekeeping, beekeeping in India, benefits of beekeeping, honey bee products, potential market of bee product, nature of work, the world of honey bees: honey how species of economic importance, bee biology, castes of bees, stages of development in honey bee's differential in honey bees, bee food plants, communication among bees.	U	CO1
Unit 2	Beekeeping equipment's: Fixed come hives, movable-comb hives, movable-frame hives, specifications of beehive-Langstroth ten frame hive, Newton's bee, advantages of routing bees in modern bee hive, other beekeeping equipment's hive stand, smoker, protective equipment's, comb foundation sheet, dummy division board / movable wall, porter bee escape board, drone excluder drone trap, swarm trap, pollen trap, division board / sugar feeder and various hive tools.	U	CO2
Unit 3	Site selection and management: Selection of site, starting a colony, establishment of a beehive-capturing a swarm of bees, purchase a packaged bee colony, using nucleus, division of colony, inspecting the bee colony, safety measures, apiary management- colony inspection, cleaning in beehives, feeding bees with sugar syrup, addition of artificial comb foundation seeds, bee swarming and its management-control of swarming, collecting swarm uniting bee colonies (newspaper method), crop management for beekeeping, extraction of honey, Seasonal management, precautions while handling the bees, beekeeping records, management bees colonies for pollination, advantages of bee pollination.	U	CO3
Unit 4	Rearing and protection management: Bee breeding and queen rearing bee breeding, caring of queen bee, types of queen rearing, biological basis of queen rearing, selection of Mather stock, production of better quality queens, methods of queen rearing- Alley's method, Millers method, grafting method (Doolittle method); queen rearing time table, queen cell builders, instrumental insemination, equipment's, scope, benefits of bee breeding, migration of bee colonies, migratory beekeeping problems, various pests and diseases of honey bees and their management. Harvesting, processing and marketing of bee products: Collection of nectar and honey, harvesting of honey, composition of fully ripened honey, physical properties of honey, grading of honey, packaging and labelling, uses of honey, storage, honey standards, Indian honey regulations, bee wax- composition and property, processing, uses of bee wax; bee venom- properties, production, uses; propolis- propolis collection technology, properties and uses; royal jelly- properties, production and uses; pollen- composition, pollen collecting technology; marketing of bee products, constraints in honey production, government schemes and policies related to beekeeping.	Ap	CO4
Field based course			



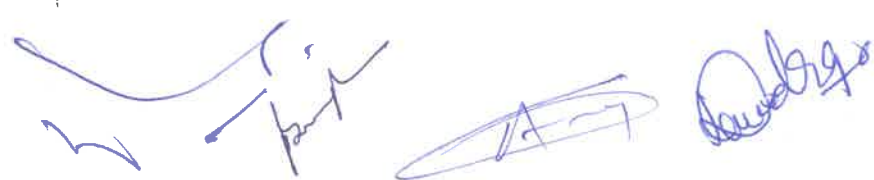
	Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. Identification of honey bee. 2. Study of equipment's used in bee keeping. 3. Study of methods of queen rearing techniques. 4. Study of extraction and processing of honey. 5. Microscopy of different pollens. 6. Study of different diseased condition of honey bees. 7. Identification of pests of honey bees. 8. Study of honey quality. 		
Reference			
Text/Reference Books	<ul style="list-style-type: none"> ✓ Chapenare: The Insects: structure and function 94 ed, 1998, ELBS) ✓ Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house) ✓ Megavin: Essential Entomology 92001, Oxford Univ Press) ✓ Srivastava: A Textbook of Applied Entomology, Vol.I &Vol.II (1993, Kalyani Publishers) Insect. Ramesh Arora and GS Dariwai ✓ The The World of HoneyBee. A.S.Atwal ✓ Bee Keeping for pleasure and profit. Moh. Naim. ✓ Honeybee Disease and Management. D.P.Abrol. 		

Semester – II						
Course Code: RT205PE		Course Title: Beekeeping Techniques - Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA	ESE	Total	
			30	70	100	
	Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. Identification of honey bee. 2. Study of equipment's used in bee keeping. 3. Study of methods of queen rearing techniques. 4. Study of extraction and processing of honey. 5. Microscopy of different pollens. 6. Study of different diseased condition of honey bees. 7. Identification of pests of honey bees. 8. Study of honey quality. 					

COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	-	1	1	2	1	-	1	1	2	1	-	-
CO2	3	2	1	-	3	2	2	1	-	1	1	2	1	-	-
CO3	3	2	1	-	2	1	2	-	-	1	1	2	1	-	-
CO4	3	2	1	-	3	1	2	1	-	1	1	2	1	-	-

Semester – III						
Code: RT301TC		Title :Remote Sensing and GIS for Rural Planning			Max. Marks	
Type: Core	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs		CIA	ESE	Total
				30	70	100
CO1	Obtain fundamental knowledge of remote sensing and gain basic experience in hands on application of remote sensing.					
CO2	Aware with the prospect and potential of remote sensing and its application in the field of rural development.					
CO3	Understand the software of remote sensing and GIS application in the field of rural development.					
CO4	Interpret the remotely sensed data					
Unit	Contents			Bloom's Corresp ondence	Cos	
Unit 1	Concepts & Fundamental of Remote Sensing: Introduction, Early History, Energy Sources & Radiation Principles, Energy Interactions in the atmosphere. Energy Interactions with Earth surface. Features, Spectral Reflectance of vegetation, Soil & water etc. Real and ideal remote sensing.			U	CO1	
Unit 2	Photo-Grammetry: Introduction, Types of Aerial Photographs, Basic principles of Photogrammetry. Geometry of a vertical aerial photograph, photographic Scale. Applications of vertical aerial photograph. Stereo-photogrammetry: Stereo models, Stereoscopic Vision.			U	CO2	
Unit 3	Satellites and sensor, imaging and non-imaging sensor, Different satellite related with remote sensing. Digital Image Processing (DIP): Introduction, Preprocessing of image – Image interpretation, Geometric & Radiometric Correction, Image Enhancement. Microwave Remote Sensing Introduction, sensors, synthetic aperture RADAR, radar returns and image signatures, radar image characteristics, Remote Sensing Satellite Orbit- Geosynchronous orbit, Sun synchronous orbit. Thematic Image classification and information Extractions			An	CO3	



Unit 4	Global Positioning System: Definition, main segment, types, uses, nature and sources of errors in GPS signals. Geographical information system: Introduction, component of GIS, role of remote sensing and GIS in the Chhattisgarh region, Spatial Data information, Image Interpretation.	Ap	CO4
Reference			
Text/ 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. Remote Sensing principals and application- Dr. B. C. Panda		

Semester – III						
Course Code: RT301PC		Course Title: Remote Sensing and GIS for Rural Planning- Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours : 32 hrs	CIA	ESE	Total
					30	70
Field based/Laboratory exercises: <ol style="list-style-type: none"> 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 neural network classification), Vegetation indices. 3. Creation of digital elevation model through contour digitization and surface hydrology. 4. Digitization of different features of given topo-sheet. Editing attributes of geo-database features. Creating different features like polygon line, tic, polyline etc. 5. Creation of personal geo-database. 						

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	2	2	1	1	2	1	1	2	1	2	1	-	-
CO2	3	2	2	2	1	1	1	1	1	2	1	2	1	-	-
CO3	2	3	2	2	1	2	1	1	1	2	1	2	1	-	-
CO4	3	1	1	2	1	1	2	1	1	2	1	2	1	-	-

Semester –III					
Code: RT301TE	Title :Entrepreneurship and Small Business Technology and Management		Max. Marks		
Type: Core	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA 30	ESE 70	Total 100
CO1	Understand entrepreneurship and qualities about an entrepreneur.				
CO2	Aware about the MSME, their function and its role in self employment.				
CO3	Understanding about the project, plan of action in any business environment.				
CO4	Knowledge about various state and central schemes for small business establishment.				
Unit	Contents		Bloom's Corresp ondence	COs	
Unit 1	Entrepreneurship- Meaning, definition and concept of Entrepreneurship. Importance of being an entrepreneur, qualities of a successful entrepreneur, types of entrepreneurs, functions of an entrepreneur, issues and problems faced by Entrepreneurs.		U	CO1	
Unit 2	Micro, small and medium enterprises (MSME) -Meaning, characteristics and scope of MSME, classification of MSME, importance of small business in India. Choosing a career, concept of career, importance of choosing a career, career avenues in business, wage, Employment. self - employment. Possible areas of self - employment, qualities required for success in self --- employment.		U	CO2	
Unit 3	Project Management and Setting up a Small Business - characteristics, needs and Classification of a project, phases of project management, roles and responsibilities of project manager, Identifying entrepreneurial Opportunity, Preparing Plan of Action, Deciding the nature and forms of business, Location of Business, Arrangement of Resources, Legal formalities.		U	CO3	
Unit 4	Government Policy towards Small Business Industrial and commercial policy of Chhattisgarh. Schemes and programs for entrepreneurship development. Institutional Support to Small Business: National Small Industries Corporation (NSIC), State Small Industries Development Corporations (SSIDCs), National Bank for Agriculture and Rural Development (NABARD), Khandi and Village Industries Commission (KVIC), Small Industries Service Institutions (SISIS), Small Industries Development Bank Of India (SIDBI), District Industries Centers.		Ap	CO4	



Reference	
Text/Reference Books	S. Kanka: Entrepreneurial Development P. Chandra: Project Planning, Analysis, Selection, Implementation and Review Tata McGraw Hill. VasanthaDesai: Dynamics of Entrepreneurial Development C.B. Gupta & N.P. Sreenivasan: Entrepreneurial Development Dr. Anupam Tiwari: Grain Management: To Ensure Food Security, Marks Books, New Delhi Nirmal K. Gupta: Small Industry - Challenges and Perspectives

Semester – II					
Course Code: RT301PE	Course Title: Entrepreneurship and Small Business Technology and Management- Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours :32 hrs	CIA	ES	Total
			30	70	100
Field based/Laboratory exercises:					
<ol style="list-style-type: none"> 1. Visit of near small scale industry. 2. Visit of NABARD and report preparation. 					

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	2	1	1	-	-	-	2	-	2	1	-	-
CO2	3	2	1	1	1	-	2	1	-	1	1	2	1	-	-
CO3	2	2	2	2	2	-	-	1	-	2	1	2	1	-	-
CO4	3	2	1	1	1	1	2	1	-	1	1	2	1	-	-

Semester – III					
Code: RT302TE	Title : Food Science Technology			Max. Marks	
Type: Elective	Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA	ESE	Total
			30	70	100
CO1	Understand about the meal planning.				
CO2	Learn various method of food preparation.				
CO3	Understand the importance microorganisms in food preservation.				



CO4	Learn various food processing and preservation technologies.		
Unit	Contents	Bloom's Correspondence	Cos
Unit 1	Food Science- Introduction, functions of food, nutrition and nutrients, nutrient requirements, inter relationship of food, nutrition and health. Scope & job opportunities of food science. Govt. Schemes for food processing.	U	CO1
Unit 2	Meal Planning - Food groups, balanced diet, meal planning, importance of meal planning, factors affecting meal planning, modification of family meals for various age groups, need for special diet, Purchase and Storage of Food- Perishability of foods, quality indicators, selection, purchase and storage of food, food spoilage: causes and hazards, safe handling of food.	U	CO2
Unit 3	Preparation of Food - Need for cooking, pre-preparation of food, preparation of food, loss of nutrients, effect of heat on cooking, enhancement of nutritive value, effective use of leftover food. Household Equipment- Classification of equipment's, selection of household equipment's, care and maintenance of household equipment's.	An	CO3
Unit 4	Food Preservation - Meaning and need for preservation, principles of food preservation, household methods of food preservation, importance & uses of Food Preservation. Value addition: Jam, Jelly, Juice, Pickles, Beverage production of different fruit and vegetable. Rural cottage industries for preservation of food and their products.	Ap	CO4
Reference			
Text/ Reference Books	Textbook of Food Science and Technology - Vijay Khader. Preservation of Fruit and Vegetable - G.Lal, G.S.Siddappa and G.L.Tandon. Food Preservation and Processing - M.Kalia and S. Sood. Grain Management: To Ensure Food Security, Dr.Anupam Tiwari, Marks Books, New Delhi Fruit Preservation- Principles and Methods - S.S.Srivastav - KitabMahal, Delhi		

Semester – III					
Course Code: RT302PE		Course Title: Food Science Technology- Practical		Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA	ESE	Total
			30	70	100
Field based/Laboratory exercises:					
<ol style="list-style-type: none"> Study of basic instruments used in microbial techniques- Laminar air flow, oven, Incubator, Autoclave. Gram staining technique for the identification of Gram +ve and Gram –ve bacteria. Identification of Nostoc, Anabaena, Rhizopus, Yeast Detection of adulteration in food items. Study of various food preservative methods. 					



COs and POs/PSOs mapping and Co relational matrix

Course Out Come	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	1	1	1	2	1	-	1	1	2	1	-	-
CO2	3	2	1	1	2	1	2	1	-	1	1	2	1	-	-
CO3	3	2	1	1	2	1	1	-	-	1	1	2	1	-	-
CO4	3	2	1	1	3	1	1	1	-	1	1	2	1	-	-

Semester – III							
Code: RT303TE		Title :Lac Production Technique			Max. Marks		
Type: Elective		Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs		CIA	ESE	Total
				30	70	100	
CO1	Understand the basics of lac culture, biology and life cycle of lac insect.						
CO2	Enhance their knowledge and technical skills to produce lac in various host plants.						
CO3	Gain knowledge on scientific method of lac cultivation, processing technique of raw lac, shell and white lac.						
CO4	Develop marketing skill for commercial lac products.						
Unit	Contents	Bloom's Corresp ondence	Cos				
Unit 1	Lac insect: meaning, concept and economic importance of lac cultivation. Classification and morphology and life cycle of lac insect, types of lac insect, history of lac cultivation, area and geographical distribution of lac insect, natural habitat of lac insect, types of lac and its characteristics.	U	CO1				
Unit 2	Lac production in <i>Buteamonosperma</i> : Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni lac insect, selection of trees, pruning of trees. Inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.	U	CO2				
Unit 3	Lac production in <i>Ziziphusmauritiana</i> : Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of rangeeni and kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac.	An	CO3				
Unit 4	Lac production in <i>Schleicheraoleasa</i> : Introduction, history, natural habitat, merits and limitations, lac insect and crop, stages of kusmi lac insect, selection of trees, pruning of trees, inoculation of host tree, removal of used-up broodlac, pest management winter and summer crops, crop harvesting, scraping of lac from sticks, primary processing of lac, storage, transport and marketing of lac. Lac	Ap	CO4				

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

Text/Reference Books	<ul style="list-style-type: none"> ✓ Chapinan: The Insects: structure and function 94 ed, 1998, ELBS) ✓ Imms: A general text book of entomology, 2 vol. (1997, Asia publishing house) ✓ Megavin: Essential Entomology 92001, Oxford Univ Press) ✓ The Insect. Ramesh Arora and GS Dariwal ✓ Atlas of Indian Lac, Ajit Prasad Jain. ✓ Lac cultivation in India. M.G.Kamath ✓ A handbook of shellac Analysis. G.N.Bhattacharya and P.K.Bose.
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Semester – III

Course Code: RT303PE	Course Title: Lac Production Technique- Practical	Max. Marks			
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours : 32 hrs	CIA 30	ESE 70	Total 100

<p>Field based/Laboratory exercises:</p> <ol style="list-style-type: none"> 1. Identification and preparation of different host plants for lac cultivation. 2. Selection and inoculation of brood lac in host plant. 3. Removal of used-up brood lac sticks from host plants. 4. Processing of lac. 5. Lac crop protection. 6. Study of equipments used in lac cultivation. 7. Identification of lac insect and lac crops.
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COs and POs/PSOs mapping and Co relational matrix

Course Outcome	POs											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	1	-	1	2	1	1	-	1	1	2	1	-	-
CO2	3	2	1	-	3	2	1	1	-	1	1	2	1	-	-
CO3	3	2	1	-	2	2	1	2	-	1	1	1	1	-	-
CO4	3	2	1	-	3	2	1	1	-	1	1	2	1	-	-

Semester – III						
Code: RT304TE		Title :Rural Waste management		Max. Marks		
Type: Elective		Credit : 4 L:T:P= 4:0:0	Teaching Hours : 60 hrs	CIA	ESE	Total
				30	70	100
CO1	Learn broader understandings on various aspects of waste management practiced in industries.					
CO2	Aware about sanitation and waste water management.					
CO3	Learn about waste water management					
CO4	Learn about the recovery of products from waste to compost and biogas, incineration and energy recovery, hazardous waste management and treatment, and integrated waste management					
Unit	Contents			Bloom's Correspondence	Cos	
Unit 1	Introduction of Rural waste, Type of waste, different methods of systematic collection and disposal of waste, Types of sewer. Concept of sewage treatment, principle of primary, secondary treatment and Tertiary treatment of wastewater, General composition of sewage, method of determination of B.O.D. and C.O.D.			U	CO1	
Unit 2	Rural Sanitation- Provision of safe and potable water for domestic purposes, collection and disposal of dry refuse, collection and disposal of sullage, disposal of excreta waste, night soil disposal without water carriage, Construction of low-cost latrines in rural areas Septic tanks, soak pit, privy pit and bore hole privy, can privy, concrete vault privy, aqua privy, PRAI latrine.			U	CO2	
Unit 3	Waste water management- performance criteria Que waste water management system, house drainage plan, classification of traps- P-trap, O-trap, S trap, floor trap, gully trap, intercepting trap. grease trap, principle for efficient drainage system.			An	CO3	
Unit 4	Solid waste management- classification of solid waste, quantity and composition of refuse, collection and removal of refuse, transport of refuse, disposal of refuse controlled tipping, landfill, trenching, dumping into sea, pulverization, incineration, composting- composting by trenching, open window composting, mechanical composting, composting adopted in India, Biogas technology properties of biogas, types of biogas plant recognized of Non-conventional Energy Sources).			Ap	CO4	
Reference						
Text/Reference Books	<ul style="list-style-type: none"> ✓ 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 					

Semester – III							
Course Code: RT304PE		Course Title: Rural Waste management- Practical			Max. Marks		
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours : 32 hrs		CIA	ESE	Total
					30	70	100
Field based/Laboratory exercises: <ol style="list-style-type: none"> 1. To study types of waste material. 2. To study the physical treatment of waste water. 3. To study the biological treatment of waste water. 4. To study the chemical treatment of waste water 5. Visit to sewage treatment plants. 6. To study biogas technology of solid waste management. 7. To study landfill method of solid waste management 8. To study various model of privy. 9. To study biogas technology as solid waste management 							

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	POs											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	-	1	1	1	2	-	2	2	2	1	-	-	3
CO2	3	2	1	-	3	2	1	1	-	2	1	2	1	-	-	3
CO3	3	2	1	-	2	1	1	2	-	1	2	1	1	-	-	3
CO4	3	2	1	-	3	2	1	1	-	2	1	2	1	-	-	3

Semester – III							
Course Code: RT305TE		Course Title: Natural Product Management			Max. Marks		
Type: Elective	Credit : 4 L:T:P= 4:0:0		Teaching Hours : 60 hrs		CIA	ESE	Total
					30	70	100
CO1	Aware the forest product and their linkages to livelihood.						
CO2	Gain knowledge of the major classes of natural products with detailed examples.						
CO3	Develop the product as per indigenous knowledge, traditional use and cultural perspectives.						
CO4	Knowledge about the deferent edible forest-based food.						

Unit	Contents	Bloom's Correspondence	COs
Unit 1	Definition, contribution of natural products for National Economy, important product of forest, and their role in rural economy and livelihood, utilization pattern of forest products.	U	CO1
Unit 2	Classification and use, Grasses, bamboos and canes, essential oils from grass, root and flower oils. Methods of extraction of essential oils, distillation, uses of oils, Role of oils and waxes in rural economy.	U	CO2
Unit 3	Tanes and it's uses - Wood tanes, bark tanes, fruit tanes and leaf tanes, 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, catch and charcoal making.	Ap	CO3
Unit 4	Edible foods- leaves and young shoots, flower and young buds, fruits, seeds and nuts, bark and pith, gums, tubers, rhizomes and corms, nutritional value of important of edible food, Special food of Bastar region — Boda, imli, kaju, basta, mata, salfi.	Ap	CO4
Reference			
Text Books /Reference Books	Non Timber Forest Product - S. Negi. Forest Non - Wood Resources - A.P. Devadi. Textbook of Food Science and Technology - Vijay Khader. Preservation of Fruit and Vegetable - G. Lal, G. S.Siddappa and G. L.Tandon. Food Preservation and Processing -M.Kalia and 8. Sood		

Semester – III						
Course Code: RT305PE		Course Title: Natural Product Management-Practical			Max. Marks	
Type: Core	Credit : 4 L:T:P= 0:0:4	Teaching Hours :32 hrs		CIA 30	ESE 70	Total 100
Field/Laboratory based exercises: <ol style="list-style-type: none"> 1. Identification of fibre producing plants. 2. Study of fibre processing techniques. 3. Identification of gum producing plants & characteristics. 4. Tapping & collection of gums from various plant sources. 5. Study of various types of resin & their sources 6. Identification of dye producing plants. 7. Study on dye preparation techniques. 						

Cos and POs/PSOs mapping and Co relational matrix

Course Out-Come	Pos											PSOs			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4
CO1	3	2	2	-	1	-	-	-	-	1	-	2	1	-	-
CO2	3	2	1	-	1	-	2	1	-	1	1	2	1	-	-
CO3	2	3	2	-	2	-	-	-	-	1	1	2	1	-	-
CO4	3	2	1	-	1	1	2	1	-	1	1	2	1	-	-






Semester – IV						
Code: RT401TC		Title: Indigenous Art and Its Management		Max. Marks		
Type: Core		Credit : 4 L:T:P= 03:01:0	Teaching Hours : 60 hrs	CIA	ESE	Total
				30	70	100
CO1	Understand the constitution of drug and drug delivery system.					
CO2	Learn drug formulation and extraction phenomenon.					
CO3	Learn innovation in design and processes					
CO4	Understand the economy and marketing of indigenous art					
Unit	Contents			Bloom's Correspondence	Cos	
Unit 1	Introduction to Indian art, Art scope in Chhattisgarh, Various traditional arts and its importance in Chhattisgarh. Origin and history of Chhattisgarh traditional art, background, different technique related with Chhattisgarh traditional art.			U	CO1	
Unit 2	Bell metal craft (Dhokara Art/Ghardwa Art) - Materials, Processes and techniques. Tribal Iron Art- Materials, processes, techniques and equipments, Woodenart, Terracotta art and Bamboo art - Materials, Processes, techniques, equipments and applications, Stone Art..			An	CO2	
Unit 3	Innovation in Design and Processes- Mixing of modern art with indigenous art, Creativity development in traditional art, required improvement in raw materials and equipment.			An	CO3	
Unit 4	Economy and marketing- Marketing problems related with rural; art; present situation of rural artisans of Chhattisgarh state, role of different government and non-government organization in the development of rural artisans.			An	CO4	
Reference						
Text/ Reference Books	<ol style="list-style-type: none"> 1. Chandra, Seema, Social Problem and Social Works, 2012, ALP Books, ISBN-10 .9382215816 2. Zastrow, Charles, Social Problems: Issues and Solutions, 2000, Wadsworth, 0534523927, 9780534523923 3. Madan, G.R., Indian Social Problems, Allied Publishers Pvt Ltd, 2013, ISBN-13 8184244533-978 : 4. Agrawal, Namita (2002) Women and Law in India, Women Studies and Development Centre, December, New Century Publication. 					

Semester – IV							
Course Code: RT401PC	Course Title: Indigenous Art and Its Management- Practical				Max. Marks		
Type: Core	Credit : 4 L:T:P= 0:0:4		Teaching Hours : 32 hrs		CIA	ESE	Total
					30	70	100
Field based/Laboratory exercises:							
1. Visit of Bell metal craft manufacturing site. 2. Making of bamboo art. 3. Visit of Wooden art and Terracotta art manufacturing site.							

COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	2	-	1	-	1	2	1	2	-	2	1	-	3	-	-	-
CO2	2	3	3	1	1	2	1	1	-	2	1	-	3	1	-	-
CO3	3	2	2	2	1	2	1	1	-	2	1					
CO4	3	2	2	1	1	2	1	1	-	2	1					

Semester – IV						
Code: RT402PR		Title : Focussed Group Discussion, Analysis and Report			Max. Marks	
Type: Research Methodology	Credit : 4 L:T:P= 0:0:04	Teaching Hours : 120 hrs	CIA	ESE	Total	
			100	00	100	
CO1	Able to understand how to conduct a Focus Group Discussion.					
CO2	To develop ability to build relationship with groups and communities.					
CO3	To develop the quality of analyzing the problems of a particular group as well as the ability to think and understand to solve those problems.					
CO4	Able to help the group in getting benefits of government schemes and connecting them with the mainstream.					
Unit	Contents	Bloom's Correspondence	Cos			
Focus group discussion, Analysis and Report	A focus group discussion (FGD) is a good way to gather together people from similar backgrounds or experiences to discuss a specific topic o interest. Students will be divided into some groups. A group of student will select a Focused group. Students will go to the field and study that group. Understand their problems and study what can be done for the development of that group. Students will have to submit FGD report to the department.	U	CO1			
Reference						
Text Books	1. Hennink Monique M., Focus Group Discussion, understanding qualitative research, 2014, Oxford University Press Inc, ISBN 13- 978-0199856169 2. Hennink Monique M., International Focus Group Research, 2014, Cambridge University Press, ISBN 13- 978-0521845618					

COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	2	-	2	-	-	3	2	-	-	-	-	2	2	1	-	-
CO2	-	-	1	-	3	3	-	-	2	-	-	-	2	1	-	-
CO3	3	2	3	2	-	3	-	2	-	3	-	3	-	3	3	3
CO4	2	-	2	-	-	3	3	3	-	3	-	3	-	3	3	3

Semester – IV						
Code: RT403R	Title : Formulation of Research Problem and Review of Literature, Synopsis Presentation, Research Work			Max. Marks		
Type: Research Methodology	Credit : 8 L:T:P= 0:0:16	Teaching Hours : 240 hrs		CIA	ESE	Total
				100	00	100
CO1	Develop the quality to identify the Problems.					
CO2	Describes problem formulation, review of literature related to the study, preparing the research proposal, choosing an appropriate research strategy.					
CO3	Assess to develop instruments of data collection, collecting the data, processing, analyzing and interpreting the data and preparing the research report.					
CO4	Learn Skills and able to apply methods and Principles during the Research, Develop skill to make research report and project report.					
Unit	Contents			Bloom's Correspondence	Cos	
Formulation of Research Problem and Review of Literature, Synopsis Presentation, Research Work	In this part of the course students will be offered to learn research methodology and prepare a small dissertation. The purpose of the research work is to acquaint the student with the methods and Process of research, to make them intelligent and smart users of research work available and also to some extent, to help them to be a producer of a quality research. Each student of Rural Technology has to undertake a research project for investigating any social problem or issue. An effort is made to select subjects of interest to the students and which fall in their field of specialization.			Cr	CO1	

COs and POs/PSOs mapping and Co relational matrix

Course Outcome	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	-	-	3	3	2	-	-	1	3	2	1	-	3
CO2	1	2	1	-	2	3	2	2	2	1	-	3	2	1	-	3
CO3	-	2	-	2	-	3	3	3	-	3	-	3	-	3	3	3
CO4	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	3

Semester – IV					
Code: RT404R	Title : Research Thesis			Type: Research	
Type: Research Methodology	Credit : 4 L:T:P= 0:0:04	Teaching Hours : 60 hrs		CIA 00	ESE 200 Total 200
CO1	Able to use skills and knowledge in the area of interest and understand the day-to-day activity in a Rural Area work field				
CO2	Able to developed to integrate learning and generate new learning by participation through intervention process				
CO3	Able to acquire the knowledge about the direct practice with social issues.				
CO4	Able to do data analysis and report writing, Able to present our research work.				
Unit	Contents			Bloom's Correspondence	Cos
Research Thesis	In this part of the course students will prepare the report of research. Viva-Voce will be conducted by the Department. Viva-voce will be held in the presence of External Examiner appointed by the Vishwavidyalaya.			Cr	CO1

COs and POs/PSOs mapping and Co relational matrix

Course	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	2	2	2	-	-	-	-	2	-	-	-	2	-	3	2	1
CO2	-	2	2	-	-	-	-	2	-	-	-	2	-	3	2	1
CO3	-	-	-	-	-	-	-	-	-	-	-	2	-	3	2	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-

Handwritten signatures and initials of faculty members, including a large signature on the left, a signature in the middle, and a signature on the right.

Semester – IV							
Code: RT404R	Title : Research Thesis				Type: Research		
Type: Research Methodology	Credit : 4 L:T:P= 0:0:04	Teaching Hours : 60 hrs			CIA 00	ESE 200	Total 200
CO1	Able to use skills and knowledge in the area of interest and understand the day-to-day activity in a Rural Area work field						
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COs and POs/PSOs mapping and Co relational matrix

Course Out Come	Pos											PSOs				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	2	2	2	-	-	-	-	2	-	-	-	2	-	3	2	1
CO2	-	2	2	-	-	-	-	2	-	-	-	2	-	3	2	1
CO3	-	-	-	-	-	-	-	-	-	-	-	2	-	3	2	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-

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CO2	-	2	2	-	-	-	-	2	-	-	-	2	-	3	2	1
CO3	-	-	-	-	-	-	-	-	-	-	-	2	-	3	2	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-

