M.Sc. RURAL TECHNOLOGY
(Revised Syllabus w.e.f. the academic session 2023-2024)

Course Code	Course Title	Credit (Marks)					
	Semester I	**Total**	**Theory**	**Tutorial**	**Practical**	**Sessional**	**Credit**
SOA/RT/C001	Integrated Watershed Management	100	2(60)	-	1(20)	20(10+10)	03
SOA/RT/C002	Nursery Techniques & Management	100	2(60)	-	1(20)	20 (10+10)	03
SOA/RT/C003	Project Planning in Extension Education	100	2(60)	1(20)	-	20 (10+10)	03
SOA/RT/C004	Fundamentals of Extension Education	100	2(60)	1(20)		20 (10+10)	03
SOA/RT/C005	Research Methods in Behavioral Science	100	2(60)		1(20)	20 (10+10)	03
SOA/RT/C006	Introduction to Apiculture	100	2(60)		1(20)	20 (10+10)	03
	Total	**600**	**12**	**02**	**04**		**18**
Semester II							
SOA/RT/C007	Soil Science and Agricultural Chemistry	100	2(60)	-	1(20)	20(10+10)	03
SOA/RT/C008	Diffusion & Adoption of Innovations	100	2(60)	-	1(20)	20 (10+10)	03
SOA/RT/C009	Development perspectives of extension education	100	2(60)		1(20)	20 (10+10)	03
SOA/RT/C010	Innovative Technologies for Rural Development	100	2(60)	-	1(20)	20 (10+10)	03
SOA/RT/C011	Participatory Methods For Technology Development and Transfer	100	2(60)		1(20)	20 (10+10)	03
SOA/RT/C012	Mushroom Cultivation Technique	100	2(60)	-	1(20)	20 (10+10)	03
Self-Study: Any One of the following							
SOA/RT/SS001	Rural Tourism	100	2(60)	1(20)	-	20 (10+10)	03
SOA/RT/SS002	Environmental Impact Assessment	100	2(60)	1(20)		20 (10+10)	03
	Total	**600**	**12**		**06**		**18**
Semester III							
SOA/RT/C013	Entrepreneurship Development and Management in Extension	100	2(60)	-	1(20)	20(10+10)	03
SOA/RT/C014	Training for Human Resource Development	100	2(60)	1(20)	-	20 (10+10)	03
SOA/RT/C015	Rural Waste Management	100	2(60)	1(20)	-	20 (10+10)	03
Elective Courses: Any three of the following							
SOA/RT/E001	Environment & Biodiversity Conservation	100	2(60)	1(20)	-	20 (10+10)	03
SOA/RT/E002	Rural Marketing and Management	100	2(60)	1(20)		20(10+10)	03
SOA/RT/E003	Fundamentals of Remote Sensing and GIS	100	2(60)		1(20)	20 (10+10)	03
SOA/RT/E004	Medicinal & Aromatic Plants(MAPs)	100	2(60)		1(20)	20 (10+10)	03
		600	**12**	**04**	**02**		**18**
Semester IV							
SOA/RT/C016	Master Seminar	100	1(60)	0(20)	-	0(20)	01
SOA/RT/C017	Master Thesis	100	12(60)	0(20)	-	0(20)	12
Elective Courses: Any three of the following							
SOA/RT/E005	Gender sensitization for development	100	2(60)	-	1(20)	20 (10+10)	03
SOA/RT/E006	Post-harvest Techniques of Fruit and Vegetable	100	2(60)	-	1(20)	20 (10+10)	03
SOA/RT/E007	Information And Communication Technology	100	2(60)	1(20)		20 (10+10)	03
SOA/RT/E008	Basic Imaging Technology	100	2(60)	1(20)		20 (10+10)	03
		500	**19**	**01**	**02**		**22**
		2300	**56**	**6**	**14**		**76**

Summary of Credit

Semester	Core Credit	Elective Credit	Self Study	Total Credit
I	18(600)			18(600)
II	18(600)			18(600)
III	09(300)	09(300)	3(100)	18(600)
IV	13(200)	09(300)	3(100)	22(500)
Total	**58(1700)**	**18 (600)**	**3(100)**	**76(2300)**

#There will be 02 internal assessments consisting of 10 marks each for each theory paper/ course. However, it can be internal assessment depending on course teacher.

- **In some paper, Instead of practical there will be Term paper/ Seminar in which students will be asked to prepare a paper on a particular topic and present the same in seminar.**

- **Maximum marks for each course: 100 [40 (20 sessional + 20 Practical/Term paper) + 60 End Term Test]**

Important Point from Academic Ordinances

- In order to qualify for a Two-Year Master's degree a student must acquire a minimum of 76 credits including a minimum of 58 credits in Core and 18 credits in Electives course.

- Maximum 6 credits self study course (one minimum 3 Credits course shall be mandatory but not to be included while calculating the grades).

The Distribution of marks for Dissertation/ Project report & Viva-voce will be as below

Master Thesis / Dissertation	60 Marks
Periodical Presentation	20 Marks
Viva-voce	20 Marks
Total	**100 Marks**

Master Thesis / Dissertation shall be evaluated jointly by Internal and the External Examiner.

DEPARTMENT OF RURAL TECHNOLOGY

H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand, India-246 174

Course Curriculum for M. Sc. Rural Technology, 2023-2024

Course offered

Core Courses

Course No.	Course Title	Credits
SOA/RT/C001	Integrated Watershed Management	03
SOA/RT/C002	Nursery Techniques & Management	03
SOA/RT/C003	Project Planning in Extension Education	03
SOA/RT/C004	Fundamentals of Extension Education	03
SOA/RT/C005	Research Methods in Behavioral Science	03
SOA/RT/C006	Introduction to Apiculture	03
SOA/RT/C007	Soil Science and Agricultural Chemistry	03
SOA/RT/C008	Diffusion & Adoption of Innovations	03
SOA/RT/C009	Development perspectives of extension education	03
SOA/RT/C010	Innovative Technologies for Rural Development	03
SOA/RT/C011	Participatory Methods For Technology Development and Transfer	03
SOA/RT/C012	Mushroom Cultivation Technique	03
SOA/RT/C013	Entrepreneurship Development and Management in Extension	03
SOA/RT/C014	Training for Human Resource Development	03
SOA/RT/C015	Rural Waste Management	03
SOA/RT/C016	Master Seminar	01
SOA/RT/C017	Master Thesis	12
	Total	**58**

Elective Courses

Course No.	Course Title	Credits
SOA/RT/E001	Environment & Biodiversity Conservation	03
SOA/RT/E002	Rural Marketing and Management	03
SOA/RT/E003	Fundamentals of Remote Sensing and GIS	03
SOA/RT/E004	Medicinal & Aromatic Plants(MAPs)	03
SOA/RT/E005	Gender sensitization for development	03
SOA/RT/E006	Post-harvest Techniques of Fruit and Vegetable	03
SOA/RT/E007	Information And Communication Technology	03
SOA/RT/E008	Basic Imaging Technology	03
	Total	**24**

Self-Study Courses

Course No.	Course Title	Credits
SOA/RT/SS001	Rural Tourism	03
SOA/RT/SS002	Environmental Impact Assessment	03

DEPARTMENT OF RURAL TECHNOLOGY

SCHOOL OF AGRICULTURE & ALLIED SCIENCE
HNB GARHWAL UNIVERSITY (A CENTRAL) UNIVERSITY
SRINAGAR GARHWAL, UTTARAKHAND

Revised Syllabus of PG Programme
M.Sc. Rural Technology

M.Sc. I SEMESTER

M.Sc. I Semester		
Course Code: SOA/RT/C001		**Credit-(2+1)**
Course Title: INTEGRATED WATERSHED MANAGEMENT		

Course outcomes:

- The main aim of the course are to preserve and conserve the ecology, restore and develop degraded natural resources by arresting soil loss, improving soil health, soil-moisture regime augmentation, promote water harvesting, recharging ground water, enhance crop production and promote livelihood and gainful employment opportunities for sustainable livelihood.
- The course is conceptualized to provide competency in understanding the impact of landuse changes on various hydrological cycle parameters and soil erosion and choosing suitable soil and water conservation techniques to control it.
- The course is designed as an elective to help capacity building of the candidates to undertake research work or professional assignment in the sub-fields of watershed management, which plays a key role in sustainable development.

Theory

Watershed Management: Definition, size, concept of watershed, effect of watershed on the community, watershed characteristics, objectives of watershed management, selection of watershed, watershed management plan, monitoring and evaluation in watersheds, participatory rural appraisal watershed program (PRA), watershed map, Format for watershed management Plan

Hydrology of Watershed: Precipitation, forms of precipitation, Rainfall pattern in India, Rain fall parameter, Rainfall measurement, Selection of raingauge sites, estimation of runoff, measurement of stream discharge.

Geo-hydrology of Watershed: Availability of ground water, Distribution of subsurface water, soil moisture, aquifer, water table, springs, Ground water recharge, recharges structure, Water harvesting.

Topographic surveying: Elementary surveying equipment, setting out straight lines, setting out contour and graded contour lines and slopes.

Erosion control measures for non-agricultural lands: Soil conservation on wastelands, contour and staggered trenching, gully control structures, Check dams

Erosion control measures for agricultural lands: Contour cultivation, contour banding, planning of contour bunds, maintenance of bunds, Graded bunds, advantages and disadvantages, bench terracing.

Practical:

Measurement of stream discharge. Water quality analysis (WQA). Techniques of water harvesting tank. Rainfall measurement, Surveying - Plane Table survey (Radiation and Inter section). Preparation of a watershed development plan (agronomic, physical treatment, social etc.)

Suggested Readings

- Integrated Watershed Management: Rajesh Rajora, Rawat Publications, Satyam Apts., Sector-3, JawaharNagar,Jaipur- 302004 Indai.
- Watershed management, Guidelines for Indian conditions: E.M. Tideman, Omega Scientific Publishers, B-17, 2nd Floor, Lajpat Nagar Part 2, New Delhi-110024.
- Watershed Management: M.K. Maitra
- Engineering & General Geology: Parbin Singh
- जलग्रहणप्रबन्धनः बी0 सी0 जाट, पोइन्टरपब्लिषर्स, व्यासबिल्डिंग, एस0 एम0 एस0 हाईवे, जयपुर–302003

M.Sc. I Semester		
Course Code: SOA/RT/C002		**Credit-(2+1)**
Course Title: NURSERY TECHNIQUES & MANAGEMENT		

Course outcomes:

- The aim of the course is to provide knowledge about nursery management its importance and scope of propagation of horticultural nursery management.
- To impart basic knowledge and develop skills about propagating different types of plants by seed, cuttings, budding and grafting, separation, division, layering as well as micro-propagation in commercially viable way.
- To provide basic knowledge about tools, equipments and growing structures used in nursery for plant production.
- To impart knowledge on establishment of commercial plant tissue culture unit.
- Student learnt about role of nurseries in horticulture development – demand and supply analysis of nursery plants.
- Provide knowledge of Selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship and bud wood certification.

Theory

Nursery: Introduction to nursery, Importance and Classification of Nurseries. Establishment of Commercial Nursery Nursery-site selection, lay out, records, Nursery structures.

Nursery management: Progeny orchard, Problems in nursery management and its control, Important Nursery operations - bed Culture, Manure and fertilizers, Irrigation, Protection, Potting, repotting, Lifting, Grading, Storage, Packing and Transportation of nursery plants.

Nursery Propagation: Seed propagation, Germination of seeds, Seed dormancy and viability, Seed testing, Vegetative propagation- cuttings layering, Grafting and budding,

Propagation by specialized by stem and roots, stolons, runners, offsets, bulbs, corms, rooted crowns, Micro-propagation.

Practical:

Study of media preparation for growing of plants in nursery beds, pots and in poly houses, preparation of nursery beds and sowing of seeds, rising of seedlings. Practice of vegetative means of propagations of cuttings layering, Grafting and budding. Practice of construction of propagation structures, study of media and PGR. Visit to Commercial nurseries.

Suggested Readings

- Hartmann HT & Kester DE. 1989. Plant Propagation – Principles and Practices. Prentice Hall of India.
- Bose TK, Mitra SK & Sadhu MK. 1991. Propagation of Tropical and Subtropical Horticultural Crops. NayaProkash.
- Peter KV. (Ed.). 2008. Basics of Horticulture. New India Publ. Agency. Singh SP. 1989 Mist Propagation. Metropolitan Book Co.
- Rajan S & Baby LM. 2007. Propagation of Horticultural Crops. New India Publ. Agency. Radha T & Mathew L. 2007. Fruit Crops. New India Publ. Agency.
- Plant propagation, M. K. Sadhu, New Age International Publishers.

M.Sc. I Semester		
Course Code: SOA/RT/C003		**Credit-(2+1)**
Course Title: PROJECT PLANNING IN EXTENSION EDUCATION		

Course outcomes:

By the End of the course student will be able to

- Develop & Standardize Attitude scale using different techniques of attitude scale construction.
- Develop skills of using Projected & Semi Projected & Semi Projected Techniques, Computer Package analysis and PRO Tools in Extension Research.

Theory

Introduction- definitions – classifications – project risk – scope. Project management – definitions – overview – project plan – management principles applied to project management–project management life cycles

Project planning – scope – problem statement – project goals – Objectives–success criteria – assumptions – risks – obstacles – approval process –projects and strategic planning. Project implementation – project resource requirements – types of resources–men – materials. Project - GOPP/Log Frame analysis

Project monitoring – evaluation – control – project network technique –planning for monitoring and evaluation – project audits – project management information system – 55 project scheduling – PERT & CPM – performance Appraisal- project communication – post project reviews

Closing the project – types of project termination – strategic implications – project in trouble – termination strategies – evaluation of termination possibilities – termination procedures Practical Study of an ongoing extension project. Development of an plan

through GOPP/Log frame Work- Application of PERT & CPM in a hypothetical situation- Application of performance appraisal technique on an ongoing extension project.

Practical: Instead of practical, there will be term paper

Suggested Readings

- Goel. B.B (1987): Project Management- A Development Perspective, Deep Deep Publications, New Delhi.
- Nair. B.M (1985): Project Management- Scheduling and Monitoring.
- Maylor Harvey (2000): Project Management, Pitman Publishing.
- Rao. P.C.K: Project Management and Control, Sultan Chand and Sons Publisher, New Delhi.
- Project Management:S. Choudhury,Tata McGraw Hill Education Pvt. Ltd., 7 West Patel Nagar, New Delhi-110008.
- Projects Planning, Analysis, Selection, Financing, Implementation and Review: Prasanna Chandra,Tata McGraw Hill Education Pvt. Ltd., 7 West Patel Nagar, New Delhi-110008.

M.Sc. I Semester		
Course Code: SOA/RT/C004		**Credit-(2+1)**
Course Title: FUNDAMENTALS OF EXTENSION EDUCATION		

Course outcomes:

- The course is intended to orient the students with the concept of Distance Education, Characteristics of Distance Education, Evolution, Methods of Distance Education, Different Approaches in Planning Distance Education, Educational Technology in Distance Education, Management of Resources for distance education, Strategies for maximizing the reach and programme evaluation and quality assessment.
- The course is intended to orient the students with the concept of extension education and its importance in Agriculture development
- Besides, the students will be learning about the new innovations being brought into the Agricultural Extension in India.

Theory

Analysis of definitions, principles and philosophy of Extension Education. Extension Education as a discipline and profession, objectives and role in development; Historical and emerging perspective of Agricultural Extension in India; Integrated functioning of teaching, research and extension in ICAR and SAUs systems; Participatory extension and participatory research - concepts, modalities and implications; Extension System in India and its linkage with National Agricultural Research Systems. Gender issues in rural development & its implications to Extension Education.

Practical: Instead of practical, there will be term paper

Suggested Readings

- Cernea, M.M.; Russell, J.E.A., and Coulter, J.K. (Eds) (1983). Agricultural Extension by Training and Visit: The Asian Experience. The World Bank, Washington D.C.

- Directorate of Extension (1964). Extension Education in Community Development. Directorate of Extension, Ministry of Agriculture, Government of India,
- Dahama, O. P. and Bhamagar, O. P. (1987). Education and Communication for Development. Oxford and IBH Publishing Co. New Delhi.
- Mosher, A.T. (1978). An introduction to Agricultural Extension. ADC, New York.
- Roling, N. (1988). Extension Science. Information systems in Agricultural Development. Cambridge University Press. New York.

M.Sc. I Semester		
Course Code: SOA/RT/C005		**Credit-(2+1)**
Course Title: RESEARCH METHODS IN BEHAVIOURAL SCIENCE		

Course outcomes:

- This course is designed with a view to provide knowledge and skills in methods of behavioral sciences research.
- Student will learn the Statistical Package for Social Sciences (SPSS) for choosing appropriate statistics for data analysis.
- By the end of the course student will be able to develop skills of theory building and scientific application of theoretical concept in Social Sciences by applying appropriate statistical tests.

Theory

Research – Meaning, importance, characteristics. Behavioural sciences research – Meaning, concept and problems in behavioural sciences research. Types and methods of Research – Fundamental, Applied and Action research, Exploratory, Descriptive, Diagnostic, Evaluation, Experimental, Analytical, Historical, Survey and Case Study. Review of literature – Need, Search Procedure, Sources of literature, Planning the review work. Research problem – Selection and Formulation of research problem and guiding principles in the choice of research problem, Factors and criteria in selection of research problem, statement of research problem and development of theoretical orientation of the research problem.

Objectives– Meaning, types and criteria for judging the Objectivess. Concept and Construct – Meaning, role of concepts in research and Conceptual frame work development in research. Variable – Meaning, types and their role in research. Definition – Meaning, characteristics of 48 workable definitions, types and their role in research. Hypothesis – Meaning, importance and functions of hypothesis in research, Types of hypothesis, linkages, sources, problems in formulation and criteria for judging a workable hypothesis. Measurement – Meaning, postulates and levels of measurement, Use of appropriate statistics at different levels of measurement, criteria for judging the measuring instrument and importance of measurement in research. Validity – Meaning and methods of testing. Reliability – Meaning and methods of testing. Sampling – Universe, Sample and Sampling-Meaning, basis for sampling, advantages and limitations, size and factors affecting the size of the sample and sampling errors – Methods of elimination and minimizing, Maximincon Principle, Sampling – Types of sampling and sampling procedures.

Research Designs – Meaning, purpose and criteria for research design, Types, advantages and limitations of each design. Experimental design – Advantages and limitations. Data Collection devices - Interview – Meaning, purpose, types, techniques of interviewing and advantages and limitations. Enquiry forms and Schedules – Meaning, types of questions used, steps in construction and advantages and limitations in its use. Questionnaires – Meaning, difference between schedule and questionnaire, types of questions to be used, pre – testing of the questionnaires or schedules and advantages and limitations. Check lists – Meaning, steps in construction, advantages and limitations in its use. Rating scales – Meaning, types, limits in construction, advantages and limitations in its use. Observation – Meaning, types, tips in observation, advantages and limitations in its use. Case studies – Meaning, types, steps in conducting, advantages and limitations in its use. Social survey – Meaning, Objectives, types and steps in conducting, advantages and limitations.

Data processing – Meaning, coding, preparation of master code sheet, analysis and tabulation of data, Statistical Package for Social Sciences (SPSS) choosing appropriate statistics for data analysis based on the level of measurement of variables. Report writing – Meaning, guidelines to be followed in scientific report writing, References in reporting.

Practical Selection and formulation of research problem - Formulation of Objectives and hypothesis Selection of variables based on Objectives-Developing the conceptual framework of research. Operationally defining the selected variables-Development of data collection devices.- Testing the validity and reliability of the data collection instruments.- Pre-testing of the data collection instrument-Techniques of interviewing and collection of data using the data collection instruments-Data processing, hands on experiences on SPSS, coding, tabulation and analysis. Formulation of secondary tables based on Objectives of research. Writing report, Writing of thesis and research articles-Presentation of reports.

Suggested Readings

- Chandrakandan K, Venkatapirabu J, Sekar V &Anand Kumar V. 2000. Tests and Measurements in Social Research. APH Publ.
- Kerlinger FN. 1973. Foundations of Behavioural Research. Holt Rhinehart.
- Kothari CR.1984. Research Methodology, Methods and Techniques.Chaitanya Publ. House.
- Mulay S &Sabaratnam VE.1983. Research Methods in Extension Education.Manasavan.
- Ray GL & SagarMondal. 1999. Research methods in Social Sciences and Extension Education. NayaProkash.

M.Sc. I Semester		
Course Code: SOA/RT/C006		**Credit-(2+1)**
Course Title: INTRODUCTION TO APICULTURE		

Course outcomes:

- The course is prepared with the objective of introducing students to the world of honey bees and modern beekeeping. This course starts with importance of apiculture with brief history and information on equipment required, handling of honey bee colonies, seasonal managements and economics has been provided in concise form.

- The course content has been developed to provide student an easy to understanding the needs of the bee colonies during different seasons and providing them space, food and protection from enemies and tips for handling of bee colonies, feeding methods, honey extraction etc.

Theory

Introduction to Apiculture: Definition of apiculture, Importance and future prospects of apiculture, History of apiculture industries in India and world.

Origin and Classification of Bee: Origin, Classification and its silent feature, Species of honeybee and their castes.

Equipments and Appliances: Bee Hive, Comb, other appliances for bee keeping.

Life cycle: Developmental stages of Honey Bees (Egg, Larva, Pupa and Adult) and division of labour, Honey bee senses, Recourse needs of the colony, Artificial feeding of honeybees.

Anatomy of Honey Bees: External anatomy and internal anatomy of bee, Importance of bees in human life.

Properties of Honey: Physical and chemical properties of honey, Honey bee products and their values. **Extraction of Honey:** Extraction handling, processing and storage of honey, Granulation and fermentation of honey, Hydroxy- methyl-furfural (HMF) value.

Honey Processing Unit: Design of honey processing unit.

Diseases Management: Enemies of honeybees, Diseases in apiculture

Practical:

Study the techniques of bee keeping and identification of related equipments, colony formulation, identification of Caste, feeding, honey extraction, migration.

Suggested Readings:

- A handbook of Beekeeping: Dharm Singh/ DevendraPratap Singh, Agrobios, India.
- Beekeeping: . E. F. Phillips, Agro bios, India.

M.SC. II SEMESTER

M.Sc. II Semester		
Course Code: SOA/RT/C007		**Credit-(2+1)**
Course Title: SOIL SCIENCE & AGRICULTURAL CHEMISTRY		

Course outcomes:

- Students will gain knowledge on concepts and principles of Soil Science
- Comprehensive knowledge on rocks and minerals, their composition and the types of soils formed from different parent materials.
- Understand the role of soil forming factors and processes in soil formation
- Understand various soil physical, chemical and biological properties and their impact on plant growth.
- The knowledge gained in this course will be useful in understanding the behavior of soils in crop production and management

Theory

Introduction: Theory Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil;

Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth,

Soil reaction-ph, soil acidity and alkalinity, buffering, effect of phon nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation; soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects;

Soil pollution-behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content. Determination of soil texture by Buckman and Brady Methods. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour by Munsell Soil Colour chart. Estimation of organic matter content of soil

Suggested Readings:

- Engineering & General Geology:**Parbin Singh,** S.K. Kataria& Sons 4424/6, Guru Nanak Market, NaiSarak, Delhi-110006
- Textbook of Soil Science: **R.K. Mehra,** Agriculture Indian Council of Agricultural Research, KrishiAnusandhanBhavan, Pusa, New Delhi-110012.
- Principles and Practice of Soil Science**: Robert E. White,** Wiley India Pvt. Ltd. New Delhi.
- Watershed management, Guidelines for Indian conditions: **E.M. Tideman,** Omega Scientific Publishers, B-17, 2nd Floor, Lajpat Nagar Part 2, New Delhi-110024.
- The Nature and Properties of Soil: Brady, N.C. 1990, McMillan, Eurasia.

M.Sc. II Semester		
Course Code: SOA/RT/C008		**Credit-(2+1)**
Course Title: DIFFUSION AND ADOPTION OF INNOVATIONS		

Course outcomes:

- The students will learn how the agricultural innovations spread among the farmers in the society by getting into the insights of diffusion concept and adoption process, stages of adoption and innovation decision process, adopted categories and their characteristics, opinion leaders and their characteristics, attributes of innovations, and factors influencing adoption.
- In addition, the students would be learning various concepts related to diffusion and adoption of innovations.

Theory

Diffusion – concept and meaning, elements; traditions of research on diffusion; the generation of innovations; innovation-development process; tracing the innovation-development process, converting research into practice.

The adoption process- concept and stages, dynamic nature of stages, covert and overt processes at stages, the innovation-decision process – a critical appraisal of the new formulation.

Adopter categories – Innovativeness and adopter categories, adopter categories as ideal types, characteristics of adopter categories; Perceived attributes of Innovation and their rate of adoption, factors influencing rate of adoption.

Diffusion effect and concept of over adoption, opinion leadership- measurement and characteristics of opinion leaders, monomorphic and polymorphic opinion leadership, multistep flow of innovation; concepts of homophily and heterophily and their influence on flow of innovations; Types of innovation-decisions –Optional, Collective and Authority and contingent innovation decisions; Consequences of Innovation-Decisions – Desirable or Undesirable, direct or indirect, anticipated or unanticipated consequences; Decision making – meaning, theories, process, steps, factors influencing decision – making.

Practical:

Case studies in individual and community adoption process, content analysis of adoption studies, Identification of adopter categories on a selected technology, study of attributes of current farm technologies, Identification of opinion leaders, Sources of information at different stages of adoption on a selected technology, study of factors increasing or retarding the rate of adoption, presentation of reports on adoption and diffusion of innovations.

Suggested Readings:

- Dasgupta. 1989. Diffusion Agricultural Innovations in Village India. Wiley Eastern.
- Jalihal KA &Veerabhadraiah V. 2007. Fundamentals of Extension Education and Management in Extension. Concept Publ. Co.
- Ray GL. 2005. Extension Communication and Management. Kalyani Publ.
- Reddy AA. 1987. Extension Education. Sree Lakshmi Press, Bapatla.
- Rogers EM. 2003. Diffusion of Innovations. 5th Ed. The Free Press, New York.

M.Sc. II Semester		
Course Code: SOA/RT/C009		**Credit-(2+1)**
Course Title: DEVELOPMENT PERSPECTIVES OF EXTENSION EDUCATION		

Course outcomes:

- The course is intended to orient the students with the concept of extension education and its importance in Agriculture development and also to expose the students with various rural development programmes aimed at poverty alleviation and to increase employment opportunities and their analysis.
- Besides, the students will be learning about the new innovations being brought into the Agricultural Extension in India.

Theory

Extension Education – Meaning, Objectives, concepts, principles and philosophy, critical analysis of definitions – Extension Education as a Profession – Adult Education and Distance Education.

Pioneering Extension efforts and their implications in Indian Agricultural Extension – Analysis of Extension systems of ICAR and SAU – State Departments Extension system and NGOs – Role of

Poverty Alleviation Programmes – SGSY, SGRY, PMGSY, DPAP, DDP,CAPART – Employment Generation Programmes – NREGP, Women Development Programmes – ICDS, MSY, RMK, Problems in Rural Development.

Current Approaches in Extension: Decentralised Decision Making, Bottom-up Planning, Farming System Approach, Farming Situation Based Extension, Market– Led – Extension, Farm Field School, ATIC, Kisan Call Centres, NAIP.

Practical:

Visit to Gram Panchayat to study on-going Rural Development Programmes, Visit to KVK, NGO and Extension centers of State Agricultural University and State Departments, Bottom up planning, Report preparation and presentations.

Suggested Readings:

- Jalihal KA &Veerabhadraiah V. 2007. Fundamentals of Extension Education and Management in Extension. Concept Publ. Co.
- Ray GL. 2005. Extension Communication and Management. Kalyani Publ.
- Reddy AA. 1987. Extension Education. Sree Lakshmi Press, Bapatla.
- Rogers EM. 2003. Diffusion of Innovations. 5th Ed. The Free Press, New York.

M.Sc. II Semester		
Course Code: SOA/RT/C010		**Credit-(2+1)**
Course Title: INNOVATIVE TECHNOLOGIES FOR RURAL DEVELOPMENT		

Course outcomes:

- The main aim of the study of this course is to Improving the quality of life of the rural population by introducing new technologies to farmers. Student learnt about different earthworm species its morphology, anatomy and use of earthworms, vermicomposting materials, requirement of vermiculture and vermicomposting
- Course provide knowledge of vermiculture and effect of vermiwash in agricultural crops. Student also learnt about biocomposting and methods of different types of composting harvesting and marketing of compost and the basics of organic farming and certification organic products.

Theory

Vermi Technology: Earthworm classification, Species, External and internal features of verms, Use of earthworms, vermicomposting materials, requirement of vermiculture and vermicomposting, Factors affecting earth worm's growth, Types of vermicomposting, methods of vermicomposting, Harvesting and storage of vermicompost, advantages of vermicompost, Use and benefits of Vermicompost, Effect of vermicompost on plants, chemical composition of vermicompost, vermiwash (worm-tea), Chemical composition of vermiwash, Use and advantages of vermiwash.

Biocomposting: methods of biocomposting, decomposition process, difference between biocompost and Farm yard manure (FYM), Materials used in biocompost, advantages of biocompost. Precaution needed for compost preparation.

NADEP Compost: Preparation of NADEP compost, construction and design of NADEP compost tank, Material use for preparation of NADEP compost, Substrate use for the production of compost.

Organic Farming: Definition, its components, importance and certification.

Practical:

Study the pit construction, different types of worms used for vermicompost, pit installation, compost preparation, removal of compost from the pit and reinstallation, Preparation of Nadep compost.

Suggested Readings

- Vermiculture and Organic Farming, T. V. Sathe, Daya Publishing House, New Delhi.
- A Hand book of Organic Farming: Arun K Sharma Agro bios Inida, New Delhi.

M.Sc. II Semester		
Course Code: SOA/RT/C011		**Credit-(2+1)**
Course Title: PARTICIPATORY METHODS FOR TECHNOLOGY DEVELOPMENT AND TRANSFER		

Course outcomes:

- This course is intended to orient the students with the key concepts, principles process of different participatory approaches for technology development and transfer and also to expose the students with various participatory tools and techniques like space related, time related, and relation oriented methods.
- Besides the students will be learning the preparation of action plans participatory monitoring and evaluation.

Theory

Participatory extension – Importance, key features, principles and process of participatory approaches; Different participatory approaches (RRA, PRA, PLA, AEA, PALM, PAR, PAME, ESRE, FPR) and successful models.

Participatory tools and techniques. Space Related Methods: village map (social &resource), mobility services and opportunities map and transect; Time related methods: time line, trend analysis, seasonal diagram. Daily activity schedule, dream map; Relation oriented methods: cause and effect diagram (problem tree), impact – diagram, wellbeing ranking method, Venn diagram, matrix ranking, livelihood analysis.

Preparation of action plans, concept and action plan preparation; Participatory technology development and dissemination; Participatory planning and management, phases and steps in planning and implementation aspects; Process monitoring, participatory evaluation.

Practical

Exercises on space related methods, time related method and relation oriented methods; Documentation of PTD and dissemination; Preparation of action plan; Participatory monitoring and evaluation of developmental programmes.

Suggested Readings

- **Adhikary. 2006**. Participatory Planning and Project Management in Extension Science. Agrotech Publ. Academy.
- **Mukharjee N. 2002.** Participatory Learning and Action. Concept Publ. Co.
- **Singh BK. 2008.** PRA/PLA and Participatory Training. Adhyayan Publ. & Distr.
- **Somesh Kumar. 2002**. Methods for Community Participation. Vistaar Publ.

M.Sc. II Semester		
Course Code: SOA/RT/C012		**Credit-(2+1)**
Course Title: MUSHROOM CULTIVATION TECHNIQUE		

Course outcomes:

- The foremost aim of this course is to promote self-employment.
- The course components comprises of theory and practical components covering important topics such as spawn production, cultivation of button mushroom, oyster mushroom, paddy straw mushroom, milky mushroom and other medicinal mushrooms of economic importance and management of insect pest and diseases of mushroom.
- The course provides knowledge of value addition, entrepreneurial skills and health and safety at workplace etc.

Theory

Introduction to Mushroom, Mushroom Cultivation – History of Mushroom in India and Abroad, Types of edible Mushroom species, Nutritional value of Mushrooms, Medicinal value of mushrooms.

Mushroom Production Technique – Button Mushroom (*Agaricus*), Oyester Mushroom (*Pleurotua)*, Paddy Straw Mushroom (*Volvariella*).

Spawn Production Techniques: Preparation of culture, Mother Spawn Production, Multiplication of spawn.

Post Harvest Handling and Preservation of Mushroom: Harvesting and Packaging, Storage of mushroom, Marketing problems in mushrooms, Future prospects of Mushroom in India.

Disease and pest management.

Practical:

Identification of different mushroom species, mushroom production, Preparation of medium for mushroom cultivation, spawn mixing, packaging, mushroom recopies.

Suggested Readings

- Mushroom: Cultivation and Use ,Suman and Sharma, Agrobios India.
- Mushroom Growing, S. C. Day, Agrobios India.
- Mushroom: Production and Processing Technology, Pathak Yadav Gour, Agrobios India.
- Mushroom and their Cultivation Technique, R. C. Ram, Aavishkar Publishers, Distributors, Jaipur India.

SELF STUDY

M.Sc. II Semester		
Course Code: SOA/RT/SS001		**Credit-(2+1)**
Course Title: RURAL TOURISM		

Course outcomes:

- The course provides knowledge about the potential customer of rural tourism.
- To orient the students about the challenges and opportunities in rural tourism from both tourist and host concerns and also know about the essential elements for the development of rural tourism.

Theory

Introduction, Tourism, types of tourism, tourism in world, in India, in Uttarkahand, tourism in past, present trends and foresight models of tourism, tourism & sustainable development, sustainable tourism, social tourism, rural tourism. Market share of tourism in world market, world tourism day & motto, Rural tourism & India.

Rural Tourism in India, its scope & importance, rural society of India, cultural aspects of India & tourism, Models of sustainable tourism in India, Rural Tourism components & types of rural tourism.

Economics of tourism, GDP share of tourism in India. Opportunities for development of rural tourism, Challenges in development of rural tourism, benefits & hazards of rural tourism, rural tourism & employment generation in rural India.

Development of rural tourism, selection of theme, selection of site, planning of rural tourism theme, execution of rural tourism theme, promotion & marketing of rural tourism theme, management of resources, security & service, guests feedback.

Practical: Instead of practical, there will be term paper/ assignment.

Suggested Readings

- Rural Tourism, by R. Prudhi
- Rural Tourism and Tribal Development1 December 2006 by S.B. Verma and S.K. Jiloka
- Rural Tourism: New Concepts, New Research, New Practice19 September 2017 by Bernard Lane and Elisabeth Kastenholz
- International rural tourism development: an Asia-Pacific perspective1 July 2017 by World Tourism Organization

M.Sc. II Semester		
Course Code: SOA/RT/SS002		**Credit-(2+1)**
Course Title: Environmental Impact Assessment		

Course outcomes:

- This course is designed to introduce students to environmental impact assessment and to provide theoretical and practical education in this field.
- The focus is on the rationale and methodology of integrated environmental impact assessment (EIA), including consideration of the relevant bio-physical, social, cultural, economic and human health aspects of development proposals, programs and policies.

Theory

Introduction: principles and purpose of IEE and EIA and its significance for the society, Cost and benefits of EIA. EIA involvement during project life cycle. EIA management, principles and management of EIA, main stages in EIA techniques, checklists, scooping, prediction, mitigation and alternatives auditing. EIA techniques, checklists, matrices, network method, remote sensing and GIS. Public consultation in EIA and SEA(Strategic Environmental Assessment).

Practical: Instead of practical, there will be term paper/ assignment

Suggested Readings

- Ecology Environment and Resource Conservation : J.S. Singh, S.P. Singh, S.R. Gupt, Anamaya Publishers, F-154/2, Lado Sarai, New Delhi-110030, India.
- Strategic Environmental Assessment, A Source Book and reference guide to International Experience: Barry Dalal, Clayton &Barrry Sadler, Earthscan U.K
- Environment Impact Assessment: Peter Morris &RikiTherivel.

M.Sc. III Semester

M.Sc. III Semester		
Course Code: SOA/RT/C013		**Credit-(2+1)**
Course Title: ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT IN EXTENSION		

Course outcomes:

- The first part of the course is intended to provide overall picture of planning and development of enterprises for extending sustainable livelihoods for rural people.
- The second part of the course is structured to help the students to gain knowledge and skills in different concepts and techniques of management in extension organizations.

Theory

Entrepreneurship – Concept, characteristics, Approaches, Theories, Need for enterprises development. Agri – entrepreneurship – Concept, characteristics, Nature and importance for sustainable Livelihoods. Traits of entrepreneurs – Risk taking, Leadership, Decision making, Planning, Organizing, Coordinating and Marketing, Types of Entrepreneurs. Stages of establishing enterprise – Identification of sound enterprise, steps to be considered in setting up an enterprise, feasibility report, product selection, risk and market analysis, legal requirements. Project Management and Appraisal – Market, Technical, Financial, Social Appraisal of Projects.

Micro enterprises – Profitable Agri enterprises in India – Agro Processing, KVIC industries. Micro financing – meaning, Sources of Finance, Banks, Small scale industries development organizations. Marketing for enterprises – Concept, planning for marketing, target marketing, Competition, market survey and strategies, Product sales and promotion. Gender issues in entrepreneurship development – Understanding gender and subordination of women, Gender as a development tool, Policy approaches for women entrepreneurship development. Success and Failure stories for enterprises – Issues relating to success and failure of enterprises – Personal, Production, Finance, Social, Marketing.

Management – Meaning, concept, nature and importance, Approaches to management, Levels of management, Qualities and skills of a manager. Extension Management –

Meaning, Concept, Importance, Principles of management, Classification of Functions of Management. Planning – Concept, Nature, Importance, Types, Making planning effective. Change Management – factors, process and procedures. Decision making – Concept, Types of decisions, Styles and techniques of decision making, Steps in DM Process, Guidelines for making effective decisions. Organizing – Meaning of Organization, Concept, Principles, Organizational Structure, Span of Management, Departmentalization, Authority and responsibility, Delegation and decentralization, line and staff relations.

Coordination – Concept, Need, Types, Techniques of Coordination. Interpersonal relations in the organization. Staffing – Need and importance, Manpower planning, Recruitment, Selection, Placement and Orientation, Training and Development – Performance appraisal – Meaning, Concept, Methods. Direction – Concept, Principles, Requirements of effective direction, Giving orders, Techniques of direction. Leadership – Concept, Characteristics, Functions, Approaches to leadership, Leadership styles. Organizational Communication – Concept, Process, Types, Net Works, Barriers to Communication. Managing work motivation – Concept, Motivation and Performance, Approaches to motivation. Supervision – Meaning, Responsibilities, Qualities and functions of supervision, Essentials of effective supervision. Managerial Control – Nature, Process, Types, Techniques of Control, Budgeting, Observation, PERT and CPM, MIS.

Practical

Field visit to Successful enterprises-Study of Characteristics of Successful entrepreneurs Development of Project Proposal -Case Studies of Success / Failure enterprises-Exercise on Market Survey-Field visit to Financial institutions- Simulated exercise to understand management process-Field visit to extension organizations to understand the functions of management -Group exercise on development of short term and long term plan-Simulated exercise on techniques of decision making-Designing organizational structure -Group activity on leadership development skills.

Suggested Readings

- Akhouri, M.M.P., Misra, S.P. and Sengupta, Rita (1989). Trainers Manual on Developing Entrepreneurial motivation, NIESBUD, New Delhi
- Betty Gordan B (1979). Entrepreneurship, Playing to Win, Taraporewala, Bombay
- Entrepreneurship Development Institute of India (1987). Developing New Entrepreneurs EDII, Ahmedabad, NISIET Library: 338.93/EDI/87/25104
- Mancuso, Josheph (1974). The Entrepreneurs Handbook Vol.1 & 2 Artech House Inc. USA
- Patel V.G. (1987) Entrepreneurship Development Programme in India and its relevance to Developing Countries, Entrepreneurship Development Institute of India, Ahmedabad, NISIET Library: 338.93 (540)/PAT/87/25103
- Rao, T.V. (1974) Development of an Entrepreneur: A Behavioristic Model, Technical paper no. 51, (Mimeographed), Ahmedabad, Indian Institute of Management.
- Vasanta Desai. 1997. Small Scale Industries and Entrepreneurship. Himalaya Publ. House.

M.Sc. III Semester		
Course Code: SOA/RT/C014		**Credit-(2+1)**
Course Title: TRAINING FOR HUMAN RESOURCE DEVELOPMENT		

Course outcomes:

- To orient the students about key concepts importance, scope & conceptual frame work, growth & development of Human Resource Development, Subsystems of Human Resource Development for extension organization and process of HRD.

Theory

Human Resource Development – Definition, Meaning, Importance, Scope and Need for HRD; Conceptual frame work, inter disciplinary approach, function systems and case studies in HRD; HRD Interventions– Different Experiences; Selection, Development & Growth- Selection, Recruitment, Induction Staff Training and Development, Career planning; Social and Organizational Culture: Indian environment perspective on cultural process and social structure, society in transition; Organizational and Managerial values and ethics, organizational commitment ; Motivation productivity - job description – analysis and evaluation; Performance Appraisal.

Human Resource management: Collective bargaining, Negotiation skills; Human Resource Accounting (HRA): What is HRA? Why HRA? Information Management for HRA and Measurement in HRA; Intra personal processes: Collective behaviour, learning, and perception ; Stress and coping mechanisms; Inter-Personal Process, Helping Process – communication and Feedback and interpersonal styles; Group & Inter group process: group information and group processes; Organizational communication, Team building Process and functioning, Conflict management, Collaboration and Competition; HRD & Supervisors: Task Analysis; Capacity Building – Counseling and Mentoring; Role of a Professional Manager: Task of Professional Manager – Responsibility of Professional Manager; Managerial skills and Soft Stills required for Extension workers; Decision Making: Decision Making models, Management by Objectives; Behavioural Dynamics :Leadership styles – Group dynamics.

Training – Meaning, determining training need and development strategies – Training types, models, methods and evaluation; Facilities for training – Trainers training – techniques for trainees participation; Research studies in training extension personnel; Main issues in HRD: HRD culture and climate – organizing for HRD – emerging trends and Prospective. Practical Visit to different training organizations to review on going activities & facilities; Analysis of Training methods followed by training institutions for farmers and extension workers Studies on evaluation of training programmes; Study of HRD in organization in terms of performance, organizational development, employees welfare and improving quality of work life and Human resource information, Presentation of reports.

Practical: Instead of practical, there will be term paper

Suggested Readings

- Agochiya D. 2002. Every Trainer's Handbook. Sage Publ.
- David Gross. 1997. Human Resource Management - The Basics. TR Publ.
- Knoontz Harold &Weihhrich Heinz 1990. Essentials of Management. 5th Ed. McGraw-Hill.

- Lynton RP &Pareek U. 1993. Training for Development. DB. Taraporewale Sons & Co.
- Punna Rao P &Sudarshan Reddy M. 2001. Human Resource Development Mechanisms for Extension Organization. Kalyani Publ.
- Rao TV. 2003. Readings in Human Resource Development. Oxford Publ. Co.
- Silberman Mel. 1995. Active Training. Press Johnston Publ. Co., New Delhi.
- Subba Rao P. 2005. Management & Organizational Behaviour. Himalaya Publ. House.
- Sundaram RM, Gupta V, George SS. 2006. Case Studies in Human Resource Management. ICFAI, Hyderabad.
- Tripati& Reddy. 2004. Principles of Management. Tata McGraw-Hill.
- Wayne MR & Robert MN. 2005. Human Resource Management. International Ed. Pearson Prentice Hall.

M.Sc. III Semester		
Course Code: SOA/RT/C015		**Credit-(2+1)**
Course Title: RURAL WASTE MANAGEMENT		

Course outcomes:

- To know the problems related to the waste management and find out their mode of appurtenances. S
- To initiate the awareness toward the cleanliness and waste disposal in rural area.
- The small group of student can promote the rural people by teaching them about the waste disposal.

Theory

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.

Practical: Instead of practical, there will be term paper

Suggested Readings:

- 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,
- P.N. Water Supply Engineering, Standard Book House, Delhi

ELECTIVE COURSE:

M.Sc. III Semester		
Course Code: SOA/RT//E001		**Credit-(2+1)**
Course Title: ENVIRONMENT AND BIODIVERSITY CONSERVATION		

Course outcomes:

- The aim of the course is that the students understand biodiversity in the context of ecosystem dynamics, ecosystem functioning and provision of ecosystem services.
- Students will know how to assess biodiversity with different methodologies and they will be able to conduct a critical analysis of measures to manage biodiversity.
- Students will know how to preserve the diversity of species, sustainable utilization of species and ecosystem and maintain life-supporting systems and essential ecological processes.

Theory

Climatology: Weather and climate, Control of Climate, The Climate System , Climate Anamoly, Variability and change, Koppen's classification of Climate, climate of India, clouds and precipitation, Possible Global climate Change, Greenhouse effect, Greenhouse gases, stratospheric ozone, Strategies for protecting stratospheric ozone.

Pollution: definition, causes, effects and control measures of Air pollution, water pollution, soil pollution, Noise pollution, Pollution case studies.

Biodiversity: Definition, levels of biodiversity, uses of biodiversity, distribution of biodiversity, ecological concept, hot-spots of biodiversity, threats of biodiversity, conservation of biodiversity, India's biodiversity and its conservation, endangered threatened and rare species, IUCN red list categories

Sustainable development and ecological economics, causes of un-sustainability, national and international programme on sustainable development, sustainability indicators, environmental sustainability index, sustainability development in India.

Practical: Instead of practical, there will be term paper.

Suggested Readings:

- Ecology Environment and Resource Conservation :J.S. Singh, S.P. Singh, S.R. Gupt,Anamaya Publishers, F-154/2, Lado Sarai, New Delhi-110030, India.
- Climatology An Atmospheric Science : John E. Oliver, John J. Hidore,Dorling Kindersley (India) Pvt. Ltd.
- Climate Change and Global Warming: AvinashTyagi,Rajat Publications 4675/21, Ansari Road, Daryaganj New Delhi- 110002 (India)
- Cold Climate Hydrometeorology: D.S. Upadhyay,Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi- 110002 (India).

M.Sc. III Semester		
Course Code: SOA/RT//E002		**Credit-(2+1)**
Course Title: RURAL MARKETING AND MANAGEMENT		

Course outcomes:

- To provide an overview of rural markets and emerging perspectives of rural marketing.
- To debate the emerging managerial initiatives and relevant frameworks in rural marketing.
- To share the experiences of institutions engaged in rural marketing in the form of case studies.
- Identify the challenges and opportunities in the field of rural marketing for the budding managers and also expose the students to the rural market environment and the emerging challenges in the globalization of the economies.
- Acquaint the students with the appropriate concepts and techniques in the area of rural marketing.

Theory

Rural Marketing: Definition, Nature, Scope and importance distinction between marketing, selling distribution and evolution of market components and classification of market, Five Ps, Marketing goals, marketing practices, challenges in Indian Rural Marketing.

Marketing Analysis: Marketing environment, macro and micro component and their impact, marketing organization, marketing components and their impact, marketing research, meaning, nature and scope, objectives, marketing research procedure.

Co –operatives: Meaning and Definition of Co-operative movement in India, Basic principles of Co-operative and other lead Bank Agriculture credit societies and its function

Co-operative Marketing: Meaning, definition, Importance, objectives, advantages, need, structure and organization of marketing societies, its financing patterns, critical evaluation of co-operative marketing

Financing: Introduction of rural financing, finance requirements for production and marketing function, source of finance, national level credit Agency-NABARD, Function of NABARD, Schemes and Patterns of NABARD.

Practical: Instead of practical, there will be term paper/ assignment

Suggested Readings:

- Rural Marketing: R.V. Badi, N.V. Badi, Himalaya Publishing House, Ramdoor, Dr. Bhalerao Marg, Girgaon, Mumbai-400004.
- Indian Economy: Misra, Puri, Himalaya Publishing House, Ramdoor, Dr. Bhalerao Marg, Girgaon, Mumbai-400004.
- Rural Marketing (Environment, Problems and Strategies): T.P. Gopalaswamy, Vikas Publishing House Pvt. Ltd, A-22, Sector-4, Noida-201301 (UP).
- Case in Rural Marketing an Integrated Approach: CSG Krishnamacharyulu, LalithaRamakrishnan,Dorling Kindersley (India), Pvt. Ltd.,

M.Sc. III Semester		
Course Code: SOA/RT//E003		**Credit-(2+1)**
Course Title: FUNDAMENTALS OF REMOTE SENSING AND GIS		

Course outcomes:

- To know about Remote Sensing and its uses in various sectors like agriculture, forest, wild life and rural area planning.
- To get knowledge of study area through remote sensing Software.
- Analysis and interpretation of data of study area at different time Interval can be done for research purpose.

Theory

Remote Sensing: Fundamental & concept of remote sensing, Electromagnetic Energy, Energy interaction with Earth surface features, Spectral response of natural earth surface features. Sensor systems used in remote sensing**:** Passive system, Active system, spectral enhancement techniques – NDVI, NDWI

Aerial Photography: Types of Aerial photographs, how aerial photographs are taken. Errors in flying, Geometry of Aerial photographs, aerial camera, and aerial film negative, Stereoscopes, How to order fresh photography.

Global Positioning System: Introduction, space segment, ground control segment, user segment, errors in GPS, applications of GPS.

Principles of Geographic Information System (GIS): Definition, GIS applications, Components of GIS, geographically referenced data, spatial data, attribute data, GIS operations, Types of data structure, Raster and Vector formats, Advantages and disadvantages of various data structure.

Spatial Objects: Points, lines, polygons, relationships between spatial objects, adjacency, connectivity, containment, digital elevation models (DEM)

Data Input: Method of data capture, digitization and scanning methods, data output.

Practical:

Practical on photogrametry, Visual interpretation of aerial photos on different scale, tracing of details from stereo pair, Georeferencing, GPS field study.

Suggested Readings:

- An Introduction to Geographical Information Systems: Ian Heywood, Sarah Conrnelius, Steve Carver, Srinivasa Raju, Dorling Kindersley (India) Pvt. Ltd.
- Concepts and Techniques of Geographic Information Systems: C.P.Lo. Albert, K.E. Yeung, PHI Learning Pvt. Ltd. New Delhi-110001.
- Geographical Introduction Science: Narayan Panigrahi, Universities Press (India) Pvt. Ltd.
- Remote Sensing in Geology: SM. Ramasamy, Rawat Publications, Jaipur and New Delhi.
- Remote Sensing and Image Interpretation: Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman, Wiley India, Pvt. Ltd. Daryaganj New Delhi.
- Geographic Information Systems and Science: Paul A. Longley, Michael F. Good child, David J. Maguire, David W. Rhind, John Wiley & Sons, Ltd.

M.Sc. III Semester		
Course Code: SOA/RT//E004		**Credit-(2+1)**
Course Title: MEDICINAL AND AROMATIC PLANTS (MAPs)		

Course outcomes:

- The aim of the course is to provide knowledge of cultivation and collection of medicinal plants its importance and identifies different medicinal and Aromatic plants available in different parts of the country.
- After completion of the course students will be able to perform nursery management, domestication and harvesting practice of MAPs and can carry out processing of MAPs for value addition.
- Student learn about Improvement and conservation of medicinal plants, breeding technique for medicinal plant improvement, domestication, rear and endangered medicinal plants.

Theory

Introduction of Medicinal and Aromatic Plants: Importance and needs of cultivation of Medicinal and Aromatic plants, Nutritional value, Scope, Development and future prospect , Area and production, Export potential of medicinal and Aromatic plants, medicinal plants found in Uttarakhand.

Origin, distribution, morphological features, climatic and soil requirements, classification, propagation and nursery techniques, transplanting, after care, Harvesting and post-harvest processing, and uses of the following medicinal and aromatic plants.

Medicinal Plants: Amla, Shankhpuspi, Brahmi, Chirayita, Arjuna, Kutki, Harad, Tulsi, Ashwagandha, Aloe-Vera, Sarpgandha, Isubgol, Kuth, Jatamanshi Garlic, Ginger Turmeric, Black pepper, Coriander, Fenugreek, Clove and other species related to local condition.

Aromatic Plants: Lemon grass, Lavender grass, Citronella grass, Geranium, Ocimum, Mentha, Eucalyptus and other species related to local conditions of Uttarakhand.

Improvement and conservation of medicinal plants, breeding technique for medicinal plant improvement, domestification, rear and endangered medicinal plants.

Practical:

Preparation and layout of nursery and field area, preparation of root and shoot cuttings, Methods of seed sowing, Irrigation techniques, Identification of valuable Medicinal Plants, Related indigenous knowledge, Nursery raising techniques, Planting and care, Harvesting, Storage and Preservation of MAPs, Habitat study of MAPs, Herbarium preparation, Cultivation techniques

Suggested Readings:

- A Handbook of Medicinal Plants: A Complete Source Book: Prajapati/ Purohit/ Sharms/Kumar,Agrobios India.
- Herbal and Medicinal Plants of India: Dr. D. K. Bhatt/ Dr. Aparna Raj/ Kiran Bhatt, Shree Publishers and Distributors, New Delhi.
- Introduction to Spices, Plantation Crops, Medicinal and Aromatic Plants**:** N. Kumar/ JBM Md.Abdul Khader/ P. Rangaswami/ I. Irulappan, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

SEMESTER IV

M.Sc. IV Semester		
Course Code: SOA/RT/C016		**Credit-(1+0)**
Course Title: MASTER SEMINAR		

Course outcomes:

- Department will organize in house seminars about pre-discussion of the master thesis topics and Assignments topic.
- Formulate main research question and related questions, and discuss them.
- Understand the logic and implications of the choices they are making when it comes to research methodology and methods

M.Sc. IV Semester		
Course Code: SOA/RT/C017		**Credit-(12+0)**
Course Title: MASTER THESIS		

Course outcomes:

- To build up the efficiency of students regarding research.
- To study the data collection technique on the local research areas. It will help to learn about the idea of dissertation, thesis writings, selection of problems and thesis writing. It will help to presentation of papers. Provide idea of basic research.
- Students will presentation their work. Students can write their Dissertation and paper for Publication. Improve the language and thinking of the students.

Elective Course

M.Sc. IV Semester		
Course Code: SOA/RT/ E005		**Credit-(2+1)**
Course Title: GENDER SENSITIZATION FOR DEVELOPMENT		

Course outcomes:

- In this course the students will learn about an overview of the concept of gender and gender balance on development and develop skills of identifying gender roles, rights, responsibilities and relationships on development.
- Besides the students will also learn the attitudinal change to internalize gender equity concerns as fundamental human rights and also enhance the capability for identifying and analyzing gender issues in agriculture and allied sectors.

Theory

Gender concepts, issues and challenges in development; Gender roles, gender balance, status, need and scope; Gender analysis tools and techniques.

National policy for empowerment of women since independence; Developmental programmes for women; Gender mainstreaming in agriculture and allied sectors –need and relevance; Gender budgeting – A tool for empowering women.

Women empowerment –Dimensions; Women empowerment through SHG approach; Women entrepreneurship and its role in economic development; Public Private Partnership for the economic empowerment of women; Building rural

institution for women empowerment; Women human rights ; Action plans for gender mainstreaming.

Practical

Visits to rural institutions of women for studying in the rural institutions engaged in Women empowerment; Visits to entrepreneurial unit of women for studying the ways and means of establishing entrepreneurship units for Women and their development and also SWOT analysis of the Unit; Visit to Center for women development - NIRD to study the different activities related to projects and research on gender; Visit to gender cell, Office of the Commissioner and Director of Agriculture, Hyderabad, to study the mainstreaming of gender concerns and gender budget of the department.

Suggested Readings

- Grover I & Grover D. 2002. Empowerment of Women. Agrotech Publ. Academy.
- Porter F, Smyth I &Sweetman C.1999. Gender Works: Oxfarm Experience in Policy and Practice. Oxfarm Publ.
- Raj MK. 1998. Gender Population and Development. Oxford Univ. Press.
- Sahoo RK &Tripathy SN. 2006. SHG and Women Empowerment. Anmol Publ.
- Sinha K. 2000. Empowerment of Women in South Asia. Association of Management Development Institution in South Asia, Hyderabad.
- Thakur Joshi S. 1999. Women and Development. Mittal Publ.
- Vishwanathan M. 1994. Women in Agriculture & RD. Rupa Books.

M.Sc. IV Semester		
Course Code: SOA/RT/ E006		**Credit-(2+1)**
Course Title: POSTHARVEST TECHNOLOGY OF FRUITS &VEGETABLES		

Course outcomes:

- This course is an advanced course wherein, various aspects of the "farm to table" theme will be covered.
- Main objectives of the course are to make the students aware about post harvest technology and management of fruits and vegetables.
- The course is designed to give students an understanding on various changes occurring in fruits and vegetables during the pre-and post-harvest stages.
- The students will learn more on physiology and biochemical changes in fruits and vegetables, handling, transportation and preservation/storage of the fresh harvest with emphasis laid on safety and quality evaluation.
- The course will be of immense help to students to have a better understanding of the harvesting systems (traditional and modern), postharvest biology as well as the physiology importance of quality, safety and marketability of the fresh horticultural produce, all of which are directly dependent on the consumers' attitude.

Theory

Introduction: Importance and scope and of fruit and vegetables preservation industry in India, Principles and methods of preservation.

Causes of Post-Harvest Losses: control of post-harvest losses- proper cultural operations, maturity indices of fruits and vegetables, pre-storage treatments, transportation, storage, environmental control, ionizing radiation, post-harvest chemical treatments.

Value Addition: General methods of making Jam, Jelly, marmalades, fruit juices, Pickles, Sauce and chutney, Canning and Bottling, Food spoilage.

Drying/ Dehydration of Fruit and Vegetables: Natural or home drying, commercial dehydration.

Freezing of Fruit and Vegetables: freezing process, methods of freezing.

Marketing: Principles and guidelines for establishment of processing unit. Rural entrepreneurship development for preservation of fruit, vegetables and their products. Quality management for fresh marketing, Marketing of fruits and vegetables and their products, Quality control in food processing- HACCP. List of machineries used in processing industries.

Practical:

Identification of equipments used in preservation, preparation of jam, jelly, squash, juice, chutney, sauce, pickles, estimation of acidity , vitamins C , sugar, T.S.S., and juice content, visit to processing factories.

Suggested Readings

- Fruit and Vegetable Preservation, Principles and Practices: R. P. Srivastava/ Sanjeev Kumar, International Book Distributing Co.
- Post Harvest Management and Processing of fruit and Vegetables- Instant notes: Satish Kumar Sharma, New India Publishing Agency, PitamPura, New Delhi.
- Practical Manual Series-2: Post Harvest technology of Horticultural Crops: S. K. Sharma/ M. C. Nautiyal, New India Publishing Agency, PritamPura, New Delhi

M.Sc. IV Semester		
Course Code: SOA/RT/ E007		**Credit-(2+1)**
Course Title: INFORMATION AND COMMUNICATION TECHNOLOGY		

Course outcomes:

- The course also exposes the students to various Digitized video material in multimedia and also enable to design visuals for print, TV and knowhow about scanning of visuals.
- In this course, students will learn about the concept, meaning and process of communication and various methods and modern media of communication.

Theory

Communication process – concept, elements and their characteristics – Models and theories of communication - Communication skills – fidelity of communication, communication competence and empathy, communication effectiveness and credibility, feedback in communication, social networks and

development communication – Barriers in communication, Message – Meaning, dimensions of a message, characteristics of a good message, Message treatment and effectiveness, distortion of message.

Methods of communication – Meaning and functions, classification, Forms of communication – Oral and written communication, Non-verbal communication,

interpersonal communication, organizational communication, Key communicators – Meaning, characteristics and their role in development.

Media in communication- Role of mass media in dissemination of farm technology, Effect of media mix for rural people, Modern communication media – Electronic video, Tele text, Tele conference, Computer associated instruction, Computer technology and its implications.

Agricultural Journalism as a means of mass communication, Its form and role in rural development, Basics of writing – News stories, feature articles, magazine articles, farm bulletins and folders. Techniques of collection of materials for news stories and feature articles; Rewriting Art of clear writing, Readability and comprehension of testing procedures; Photo journalism, communicating with pictures, Radio and TV journalism, Techniques of writing scripts for Radio and TV.

Practical: Instead of practical, there will be term paper/ assignment

Suggested Readings

- Communication and Instructional Technology. Agrotech Publ. Academy.
- Jana BL &Mitra KP. 2005. Farm Journalism. Agrotech Publ. Academy.
- Ray GL. 2006. Extension Communication and Management. Kalyani Publ. Rayud
- Van Den Ban AW & Hawkins HS. 1998. Agricultural Extension .2nd Ed. CBS.
- Viswanathan M. 1994. Women in Agriculture and Rural Development .Printwell Publ.
- Jitendra Chauhan, 2012. PrasarSikshaAvemSuchna Tantra, Eisha Publication, Agra
- O.P. Dahama,97. Extension and Rural Welfare, Ram Prasad & Sons, Agra

M.Sc. IV Semester		
Course Code: SOA/RT/ E008		**Credit-(2+1)**
Course Title: BASIC IMAGING TECHNOLOGY		

Course outcomes:

- In this course, students will learn the information management and journalistic writing of various information materials and also study their readability.

Theory

Photo Journalism Concept, Scope and Importance, Theory and principles of photography; role of photography in extension; types of camera and their use; essential of a camera; taking indoor and outdoor pictures;

Type of films; darkroom and its requirements; choice of papers; developing agents and their preparation Principles, Selection and Editing of photographs, writing photo features and captions.

Video Production Technology - Concepts, Types of Cameras & Parts, Different formats, Techniques of Planning, Production and Editing, Types of Shots. Audio & Video mixing. Desk Top Publishing

Practical

Designing of layout and Preparation of Agricultural Information Materials, Method of holding and Exposing a Still camera. Writing captions for photographs. Writing Photo

features for photographs. Studying various parts of video camera and Handling of video camera. Audio & Video mixing. Desk Top Publishing

Suggested Readings

- Dahama OP &Bhatnagar OP. 2005. Education and Communication for Development. Oxford & IBH. Grover I, Kaushik S, Yadav L & Varma SK. 2002. Communication and Instructional Technology. Agrotech Publ. Academy.
- Jana BL &Mitra KP. 2005. Farm Journalism. Agrotech Publ. Academy.
- Ray GL. 2006. Extension Communication and Management. Kalyani Publ. Rayud