

DEPARTMENT OF RURAL TECHNOLOGY
M.SC. (AG) AGRICULTURE EXTENSION & COMMUNICATION

Course Code		Course Title	Total Marks	E	I	Credit
SEMESTER FIRST						
SOA/RT/C001	Major Course	Development Perspectives of Extension Education	100	60	40	2(1+1)
SOA/RT/C002	Major Course	Development Communication and Information Management	100	60	40	3(2+1)
SOA/RT/C003	Major Course	Research Methods in Behavioral Science	100	60	40	3(2+1)
SOA/RT/C004	Minor/Supportive Course	Project Planning in Extension Education	100	60	40	3(2+1)
SOA/RT/C005	Minor/Supportive Course	Participatory Methods For Technology Development and Transfer	100	60	40	3(2+1)
SOA/RT/C006	Minor/Supportive Course	Media Management	100	60	40	3(2+1)
SOA/RT/C007	Supportive Course	Agricultural Research, Research Ethics and Rural Development Programmes	100	60	40	1(1+0)
Non-Credit Compulsory Course						
SOA/RT/S001	Non-Credit Compulsory Course	Library and information services	100	60	40	1(0+1)
SOA/RT/S002	Non-Credit Compulsory Course	Technical writing and communication Skills	100	60	40	1(0+1)
Total			700			18
SEMESTER SECOND						
SOA/RT/C008	Major Course	Market led extension management	100	60	40	3(2+1)
SOA/RT/C009	Major Course	Diffusion & Adoption of Innovations	100	60	40	3(2+1)
SOA/RT/C010	Major Course	e-Extension	100			3(2+1)
SOA/RT/C011	Minor/Supportive Course	Entrepreneurship Development and Management in Extension	100	60	40	3(2+1)
SOA/RT/C012	Minor/Supportive Course	Non-Parametrics	100	60	40	3(2+1)
SOA/RT/C013	Minor/Supportive Course	Visual Communication	100	60	40	3(2+1)
Non-Credit Compulsory Course						
SOA/RT/S003	Non-Credit Compulsory Course	Intellectual property and its management in agriculture	100	60	40	1(0+1)
SOA/RT/S004	Non-Credit Compulsory Course	Basic concepts in laboratory techniques	100	60	40	1(0+1)
Total			600	-	-	18

SEMESTER THIRD						
SOA/RT/C014	Major Course	Gender sensitization for development	100	60	40	3(2+1)
SOA/RT/C015	Major Course	Training for Human Resource Development	100	60	40	3(2+1)
SOA/RT/C016	Minor/Supportive Course	Perspectives of Distance Education	100	60	40	3(2+1)
SOA/RT/C017	Minor/Supportive Course	Basic Imaging Technology	100	60	40	3(2+1)
SOA/RT/C018	Minor/Supportive Course	Organisational Behaviour and Development	100	60	40	3(2+1)
SOA/RT/C019	Minor/Supportive Course	Capacity Development	100	60	40	3(2+1)
Total			600	-	-	18
SEMESTER FORTH						
SOA/RT/C020	Major Course	Master Seminar	100	60	40	(0+1)
SOA/RT/C021	Major Course	Master Thesis	100	60	40	12(0+12)
Elective Courses: Any three of the following						
SOA/RT/E001	Minor/Supportive Course	Evaluation and Impact Assessment	100	60	40	3(2+1)
SOA/RT/E002	Minor/Supportive Course	Enabling Innovation	100	60	40	3(2+1)
SOA/RT/E003	Minor/Supportive Course	Mushroom Cultivation Technique		60	40	3(2+1)
SOA/RT/E004	Minor/Supportive Course	Introduction to Apiculture	100	60	40	3(2+1)
SOA/RT/E005	Minor/Supportive Course	Integrated Watershed Management	100	60	40	3(2+1)
Total			500			22
Grand Total(Semester I+II+III+IV)			2400			76

SUMMARY OF CREDITS

I- Internal Assessment,
E- External Assessment

SEMESTER	CORE	ELECTIVE	SELF STUDY	TOTAL
FIRST	18	-	2	18
SECOND	18	-	2	18
THIRD	18	-	-	18
FORTH	13	09		22
TOTAL	67	09	04	76

DEPARTMENT OF RURAL TECHNOLOGY
H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand, India-246 174
DEPARTMENT OF RURAL TECHNOLOGY
Master's programme : M.Sc. (Ag.) Agricultural Extension & Communication
Course structure

MAJOR COURSE

Course code	Course title	Credits
SOA/RT/C001	Development Perspectives of Extension Education	2(1+1)
SOA/RT/C002	Development Communication and Information Management	3(2+1)
SOA/RT/C003	Research Methods in Behavioral Science	3(2+1)
SOA/RT/C008	Market led extension management	3(2+1)
SOA/RT/C009	Diffusion & Adoption of Innovations	3(2+1)
SOA/RT/C010	e-Extension	3(2+1)
SOA/RT/C014	Gender sensitization for development	3(2+1)
SOA/RT/C015	Training for Human Resource Development	3(2+1)
SOA/RT/C020	Master Seminar	(0+1)
SOA/RT/C021	Master Thesis	12(0+12)

Minor and supporting Subjects

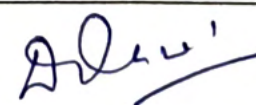
Course Code	Course Title	Credits
SOA/RT/C004	Project Planning in Extension Education	3(2+1)
SOA/RT/C005	Participatory Methods For Technology Development and Transfer	3(2+1)
SOA/RT/C006	Media Management	3(2+1)
SOA/RT/C007	Agricultural Research, Research Ethics and Rural Development Programmes	1(1+0)
SOA/RT/C011	Entrepreneurship Development and Management in Extension	3(2+1)
SOA/RT/C012	Non-Parametrics	3(2+1)
SOA/RT/C013	Visual Communication	3(2+1)
SOA/RT/C016	Perspectives of Distance Education	3(2+1)
SOA/RT/C017	Basic Imaging Technology	3(2+1)
SOA/RT/C018	Organisational Behaviour and Development	3(2+1)
SOA/RT/C019	Capacity Development	3(2+1)
SOA/RT/E001	Evaluation and Impact Assessment	3(2+1)
SOA/RT/E002	Enabling Innovation	3(2+1)
SOA/RT/E003	Mushroom Cultivation Technique	3(2+1)
SOA/RT/E004	Introduction to Apiculture	3(2+1)
SOA/RT/E005	Integrated Watershed Management	3(2+1)

*New Minor and Supporting courses can be introduced as per the requirement of research work from time to time

Non-credit compulsory courses

Course Code	Course title	Credits
SOA/RT/S001	Library and information services	1(0+1)
SOA/RT/S002	Technical writing and communication Skills	1(0+1)
SOA/RT/S003	Intellectual property and its management in agriculture	1(0+1)
SOA/RT/S004	Basic concepts in laboratory techniques	1(0+1)






DEPARTMENT OF RURAL TECHNOLOGY

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

Master's programme : M.Sc. (Ag.) Agricultural Extension & Communication

Course structure

SEMESTER FIRST		
Course Title: DEVELOPMENT PERSPECTIVE OF EXTENSION EDUCATION		
Course Code: SOA/RT/C001		Credit: 2(1+1)

Objective

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.

Course outcome:

Students have knowledge about the concepts of Extension education. Students have knowledge about various institutions, their organisational structure and functions. Students know rural development programmes and implications for rural life

Theory

UNIT I

Extension Education- Meaning, objectives, concepts, principles and philosophy, critical analysis of definitions- Extension Education as a profession- Adult education and Distance Education

UNIT II

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 Extension in Agricultural Universities

UNIT III

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

UNIT IV

Current Approaches in Extension: Decentralized decision making, bottom up planning, farming system approach, farming situation based extension, Market-led- Extension, Farm field school, ATIC, Kisan Call Centres, NAIP

Practical

Visits to a village and KisanMandal to study the on-going development programmes. Visitto NGO, Visit to KVK, Bottom-up planning, Extension centres of State Agricultural University and State departments, Report preparation and presentations.

Suggested reading

Education & Communication for Development- O.P.Dahama& O.P. Bhatanagar Extension Communication & Management- G.L.Ray
Defining Agricultural Extension for 1990s- D.C. Misra Agricultural Extension- A.W. Van Den Ban & H.S. Hawkins

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Course Title: DEVELOPMENT COMMUNICATION AND INFORMATION MANAGEMENT		
Course Code: SOA/RT/C002		Credit: 3(2+1)

Objective

In this course, students will learn about the concept, meaning and process of communication and various methods of modern media of communication. Besides the students will also learn information management and journalistic writing of various information materials and also study their readability.

Course outcome

Students understand effective planning and implementation. Students know various methods of modern media of communication. Students know the reliability of information management and journalistic writing.

Theory**UNIT I**

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.

UNIT II

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.

UNIT III

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.

UNIT IV

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

Identification of key communicators and communication networks in a selected village, Simulated Exercise on distortion of messages at different levels of communication. Visit to extension organization to study organizational communication. Exercise on writing for Print media – Writing News Exercise on Writing for Print media – Success stories, Writing feature articles for different topics related to agriculture and allied fields, Visit to AIR and TV centre, Exercise on Script writing for Radio, Exercise on Script writing for TV, Exercise on Readability and comprehension testing procedures, Participation and Interaction through Video Conference, Exercise on Computer Assisted Instruction, Developing Communication Strategy for diffusion of Modern Farm technology in villages.

Suggested Readings

Dahama OP and Bhatnagar OP. 2005. *Education and Communication for Development*. Oxford &

IBH.

Grover I, Kaushik S, Yadav L and Verma SK. 2002. *Communication and Instructional Technology*. Agrotech Publ. Academy.

Reddy AA. 1987. *Extension Education*. Sree Lakshmi Press, Bapatia

Sandhu AS. 2004. *Textbook on Agricultural Communication Process and Methods*. Oxford & IBH.

Course Title: RESEARCH METHODS IN BEHAVIORAL SCIENCE		
Course Code: SOA/RT/C003		Credit: 3(2+1)

Objective

This course is designed with a view to provide knowledge and skills in methods of behavioural sciences and students will learn the Statistical Package for Social Sciences (SPSS) for choosing appropriate statistics for data analysis.

Course outcome

Students have knowledge and skills in methods of behavioural sciences. Students know about Statistical Package for Social Sciences (SPSS) for choosing appropriate statistics for data analysis.

Theory

Unit I

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, Explanatory, Descriptive, Diagnostic, Evaluative, 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 and development of theoretical orientation of the research problem.

UNIT II

Objectives- Meaning, types and criteria for judging the objectives. 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 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 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. Maximinicon principle, Sampling – Types of Sampling and sampling procedures.

UNIT III

Research Design – Meaning, purpose and criteria for research design, Types, advantages and limitations for each design, Experimental design – Advantages and limitations. Data collection devices – Interview – Meaning, purpose, types and techniques of interviewing and advantages and limitations. Enquiry forms and Schedules – Meaning, types of questions used, steps in construction, 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, advantages and limitations. Checklists – Meaning, steps in construction, advantages

and limitations in its use. Rating scales – Meaning, types, limits in construction, advantages and disadvantages in its use. Observation – Meaning, types, tips in observation, advantages and limitations in its use. Case studies – Meaning, types, steps in construction, advantages and disadvantages in its use. Social Survey – Meaning, objectives, types and steps in conducting, advantages and limitations.

UNIT IV

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 level of measurements and 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 data collection instruments. Pre-testing of data collection instruments- 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, Allahabad.

Krishnaswami OR & Ranganatham M. 2005. *Methodology of Research in Social Sciences*. Himalaya Publ. House

Mulay S & Sabaratnam VE. 1983. *Research Methods in Extension Education*. Manasavan, New Delhi.

Course Title: PROJECT PLANNING IN EXTENSION EDUCATION		
Course Code: SOA/RT/C004		Credit: 3(2+1)

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 – Objectivess – 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 performace appraisal technique on an ongoing extension project.

Practical: Selection and formulation of Project Report and DPR

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.

Course Title: PARTICIPATORY METHODS FOR TECHNOLOGY DEVELOPMENT AND TRANSFER		
Course Code: SOA/RT/C005		Credit: 3(2+1)

Objective

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, relation oriented methods. Besides the students will be learning the preparation of action plans, participatory monitoring and evaluation.

Course outcome:

Students have knowledge about key concepts, principles, process of different participatory approaches for technology development and transfer. Students know about various participatory tools and techniques like space related, time related, relation oriented methods. Students know about preparation of action plans, participatory monitoring and evaluation

Theory

Unit-I

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.

UNIT II

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, well being ranking method, Venn diagram, matrix ranking, livelihood analysis.

UNIT III

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

Simulated 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.

Course Title: MEDIA MANAGEMENT		
Course Code: SOA/RT/C006		Credit: 3(2+1)

UNIT I: Media Management – introduction, definition, principles and significance of management. Media ownership patterns in India – proprietorship, partnership, private Ltd., public companies, trusts, cooperatives, religious Institutions societies & franchisees (chains), marketing function – product, price, and placement & promotions.

UNIT II: Mass communication – meaning, concept, definition and theories of mass communication. The Mass Media – history, functions, uses and theories of media. Journalism – meaning, definition, scope, functions and different types of Journalism. Journalism as communication tool. Farm journalism -meaning and developments in farm journalism in India. Different problems with farm journalism. Print media – history, the role of the press, news, types of news, electronics of news and sources of news, the making of newspaper & magazines, press codes and ethics, media laws. News story – principles of writing, structure a news story, procedure in writing the news story and the elements of style. Success stories & feature articles – writing for success & feature articles, types of feature articles. Information materials – types of information materials and user. Techniques in book publishing. Editing – principles, tools & techniques and art of proof reading – techniques, measuring readability of writing.

UNIT III: Electronic media-role and importance of radio-history, radio role in TOT, writing and presentation techniques, different programmes of farm broadcast, developing content for farm broadcast, Role of FM Radio in Agriculture, Ethics of Broadcasting, Broadcasting Policy and code. Community radio – concept, meaning, role of TOT, cases of Community radio. Television – history – role in TOT, fundamentals of television production, techniques of script writing for TV, visual thinking, language & style, farm telecast programmes, cable and satellite TV and their impact, ethics of telecasting, policy and code. Video production technology – potential and its utilization, typology of farm video production, types of video production and equipment used in the production, procedure or technique of video production. Cassette technology – role in TOT, techniques of production of cassettes for the farming community. Traditional media – role of folk media in TOT and integration with electronic media.

UNIT IV: Advances in communication Technology – management of agricultural information systems (MAIS). Use of computers in agriculture – application of IT in agriculture. Use of modern communication medium – electronic video, teletext, tele conference, computer assisted instruction, video conferencing – features, advantages, limitations and risk factor involved in new media. Designing and developing of communication and media strategy for developmental programmes. Online Journalism scope & importance.

Practical: Exercise on writing for print media – writing news / success stories / feature articles for different topics related to agriculture & allied fields. Exercise of editing & proof reading the farm news for news papers – different types of intro and leads. Exercise of writing for Radio, TV,

preparation of story board for farm video production – script writing for Radio and T.V. Visit to media management organizations for studying the principles, procedures and processes in managing the media. Participation and interaction through video conference. Developing communication & media strategy for selected developmental programme / activity.

Course Title: AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES		
Course Code: SOA/RT/C007		Credit: 1(0+1)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research, and rural development programmes and policies of Government.

Course outcome:

Students understand about the organization and functioning of agricultural research systems at national and international levels, research, and rural development programmes and policies of Government.

Unit-I

History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural research(CGIAR): International Agricultural Research centres(IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.

UNIT II

Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

UNIT III

Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group- Area Specific Programme, Integrated Rural Development Programme(IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary agencies/Non-Governmental Organizations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

Suggested Readings

Bhalla GS & Singh G. 2001. Indian Agriculture- Four Decades of Development. Sage Publ. Punia
MS. Manual on International Research and Research Ethics. CCS, Haryana Agricultural University, Hisar.

Course Title: LIBRARY AND INFORMATION SERVICES		
Course Code: SOA/RT/S001		Credit: 1(0+1)

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Course outcome

Students know about getting skills to trace information from libraries efficiently, to apprise them of information and knowledge resources. Students know about literature survey, to formulate information search strategies, and to use modern tools.

Practical

Introduction to library and its services;; Role of libraries in education, research and technology transfer; Classification systems and organization of library; sources of information-Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services(Science Citation Index, Biological Abstracts, Chemical abstracts, CABI Abstracts, etc.); tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; eresources access methods.

Course Title: TECHNICAL WRITING AND COMMUNICATION SKILLS		
Course Code: SOA/RT/S002		Credit: 1(0+1)

Objective

To equip the students/scholars with skills to write dissertations, research papers, etc. To equip the students/scholars with skills to communicate and articulate in English (verbal as well as writing)

Course outcome

Students know about skills to write dissertations, research papers, etc. Students have knowledge about skills to communicate and articulate in English(verbal as well as writing).

Practical

Technical Writing- Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communication; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article. Communication Skills- Grammar(Tenses, parts of speech, clauses, punctuation marks); Error analysis(Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.

Suggested Readings

Chicago Manual of Style. 14th Ed. 1996 Prentice Hall of India Collins' Cobuild English Dictionary.1995 Harper Collins.

Gordon HM & Walter JA. 1970. Technical Writing 3rd Ed. Holt, Rinehart & Winston

Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English 6th Ed. Oxford University Press

James HS. 1994. Handbook for Technical Writng. NTC Business Books Joseph G. 2000. MLA Handbook for Writers of Research Papers.5th Ed. Affiliated East-West Press

Mohan K. 2005. Speaking English Effectively. MacMillan India Richard WS. 1969. Technical Writing Barnes & Noble

SEMESTER SECOND		
Course Title: MARKET LED EXTENSION MANAGEMENT		
Course Code: SOA/RT/C008		Credit: 3(2+1)

Objective

The student will learn the significance of post harvest management & value addition in present market environment and the challenges and future strategy for market led extension management. Also identifies the information sources and develop strategy for market Intelligence and the marketing infrastructure, multilevel marketing and linkages for market led extension. In addition the students would be learning the public private partnerships for market led extension management, the features of contract farming, WTO its implications on agriculture and Understanding the role of IT for market intelligence.

Course outcome:

Students have knowledge about significance of post harvest management & value addition in present market environment. Students know about information sources and develop strategy for market intelligence and the marketing infrastructure, multilevel marketing and linkages for market led extension.

Theory

UNIT I

Agricultural extension at cross roads; Changing scenario of agricultural extension at the national level; Market led extension – emerging perspectives; Market led extension – issues and challenges; Dimensions of market led extension.

UNIT II

Agricultural marketing an overview; Development of a marketing plan, pricing concepts and pricing strategy; Consumer behaviour; Marketing communication and promotional strategies; The marketing research process; Agricultural trade liberalization and its impact; International marketing opportunities; Implications of AOA, TRIPS and IPRs agreements on agriculture; Agreement on SPS and TBT - an over view; Commodity features marketing.

UNIT III

Public private linkages in market led extension; Role of SHG in market led extension; Contract farming – a viable approach to meet market challenges; IT enabled approaches for market led extension and communication; Weather service and crop modeling – An effective tool in market led extension.

Practical

Identification and analysis of different marketing sources for agricultural commodities. Development of strategy for an effective market intelligence system; Development of suitable marketing plan to suite rural situation; Visit to APEDA, Rythu Bazaars to study the processes and procedures related to market-led extension.

Suggested Readings

- Kaleel FMH & Krisnamurthy J. 2007. *Market Led Extension Dimensions and Tools*. Agro Tech Publ. Academy.
- Rajmanohar TP & Kumaravel KS. 2006. *Contract Farming in India*. ICFAI Univ. Press, Hyderabad.
- Subbalakshmi V. 2005. *Globalization - Indian Experience*. ICFAI Univ. Press, Hyderabad.
- Suresh K. 2005. *Rural Markets - Emerging Opportunities*. ICFAI Univ. Press, Hyderabad

Course Title: DIFFUSION & ADOPTION OF INNOVATIONS		
Course Code: SOA/RT/C009		Credit: 3(2+1)

Objective

The students learn how 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, adopter categories and their characteristics, opinion leaders and their characteristics, attributes of innovation, and factors influencing adoption. In addition, students would be learning various concepts related to diffusion and adoption of innovations.

Course outcome:

Students have knowledge about agricultural innovations spread among the farmers in the society by getting into the insights of diffusion concept and adoption process. Students understand about various concepts related to diffusion and adoption of innovations. Students know about towards stages of adoption and innovation decision process, adopter categories, opinion leaders, attributes of innovation, and factors influencing adoption.

Unit-I

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.

UNIT II

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.

UNIT III

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.

UNIT IV

Diffusion effect and concept of over adoption, opinion leadership measurement and characteristics of opinion leaders, monomorphic and polymorphic opinion leadership, multi step 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 processes, 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 Agrucultural Innovations in Village India*. Wiley Eastern.
 Jalihal KA and Veerabhadraiah V. 2007. *Fundamentals of Extension Education and Management in Extension*. Concept Publ. Co.
 Ray GL. 2006. *Extension Communication and Management*. Kalyani Publ. Reddy AA. 1987. *Extension Education*. Sree Lakshmi Press, Bapatia Rogers EM. 2003. *Diffusion of Innovations* 5th Ed. The Free Press, New York

Course Title: E-EXTENSION		
Course Code: SOA/RT/C010		Credit: 3(2+1)

Objective:

To orient the students to prepare web portals.

To acquaint the students about mobile based developmental initiatives of government as well as non-government sectors.

Course outcome:

Students have knowledge about preparing web portals.

Students know about mobile based developmental initiatives of government as well as non-government sectors

Unit I

ICTs projects, case studies in India and developing world. ICT use in field of extension- Expert systems on selected crops and enterprises; Self learning CDs on package of practices, diseases and pest management, Agricultural web sites and portals related to crop production and marketing etc.

Unit II

Community Radio, Web, Tele, and Video conferencing. Computer Aided Extension. Knowledge management, Information kiosks, Multimedia. Online and Offline Extension. Tools for Mobile technologies, learning concepts.

Unit III

ICT Extension approaches-pre-requisites, precision farming, Human resource information. Basic e-extension training issues, ICT enabled extension pluralism, emerging issues in ICT.

Unit IV

Cloud based extension approaches, Blog extension practices, voice enabled extension services, SWOT analysis of ICT based agriculture projects.

Recommended Books:

1. Batnakar S & Schware R. Information and Communication Technology in Development- Cases from India. Sage Publ.
2. Meera SN. ICTs in Agricultural Extension: Tactical to Practical.
3. Ganga-Kaveri Publ. House. Jangam Wadi Math, Varanasi.
4. Willem Zip. Improving the Transfer and Use of Agricultural Information - A Guide to Information Technology. The World Bank, Washington

Course Title: ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT IN EXTENSION		
Course Code: SOA/RT/C011		Credit: 3(2+1)

Objective

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.

Course outcome:

Students have knowledge about planning and development of enterprises for extending sustainable livelihoods for rural people. Students gain knowledge and skills in different concepts and techniques of management in extension organizations.

Theory

Unit I

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, Coordinating and Marketing. Types of entrepreneurs, Stages of establishing enterprise – Identification of sound enterprise, steps to be considered against 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.

UNIT II

Micro Enterprises – Profitable Agri-enterprises in India – Agro processing, KVIC industries. Micro- financing- Meaning, Sources of Finances, Banks, small scale industries development organizations. Marketing for enterprises – Concept, Planning for marketing, target marketing, Competition, market surveys 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 of enterprises – Issues relating to success and failure of enterprises – Personal, Production, Finance, Social, Marketing.

UNIT III

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, Classifications of functions of management. Planning- Concept, Nature, Importance, Types, Making planning effective, Change Management – factors, processs and procedures. Decision making – Concept, Types of decisions, Style 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.

UNIT IV

Coordination – Concept, Need , Types of Coordination, Interpersonal Relations in the organization. Staffing- Need, and Importance, Manpower planning, Recruitment, Selection, Placement and Orientation, Training and Development – Performance Appraisal – Meaning, Concepts, Methods. Direction – Concepts, Principles, Requirements of effective directions, Giving orders, techniques of Direction. Leadership – Concepts, Characteristics, Functions, Approaches to Leadership, Leadership Styles. Organizational Communication – Concepts, Processes, 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-Stimulated 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-Stimulated exercise on techniques of decision making-Designing organizational structure-Group activity on leadership developmental skills.

Suggested Readings

Gupta CB, 2001. *Management Theory and Practice*. Sultan Chand & Sons.
 Indu Grover, 2008. *Handbook on Empowerment and Entrepreneurship*. Agrotech Public Academy.
 Khanka SS, 1999. *Entrepreneurial Development*. S. Chand & Co.
 Singh D. 1995. *Effective Managerial Leadership*. Deep & Deep Publ.
 Tripathi PC & Reddy PN. 1991. *Principles of Management*. Tata McGraw Hill.
 Vasanta Desai, 1997. *Small Scale Industries and Entrepreneurship*. Himalaya Publ. House

Course Title: NON-PARAMETRICS		
Course Code: SOA/RT/C012		Credit: 3(2+1)

Objective:

To orient the students about population, sampling, random variables
 To acquaint the students about the use of statistical software: SPSS

Course outcomes:

- Students have knowledge about population, sampling, random variables Students understand about the use of statistical software: SPSS

Unit-I

Populations, Samples and Statistics, Estimation, Hypothesis testing, some properties of hypothesis testing, Review problems, Glance on Non-Parametric Statistics

Unit 2

Random variables, Properties of Random Variables, Definition and concept, Importance, Levels of measurements, Characteristics of Nonparametric / Distribution free tests, Types of Non Parametric Tests, One Sample Tests, Tests for related samples, Independent sample test

Unit 3

Non-parametric tests of difference: Mann-Whitney, Sign, Kruskal-Wallis, McNemer Test

☐ *Non-parametric tests of association:* Spearman's rank correlation

☐ *Parametric and Non- Parametric:* Chi-square test

Paired Sample t Test, Non Parametric Linear Regression Methods, Measures of Rank Correlation

Practical

Use of statistical software: SPSS (Paired Sample t Test, Mann-Whitney, Sign, Kruskal-Wallis, McNemer Test, Spearman's rank correlation, Chi-squared goodness of fit test)

Suggested Readings

- Conover, W.J., (2014), *Practical Non parametric Statistics*, 3rd ed., Wiley
- Gopal, M.H., *An introduction to Research Procedure in Social Sciences*, Bombay: Asia Publishing House
- Kothari, C. R., (2009), *Research Methodology: Methods and technologies*, New Age International Publishers, New Delhi
- Kothari, C. R., (1994), *Quantitative Techniques*, 2nd ed., New Delhi: Vikas Publishing House Pvt. Ltd.
- Meier, Delbert C., (1977), *Handbook of Research Design & Social Measurement*, 3rded, New York: David McKay Company, Inc.

Course Title: VISUAL COMMUNICATION		
Course Code: SOA/RT/C013		Credit: 3(2+1)

Objective

This course is intended to give a clear perspective about the importance of visuals and graphics in communication. The course starts with the delineating about the characteristics of visuals and graphics followed by its main functions, theories of visual perception and its classification and selection. Further, the course deals with the designing the message, graphic formats and devices and presentation of data.

It makes the students to

understand, prepare and present the scientific data effectively by using low cost visuals. 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

Theory

UNIT I

Role of visuals & graphics in Communication. Characteristics of visuals & graphics. Functions of visuals and graphics. Theories of visual perception. Classification and selection of visuals.

UNIT II

Designing message for visuals, Graphic formats and devices. Presentation of Scientific data. Principles and procuction of low cost visuals.

UNIT III

Photographs- reprographic visuals. PC based visuals. Degitized video material in multimedia production. Designing visuals for print and TV and video.

UNIT IV

Pre-testing and evaluation of visuals. Scanning of visuals.

Practicals

Preparation of low cost projected and Non-Projected visuals. Designing and layout of charts, posters, flash cards etc. Power point presentations. Generating computer aided presentation graphics. Scanning and valuation of visuals.

Suggested Readings

Bhatia A. 2005. *Visual Communication*. Rajat Publications, New Delhi. Edgar

Dale 1970. *Audio Visual methods in Teaching*. Holt, Rinehart & Winston.

James WB, Richard BL, Fried F Harclerod. 1952. *A.V. Instructional Material & Methods*. Mc.Graw Hill.

Reddy YN. 1998. *Audio Visual Aids in Teaching, Training and Extension*. Haritha Publ. House, Hyderabad.

Course Title: INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE		
Course Code: SOA/RT/S003		Credit: 1(0+1)

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Course outcome:

Students get knowledge about Intellectual property rights related protection systems. Students know use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Theory

Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and biodiversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License agreement.

Suggested Readings

Erbisch FH & Maredia K. 1998. Intellectual Property Rights in Agricultural Biotechnology. CABI.
Ganguli P. 2001. Intellectual Property Rights: Unleashing Knowledge Economy. McGraw-Hill.
Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC & Aesthetic Technologies.
Ministry of Agriculture, Government of India. 2004. State of Indian Farmer. Vol.C. Technology Generation and IPR Issues. Academic Foundation.
Rothschild M & Scott N.(Ed.). 2003. Intellectual Property Rights in Animal Breeding and Genetics. CABI.
Saha R.(Ed.). 2006. Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies. Daya Publ. House.
The Indian Acts- Patents Act, 1970 and amendments; Act, 2000;

Course Title: BASIC CONCEPTS IN LABORATORY TECHNIQUES		
Course Code: SOA/RT/S004		Credit: 1(0+1)

Objective

To acquaint the students about the basic of commonly used techniques in laboratory.

Course outcome: Students have knowledge about basic of commonly used techniques in laboratory.

Practical

Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccumets; washing, drying and sterilization of glassware; Drying of solvents/chemicals. Weighing and preparation of solutions of different strengths and their dilution; Handling techniques of solutions; preparation of different agro-chemical doses in field and pot application; Preparation of solutions of acids; Neutralisation of acid and bases; Preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oilbath; Electric wiring and earthing. Preparation of media and methods of sterilization; Seed viability testing, testing of pollen viability; Tissue culture of crop plants; Description of flowering plants in botanical terms in relation to taxonomy.

Suggested Readings

Furr AK. 2000. CRC Hand Book of Laboratory Safety. CRC Press.
Gabb MH & Latchem WE. 1968. A Handbook of Laboratory Solutions. Chemical Publ. Co.

SEMESTER THIRD		
Course Title: GENDER SENSITIZATION FOR DEVELOPMENT		
Course Code: SOA/RT/C014		Credit: 3(2+1)

Objective

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.

Course outcome

Students have knowledge towards overview of the concept of gender and gender balance on development. Students know about attitudinal change to internalize gender equity concerns as fundamental human rights. Students understand about for identifying and analyzing gender issues in agriculture and allied sectors.

Unit-I

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

UNIT II

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.

UNIT III

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.

Course Title: TRAINING FOR HUMAN RESOURCE DEVELOPMENT		
Course Code: SOA/RT/C015		Credit: 3(2+1)

Objective

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.

Course outcome

Students have knowledge about key concepts, importance, scope & conceptual frame work, growth & development of Human Resource Development. Students have get idea about subsystems of Human Resource Development for extension organization and process of HRD.

UNIT-I

Human Resource Development –Definition , Meaning, Improtance, Scope and Need for HRD; Conceptual frame work, inter disciplinary approach, function systems and case studies in HRD; HRD Interventiona-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.

UNIT-II

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 behavior, 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 Manger: Task of Professional Manager- Responsibility of Professional Manger; Managerial skills and Soft Stills required for Extension workers; Decision Making: Decision Making models, Management by Objectives; Behavioural Dynamics: Leadership styles-Group dynamics.

UNIT-III

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, Presentations of reports.

Suggested Readings

Agochiya D 2002.Every Trainer's Handbook.Sage Publ.
David Gross 1997 Human Resource Management- The Basics TR Pubi.
Davis Keth&Newston W John 1989. Human Behaviour at Work, 8thEd.McGraw hill
Hersey Paul &Balanchard H Kenneth 1992 Management of OrganizationalBehaviour Utilizing Human Resource.5thEd.Prentice-Hall of India.

Course Title: PERSPECTIVES OF DISTANCE EDUCATION		
Course Code: SOA/RT/C016		Credit: 3(2+1)

UNIT I

Distance Education – Introduction Meaning, Concept, Philosophy and its work ethics, characteristics of Distance Education – Evolution and Historical view of Distance Education – Theory Methodology, and Epistemology. Dimensions of Distance Education, Scope and difficulties. Open Education – Non-formal Education, Continuing Education, Education by correspondence.

UNIT II

Forms and systems of Distance and Open Education, Modes of Teaching and Learning in Distance Education, Methods of Distance Education, Significance of Distance Education in Teacher Education.

UNIT III

Planning Distance Education – A Systems Approach Student Learning – Course Planning, The target groups – Barriers to learning in Distance Education – Planning and Management of Networked Learning.

UNIT IV

Educational Technology is Distance Education Application of information and Educational Technologies in Distance Education, Development of Course and Course material, Management of resources, processes, Forms of Instructional material in Distance Education and Media Development and Production in Distance Education - Video Classroom Strategy in Distance Education – Strategies for maximizing the reach – services to students, programme Evaluation - performance indicators and Quality Assessment.

Practical

Visit to the University which is implementing the Distance Education Programmes. Detailed Study of their programme in relation to Educational Technology, Methodology, Curriculum Development, Evaluation and Assessment. Exercise on development of curriculum for Distance Education exclusively for farming community.

Suggested Readings

- Holmberg B. 1995. *Theory and Practice of Distance Education*. Routledge Publ..
- Lakshmi Reddy MV. 2001. *Towards Better Practices in Distance Education*. Kanishka Publ.
- More MG. 2003. *Hand Book of Distance Education*. Lawrence Erlbaum Associates Publ.
- Panda.S. 2003. *Planning & Management in Distance Education*. Kogan Page Publ.
- Pathak CK. 2003. *Distance Education: Prospects and Constraints*. Rajat Publ.
- Sharma DC. 2005. *Management of Distance Education*. Anmol Publ.
- Sharma M. 2006. *Distance Education: Concepts and Principles*. Kanishka Publ.

Course Title: BASIC IMAGING TECHNOLOGY		
Course Code: SOA/RT/C017		Credit: 3(2+1)

UNIT I

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;

UNIT II

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.

UNIT III

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

Practicals

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

Course Title: ORGANISATIONAL BEHAVIOUR AND DEVELOPMENT		
Course Code: SOA/RT/C018		Credit: 3(2+1)

Block 1: Organizational

Behaviour Unit 1: Basics of

Organization

- Introduction to organizations-concept and characteristics of organizations.
- Typology of organizations.
- Theories of organizations: nature of organizational theory, Classical theories, Modern management theories.
- System Theory - Criticisms and lessons learnt/ analysis.

Unit 2: Basics of Organizational Behaviour

- Concepts of Organisational Behaviour, Scope, Importance.
- Models of OB.

Unit 3: Individual Behaviour in Organizations

- Introduction, Self-awareness, Perception and Attribution.
- Learning, Systems approach to studying organization needs and motives – attitude, values and ethical behaviour.
- Personality.
- Motivation-Concept & Theories, Managing motivation in organizations.

Unit 4: Group Behaviour in Organization

- Foundations of group, group behaviour and group dynamics.
- Group Development and Cohesiveness, Group Performance and Decision Making.
- Intergroup Relations.
- Teams in Organizations-Team building experiential exercises.
- Interpersonal Communication and Group.
- Leadership: Meaning, types, Theories and Perspectives on Effective Leadership, Power and Influence. Managing Conflict and Negotiation skills.
- Job/ stress management, decision-making, problem-solving techniques.

Unit 5: Productive Behaviour and Occupational Stress

- Productive behaviour - Meaning, dimension.
- Job analysis and Job performance –meaning, dimensions, determinants and measurement.
- Job satisfaction and organizational commitment - meaning, dimensions and measures roles and role clarity.
- Occupational stress – meaning, sources, theories and models, effects, coping mechanism, effects and management.
- Occupational stress in farming, farmer groups/organizations, research and extension organizations.

Unit 6: Organizational System

- Organizations Structure- Need and Types, Line & staff, functional, committee,

- project structure organizations, centralization & decentralization.
- Different stages of growth and designing the organizational structure.
- Organizational Design- Parameters of Organizational Design, Organization and Environment.
- Organizational Strategy, Organization and Technology, Power and Conflicts in Organizations.
- Organizational Decision-Making.
- Organizational Culture vs Climate, Organizational Change.
- Organizational Learning and Transformation.

Block 2: Organisational Development

Unit 1: Overview of Organizational Development

- Concept of OD, Importance and Characteristics, Objectives of OD.
- History and Evolution of OD, Implications of OD Values.

Unit 2: Managing the Organizational Development Process

- Basic Component of OD Program-Diagnosis-contracting and diagnosing the problem.
- Diagnostic models, open systems, individual level, group level and organizational level diagnosis.
- Action-collection and analysis for diagnostic information, feeding back the diagnosed information and interventions.
- Program Management- entering OD relationship, contracting, diagnosis, feedback, planned change, intervention, evaluation.

Unit 3: Organizational Development Interventions

- Meaning, Importance, Characteristics of Organization development Interventions,
- Classification of OD Interventions-Interpersonal interventions, Team Interventions, Structural Interventions, Comprehensive Interventions.

Unit 4: Organizational Development Practitioner or Consultant

- Who is OD consultant? Types of OD consultants and their advantages, qualifications, Comparison of traditional consultants Vs. OD consultants. Organizational Development process by the practitioners skills and activities.

Practicals

- Case Analysis of organization in terms of process – attitudes and values, motivation, leadership.
- Simulation exercises on problem-solving – study of organizational climate in different organizations.
- Study of organizational structure of development departments, study of departmentalization, span of control, delegation of authority, decision-making patterns.
- Study of individual and group behaviour at work in an organization.
- Conflicts and their management in an organization.
- Comparative study of functional and nonfunctional organizations and drawing factors for organizational effectiveness.
- Exercise on OD interventions (Interpersonal, Team, Structural, Comprehensive) with its procedure to conduct in an organization.

Block 1: Introduction to Capacity Development**Unit 1: Capacity Development–An Overview**

Training, capacity building, capacity development and HRD-Meaning and differences; Need and principles of capacity development; Types and levels of capacities - Institutional capacities (include the rules, regulations and practices that set the overarching contextual environment), Organisational capacities (how various actors come together to perform given tasks), Individual capacities (technical, functional and leadership skills). Types of capacity building - Based on structure (structured, semi-structured & unstructured), Based on context (orientation, induction and refresher), and other categories (online, Webinar, distance etc.). Components of capacity development; Capacity development cycle.

Unit 2: Capacity Development- Approaches and Strategies

Capacity Development Dilemma- Theory versus Practice, Trainee versus Task, Structured versus Unstructured, Generic and Specific; Approaches in Capacity Development -Informative approach, Participatory approach, Experimental/ approach/ Experiential, Performance based approach; Capacity Development Strategies - Academic strategy, Laboratory strategy, Activity strategy, Action strategy, Personal development strategy, Organizational development strategy.

Unit 3: Planning and Organization of Capacity Development Programmes

Steps in Designing and Planning of Capacity Development- Step 1. Select the participants, Step 2. Determine the participants' needs, Step 3. Formulate goal and objectives, Step 4. Outline the content, Step 5. Develop instructional activities, Step 6. Prepare the design, Step 7. Prepare evaluation form, Step 8. Determine follow-up activities; Organising capacity development programme; Operational arrangements at different stages- Before the programme, During the programme, Middle of the programme, At the end of the programme, After the programme, Follow up; Stakeholders' responsibilities.

Block 2: Capacity Development Needs Assessment**Unit 1: Planning and Organization of Capacity Development Programmes**

Concept of Need Assessment; Approaches in Need Analysis- Performance Analysis, Task Analysis, Competency Study; Needs Survey.

Unit 2: Capacity Development Needs Assessment Methods

Data Collection Methods in Identifying Needs - Rational Methods (Observation, Informal talks, Complaints, Comparison, Analysis of report, Opinion poll, Buzz session, Analysis of the new programme), Empirical Methods (Job analysis, Performance evaluation, Checklist or Questionnaire Method, Tests, Critical Incident Technique, Card Sort Method, Focus Group Discussion, Interview, SWOT Analysis); Information and Skills required in Need Analysis; Identification of Needs through Task Analysis - Task identification, Task Analysis, Gap Analysis.

Block 3: Capacity Development Institutions and Management**Unit 1: Capacity Development Institutions**

Capacity Developer (Trainer): Meaning and concept; Types of Capacity Developers (regular, *ad-hoc*, part time, guest and consultants); Roles of Capacity Developer (explainer, clarifier, supporter, confronter, role model, linker, motivator, translator/ interpreter, change agent); Good Capacity Developer – Qualities, skills and roles Qualities, Skills (Intrapersonal & Inter personal), Roles (Manager, Strategist, Task Analyst, Media Specialist, Instructional Writer, Marketer, Facilitator, Instructor, Counsellor, Transfer Agent, Evaluator); Capacity Development Centres and Locations; Organisation's Role in Capacity Development.

Unit 2: Capacity Development Project Formulation

Project Proposal: Concept and Meaning; Steps in Project Formulation- Review of past proposals, Consulting experts, consultants, and previous organizers, Review past project evaluation reports, Interact with the prospective beneficiaries; Format for Writing Project Proposal (LFA).

Block 4: Capacity Development Process and HRD

Unit 1: Capacity Development Methods and Tools

Capacity Development Methods –Lecture, Discussion, Syndicate, Seminars, Conference, Symposium, Role Play, Case study, Programmed Instruction, T - group/ Laboratory methods; Factors Determining Selection of Methods – Capacity development objectives, subject matter, categories of participants, and the available resources like time, location, budget; Capacity Development Aids.

Unit 2: Evaluation

Capacity Development Programme Evaluation - Meaning & Importance; Purpose of Evaluation; Principles of Evaluation; Types of Evaluation – Formative, Summative, Kirkpatrick's four levels of evaluation; Process of Evaluation- Evaluation at the beginning, Evaluation during the programme, Evaluation at the end; Use of evaluation findings; Statistical Tools for evaluation.

Unit 3: Impact Assessment

Impact Assessment- Meaning, Need, Features, Benefits, Concepts; Indicators for Impact Assessment - Direct indicators, Indirect or proxy indicators, Quantitative indicators, Qualitative indicators, Result chain / hierarchy of indicators; Methods of Impact Evaluation- Learning retention of participants (KOSA), Impact on the job performance, Impact on organizational effectiveness, Impact on stakeholder's competency.

Unit 4: Human Resource Development

HRD: Meaning, Importance and Benefits; Types of HRD Systems & Sub-systems Career system (Manpower planning, Recruitment, Career planning, Succession planning, Retention), Work system (Role analysis, Role efficacy, Performance plan, Performance feedback and guidance, Performance appraisal, Promotion, Job rotation, Reward), Development system (Induction, Training, Job enrichment, Self-learning mechanisms, Potential appraisal, Succession development, Counselling, Mentor system), Self-renewal system (Survey, Action research, Organisational development interventions), Culture system (Vision, mission and goals, Values, Communication, Get together and celebrations, Task force, Small groups); Components of HRD System - Performance Appraisal, Potential Appraisal, Task System, Development System, Socialisation System, Governance; Functions of HRD-Organisational Development, Career Development, Capacity Development.

VII. Practicals

- Capacity development needs assessment exercise
- Capacity development project formulation exercise
- Planning organizing and conducting an extension capacity development programme
- Designing a programme
- Writing learning objectives
- Developing objectives into curriculum
- Training plan
- Organizing capacity development workshop
- Evaluation with pre- and post-training tests
- Training methods – Practicing each method mentioned in contents as group exercise

Suggested Reading

ADB. 2009. *Training Needs Assessment and Strategic Training Plan*.

Bentaya GM, and Hoffmann V (Eds). 2011. *Rural Extension Volume 3 -Training Concepts and Tools*. Margraf Publishers GmbH, Scientific books, KanalstraBe 21; D-97990, Weikersheim, 191 pp.

DFID .2003. *Promoting Institutional and Organisational Development. A Source Book of Tools and Techniques*, Department for International Development, United Kingdom
 DoPT.2014. *Civil Services Competency Dictionary: Strengthening Human Resource Management of Civil Service*. Department of Personnel and Training, Government of India
 FAO .2010. *FAO Capacity Assessment Approach and Supporting Tools - Discussion Draft*, Food and Agriculture Organisation of the United Nations

SEMESTER FORTH		
Course Title: EVALUATION AND IMPACT ASSESSMENT		
Course Code: SOA/RT/E001		Credit: 3(2+1)

Block1:Programme Evaluation Unit 1:

Introduction to Evaluation

- Concept of Evaluation: Meaning and concept in different contexts;
- Why Evaluation is Done and When? Programme planning, analyse programme effectiveness, decision making, accountability, impact assessment, policy advocacy;
- Objectives, types, criteria and approaches of programme evaluation, evaluation principles; the context of program evaluation in agricultural extension;
- Role and Credibility of Evaluator: Role as educator, facilitator, consultant, interpreter, mediator and change agent.
- Competency and credibility of evaluator.

Unit 2: Evaluation Theories

- Evaluation theory vs. practice – synergistic role between practice and theory in evaluation;
- Evaluation theories - Three broad categories of theories that evaluators use in their works programme theory, social science theory, and evaluation theory (other theories/ approaches - Utilization-Focused Evaluation & Utilization-Focused Evaluation (U-FE) Checklist, Values Engaged Evaluation, Empowerment Evaluation, Theory-Driven Evaluation).
- Integration between theory and practice of evaluation: evaluation forums, workshops, conferences and apprenticeship/ internship.

Block 2: Evaluation Process

Unit 1: How to Conduct Evaluation

Ten Steps in programme evaluation: (1) Identify and describe programme you want to evaluate (2) Identify the phase of the programme (design, start-up, ongoing, wrap-up, follow-up) and type of evaluation study needed (needs assessment, baseline, formative, summative, follow-up) (3) Assess the feasibility of implementing an evaluation (4) Identify and consult key stakeholders (5) Identify approaches to data collection (quantitative, qualitative, mixed) (6) Select data collection techniques (survey interviews and questionnaires with different types) (7) Identify population and select sample (sampling for evaluation, sample size, errors, sampling techniques) (8) Collect, analyse and interpret data (qualitative and quantitative evaluation data analysis) (9) Communicate findings (reporting plan, evaluation report types, reporting results, reporting tips, reporting negative findings) (10) Apply and use findings (programme continuation/ discontinuation, improve on-going programme, plan future programmes and inform programme stakeholders).

Unit 2: Evaluating the Evaluation

Evaluating the Evaluation - 10 Steps as above with focus on conceptual clarity, representation of programme components and stakeholders, sensitivity, representativeness of needs, sample and data, technical adequacy, methods used for data collection and analysis, costs, recommendations and reports.

Block 3: Programme Management Techniques

Unit 1: SWOT Analysis and Bar Charts

SWOT Analysis – Concept, origin and evolution;

SWOT As a Programme Management Tool; Conducting SWOT Analysis - Common Questions in SWOT Analysis;

Advantages and Disadvantages of SWOT; Bar Charts (Gantt Charts and Milestone Charts) - Characteristics, advantages and limitations.

Unit 2: Networks

Networks – Introduction, origin and widely used networks (Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM), differences between PERT and CPM, advantages and disadvantages.

Networks Terminology – Activity, Dummy activity, Event (predecessor event, successor event, burst event, merge event, critical event), Earliest Start Time (EST), Latest Start Time (LST), Critical Path, Critical Activity, Optimistic time (To), Pessimistic time (Po), Most likely time (TM), Expected time (TE), Float or Slack, Event Slack, Lead time, Lag time, Fast tracking, Crashing critical path, Activity Table, Dangers, Normal Time. Rules for Preparation of Networks and Steps in Network Preparation with example.

Block 4: Programme Evaluation Tools

Unit 1: Bennett's Hierarchy of Evaluation

- Introduction to Bennett's hierarchy – Background and description;
- Relation between programme objectives & outcomes at 7 levels of Bennett's hierarchy – Inputs, activities, participation, reactions, KASA changes, practice and behaviour changes, end results.
- Advantages and Disadvantages of Bennett's hierarchy

Unit 2: Logic Framework Approach (LFA)

- Introduction to LFA – Background and description;
- Variations of LFA - Goal Oriented Project Planning (GOPP) or Objectives Oriented Project Planning (OOPP);
- LFA Four-by-Four Grid – Rows from bottom to top (Activities, Outputs, Purpose and Goal & Columns representing types of information about the events (Narrative description, Objectively Verifiable Indicators (OVIs) of these events taking place, Means of Verification (MoV) where information will be available on the OVIs, and Assumptions). Advantages and Disadvantages of LFA.

Block 5: Impact Assessment

Unit 1: Introduction to Impact Assessment

- Concept of Impact Assessment: Meaning, concept and purpose in different contexts;
- Impact Assessment Framework: Meaning of inputs, outputs, outcomes, impacts and their relation with monitoring, evaluation and impact assessment.

Unit 2: Impact Assessment Indicators

Indicators for impact assessment – meaning and concept;

Selecting impact indicators;

Types of impact indicators for technology and extension advisory services - social and behavioral indicators, socio-cultural indicators, technology level indicators, environmental impact assessment indicators and institutional impact assessment indicators.

Unit 3: Approaches for Impact Assessment

Impact assessment approaches – Quantitative, qualitative, participatory and mixed methods with their advantages and disadvantages;

Quantitative Impact Assessment Types – Based on Time of Assessment (Ex-ante and ex-post), Based

on Research Design (Experimental, quasi experimental, Non-experimental). Econometric Impact Assessment: - (Partial Budgeting Technique, Net Present Value, Benefit Cost Ratio, Internal Rate of Return, Adoption Quotient, etc).

Qualitative and Participatory Impact Assessment Methods. -

Unit 4: Environment Impact Assessment (EIA)

Concept of EIA – Introduction, What it is? Who does it? Why it is conducted? How it is done?; Benefits and important aspects of EIA-risk assessment, environmental management and post product monitoring. Environmental Components of EIA –air, noise, water, biological, land; Composition of the expert committees Steps in EIA process - screening, scoping, collection of baseline data, impact prediction, mitigation measures and EIA report, public hearing, decision making, monitoring and implementation of environmental management plan, assessment of alternatives, delineation of mitigation measures and EIA report; Salient Features of 2006 Amendment to EIA Notification - Environmental Clearance/Rejection, participants of EIA; Shortcomings of EIA and How to improve EIA process?

Practicals

- Search the literature using web / printed resources and identify evaluation indicators for the following:
- Utilization-Focused Evaluation
- Values Engaged Evaluation
- Empowerment Evaluation
- Theory-Driven Evaluation
- Visit Directorate of Extension in your university and enquire about extension programmes being implemented / coordinated by Directorate. Develop an evaluation proposal of any one programme using 'Ten Steps in Programme Evaluation' discussed in the theory class.
- Review any comprehensive programme evaluation report from published sources. Evaluate the report and write your observations following the 'Evaluating the Evaluation' approach.
- Identify at least four agriculture development programmes and their objectives being implemented in your state. Write two attributes each on Strengths, Weaknesses, Opportunities and Threats related to the identified programme objectives in the SWOT grid.
- Identify an on-going development programme and make-out 6 activities from the programme.
- Draw a Gantt chart for 12 months programme activities.
- Write a report on evaluation hierarchy levels and indicators as per Bennett's hierarchy of evaluation for any development programme or project.
- Develop LFA four-by-four grid for any development programme or project with activities, outputs, purpose and goal and objectively verifiable indicators, means of verification & assumptions.
- Refer any Environment Impact Assessment report and analyse steps in EIA. Write your observations.

Course Title: ENABLING INNOVATION		
Course Code: SOA/RT/E002		Credit: 3(2+1)

Block 1: Agricultural Innovation Systems

Unit 1: Agricultural Innovation Systems: Concepts and Elements

Origins of the innovation systems concept-Innovation vs Invention; Agricultural Innovation System (AIS) -ToT, FSR, AKIS and AIS compared, Key insights from AIS: How Innovation takes place; Role of different actors in AIS; Importance of interaction and knowledge flows among different actors, Role of Communication in Innovation Process; Role of Extension in AIS, Different views to analyze AIS: structural view, functional view, process view and capacity view.

Unit 2: Enabling Innovation

Role of enabling environment: Policies and institutions in enabling innovation; Role of Government-Innovation Policy: Achieving coordination and policy coherence; Innovation Platforms; Role of Innovation Brokers, Methodologies for AIS Diagnosis:

Typologies of existing methodologies-strengths and limitations; Assessing Extension and Advisory Services within AIS; Capacity Development in AIS: Strengthening capacities to innovate.

Block 2: Scaling Up Knowledge for Innovation

Unit 1: Scaling Up: Tools, Approaches and Pathways

Scaling Up: Definitions; Changing views on scaling up: Approaches to Scaling Up: Push, pull, plant, probe: Scaling up pathways: Drivers and spaces for scaling up; Framework and Tools for Scaling up: Planning and implementing a scaling up pathways; Scalability assessment tools; Role of policies in scaling up: Influencing policies for scaling up; Innovation Management for scaling up knowledge and implications for Extension and Advisory Services.

VII. Practical

- Identify one crop/commodity sector and use AIS framework to diagnose actors and their roles, patterns of interaction, institutions determining interaction and the enabling policy environment and develop a AIS Diagnosis Report (Review and Key informant interviews)
- Undertake a case study on a successful case of scaling up knowledge and identify factors that contributed to its success
- Identify one specific knowledge (a technology, an approach) that has been recently introduced and develop an Up scaling Strategy

Suggested Reading

- Alex K. 2012. *Facilitating Agricultural Innovation Systems: a critical realist approach*. *Studies in Agricultural Economics*. 114: 64-70. <http://dx.doi.org/10.7896/j.1210>
- Binswanger HP and Aiyar SS. 2003. *Scaling Up Community Driven Development Theoretical Underpinnings and Program Design Implications*. Mimeo. Washington, D.C.: World Bank. <https://openknowledge.worldbank.org/bitstream/handle/10986/18310/multi0page.pdf?>
- Binswanger-Mkhize HP, de Regt JP, and Spector S. 2009. *Scaling Up Local and Community Driven Development: A Real World Guide to Its Theory and Practice*. February, World Bank. <http://siteresources.worldbank.org/EXTSOCIALDEVELOPMENT/Resources/244362>
- Cees L and Noelle A. 2011. *Rethinking Communication in Innovation Processes: Creating Space for Change in Complex Systems*. *The Journal of Agricultural Education and Extension*, 17:1, 21-36, DOI: 10.1080/1389224X.2011.536344

Course Title: MUSHROOM CULTIVATION TECHNIQUE		
Course Code: SOA/RT/E003		Credit: 3(2+1)

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 (*Pleurotula*), 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.

Course Title: INTRODUCTION TO APICULTURE		
Course Code: SOA/RT/E004		Credit: 3(2+1)

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, Resource 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.

Course Title: Integrated Watershed Management		
Course Code: SOA/RT/E005		Credit: 3(2+1)

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.