

**HORT 351: Seed Production of Vegetable, Tuber and Spice Crops****3(2+1)****Theory**

Introduction and history of seed industry in India. Definition of seed, classes-types of seed. Differences between grain and seed. Importance and scope of vegetable seed production in India. Principles of vegetable seed production. Role of temperature, humidity and light in vegetable seed production, land requirements, climate, season, planting time, nursery management, seed rate, rouging, seed extraction and storage of cole crops, root vegetables, solanaceous vegetables, cucurbits, okra, leafy vegetables, bulb crops, leguminous vegetables and exotic vegetables. Seed germination and purity analysis. Field and seed standards. Seed drying and extraction. Seed legislation.

**Practical**

Study of seed structure, colour size, shape and texture. Field inspection of seed crops. Practices in rouging. Harvesting and seed extraction. Germination and purity analysis. Methods of seed production, Seed certification in cole crops, root vegetables, bulb crops, solanaceous vegetables, cucurbits, okra, leafy vegetables, leguminous vegetables and exotic vegetables. Seed processing machines. Visit to seed production units.

**Suggested Reading:**

- G.N. Kulkarni, 2002. *Principles of Seed Technology*. Kalyani Publishers, Ludhiana.
- L.O. Copeland, 1999. *Principles of Seed Science and Technology*. Springer Publications.
- N.P. Nema, 1988. *Principles of seed certification and Testing*. Allied Publications.
- P. Hazra and M.G. Som, 2009. *Vegetable seed production and Hybrid Technology*. Kalyani Publishers, Ludhiana.
- Agarwal, P. K. 2010. *Techniques in Seed Science and Technology*. South Asian Publishers. New Delhi.
- Agrawal R. L. 1999. *Seed Technology*. Oxford and IBH Publicity Company, New Delhi.
- Arya, Prem Singh. 2003. *Vegetable seed Production Principles*. Kalyani Publishers. Ludhiana.
- Fageria, M. S. 2011. *Vegetable Crops- Breeding and Seed Production*. Kalyani Publishers. Ludhiana.
- Geetharani, P. 2007. *Seed Technology in Horticultural Crops*. NPH Publications. Jodhpur.
- Singh, S.P. 2001. *Seed Production in Commercial Vegetables*. Agrotech Publishing Academy, Udaipur.
- Vanangamudi, K.2010. *Vegetable Hybrid Seed Production and Management*. Agrobios. Jodhpur.
- Singh, Prabhakar.2015.*Seed Production Technology of vegetable*. Daya Publishing House. New Delhi.
- [Raymond A.T.](#), 2000. *Vegetable Seed Production*. Oxford University Press, USA
- Prem Singh Arya, 2003. *Vegetable breeding, production and seed production*. Kalyani publishers, New Delhi.
- Rattan lal Agarwal, 1995. *Seed technology*. Oxford & IBH, New Delhi
- Singh, S.P. 2001. 1st edition, *Seed production of commercial vegetables*. Agrotech Publishing, Udaipur
- Vanangamudi, K. 2006. Natarajan, P. Srimathi, N.Natarajan, T. Saravanan, M. Bhaskaran, A. Bharathi, P. Nateshan, K. Malarkodi. *Advances in Seed Science*. Agrobios (India), Jodhpur.
- Nemgal Singh, P.K. Singh, Y.K. Singh and Virendra kumar, 2006. *Vegetable Seed Production Technology*. International book distributing co., Lucknow.
- Khare, D. and Bhole, M.S. 2000. *Seed Technology*. Scientific Publishers (India) Jodhpur.

**HORT 352: Processing of Horticultural Crops****3(1+2)****Theory**

Importance and scope of fruit and vegetable preservation industry in India, food pipe line, losses in post-harvest operations, unit operations in food processing. Principles and guidelines for the location of processing units. Principles and methods of preservation by heat - pasteurization, canning, bottling. Methods of preparation of juices, squashes, syrups, cordials and fermented beverages. Drying and dehydration. Jam, jelly and marmalade. Preservation by sugar and chemicals, candies, crystallized fruits, preserves chemical preservatives, preservation with salt and vinegar, pickling, chutneys and sauces, tomato and mushrooms, freezing preservation. Processing of plantation crops, products, spoilage in processed foods, quality control of processed products, Govt. policy on import and export of processed fruits. Food laws.

**Practical**

Equipments used in food processing units. Physico-chemical analysis of fruits and vegetables. Preparation of squash, RTS, syrup, jam, jelly, marmalade, candies, preserves, chutneys, sauces, pickles (hot and sweet). Dehydration of fruits and vegetables – tomato product, refrigeration and freezing, cut out analysis of processed foods. Processing of plantation crops. Visit to processing units.

**Suggested reading:**

- Verma, L. R. and Joshi, V. K. 2000. Post Harvest Technology of Fruits and Vegetables. Vol. I & II. Indus Publishing Co., New Delhi.
- Dauthy, M. E. 1995. Fruits and Vegetables Processing- FAO Bulletin 119. International Book Distributing Co., Lucknow.
- Srivastava, R. P. & Sanjeev Kumar. 2002. Fruits and vegetable Preservation – Principles and Practice. International Book Distributing Co., Lucknow.
- Salunkhe, D.K., Bolin, H. R. and Reddy, N. R. 1991. Storage, Processing and Nutritional Quality of Fruits and Vegetables. 2nd Edition. Vol. II. CRC Press  
0849356245
- Neetu Sharma and Mashkooor Alam, M. 1998. Post Harvest Disease of Horticultural Perishable. International Book Distributing Co., Lucknow
- Chadha, K. L. and Kalloo, G. 1993. Advances in Horticulture. Vol. 4 to 10. MPH, New Delhi
- Fellows, P. J. 1998. Food Processing Technology – principles and Practices. Ellis Horwood.
- Manoranjan, K and Sangita, S. 1996. Food Preservation & Processing. Kalyani Publishers, India.
- Vijay, K. 2001. Text Book of Food Sciences and Technology. ICAR, New Delhi.
- Siddappa, G. S., Girdhari Lal and Tandon, G.L. 1998. Preservation of Fruits and Vegetables. ICAR, New Delhi
- FAO - Training Manual No.17/2. 2007. Prevention of post harvest food losses: Fruits, Vegetables and Root crops. Daya Publishing House, Delhi.
- Morris, T. N. 2006. Principles of Fruit Preservation. Biotech Books, Delhi.  
81-7622-116-3.
- <http://www.postharvest.com.au>
- [http://www.fao.org/infoods/index\\_en.stm](http://www.fao.org/infoods/index_en.stm)
- Srivastava, R. P. and Sanjeev K. 1998. Fruit and vegetable preservation principles practice. International Book Distributing Co., Lucknow.
- Girdharilal, Siddappa, G. S. and Tandon, G. L. 1998. Preservation of fruits and vegetables. ICAR, New Delhi.
- Dauthy and Mircea, E. 1995. Fruit and vegetables processing. International Book Distribution Co., Lucknow.

KaysandStanely,J.1998. Postharvestphysiologyof perishableplantproducts.  
 CBSPublishers,Distributors,NewDelhi  
 Bhatti,S1995.Vame, Fruitandvegetableprocessing. CBSPublishers,Distributors,NewDelhi.

### **HORT 353: Breeding and Seed Production of Flower and Ornamental plants 3(2+1)**

#### **Theory**

History of improvements of ornamental plants, Centre of origin of flower crops and ornamental crops, objectives and techniques in ornamental plant breeding. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of ornamental and flower crops viz., rose, jasmine, chrysanthemum, tuberose, gerbera, gladiolus, dahlia heliconia, liliun, gaillardia, petunia, hibiscus, bouganvillea, zinnia, cosmos, dianthus, snapdragon, pansy, crossandra, marigold, , geranium, antirrhinium, china aster, orchids, anthurium, carnation, hibiscus etc. Breeding for disease resistance. Development of promising cultivars of important ornamentals and flower crops. Role of heterosis and its exploitation, production of F1 hybrids and utilization of male sterility, production of open pollinated seed. Harvesting processing and storage of seeds, seed certification.

#### **Practical**

Study of floral biology and pollination in important species and cultivars. Techniques of inducing polyploidy and mutation. Production of pure and hybrid seeds. Harvesting, conditioning and testing of seeds. Practice in seed production methods.

#### **Suggested Reading:**

- B.P. Pal. *The Rose in India*.1966.Directorate of Knowledge management in Agriculture, Indian council of Agriculture Research-New Delhi.
- T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy. 2003. *Commercial flowers*. Partha Sankar Basu, Nayaudyog, 206, Bidhan Sarani, Kolkata-700006.
- S.K. Bhattacharjee and L.C. De. 2003. *Advanced Commercial Floriculture*. Aavishkar Publishers, Distributors, Jaipur (Rajasthan) India.
- D.J. Callaway and M.B. Callaway. 2000. *Breeding Ornamental Plants*. Timber Press
- J. Harding, F.Singh and J.N. Mol. 1991. *Genetics and Breeding of Ornamental Species*. Springer Publishers
- A. Vainstein. 2002. *Breeding for Ornamental: Classical and Molecular Approaches*. Springer Publishers
- Singh,B.D. 1983. *BreedingPrinciplesandMethods*. KalyaniPublishers,NewDelhi.
- R.L. Agarwal. 1996. *Seed Technology*. Oxford&IBHPublishers, New Delhi
- P.K. Agarwal. 1994. *Principles of Seed Technology*. ICAR Publication, NewDelhi

### **AEN(H)354: Insect Pests of Vegetable, Ornamental and Spice Crops 3(2+1)**

#### **Theory:**

Economic importance of insects in vegetable, ornamental and spice crops -ecology and pest management with reference to these crops. Pest surveillanace in important vegetable, ornamental and spice crops. Distribution, host range, bio-ecology, injury, integrated management of important insect-pests affecting vegetable, ornamental and spice crops. Important storage insect-pests of vegetable, ornamental and spice crops, their host range, bio-ecology, injury and integrated management. Insect –pests of processed vegetables and ornamental crops, their host range, bio-ecology, injury and integrated management. Insecticidal residue problems in vegetables and ornamental crops, tolerance limits etc.

#### **Practical**

Study of symptoms, damage, collection, identification, preservation, assessment of damage/population of important insect-pests affecting vegetable, ornamental and spice crops in field and during storage.

**Suggested reading:**

- Reddy, P. P., 2010, Plant Protection in Horticulture Vol. 1, 2 & 3, Scientific Publishers, Jodhpur  
 Ranjit, P., 2012, Entomological Techniques in Horticultural Crops, New India Publishing Agency.  
 Nair M R G K, 1995, Insect and Mites of Crops in India, ICAR, New Delhi.  
 Ayyar, T.V.R. 1963. Hand book of entomology for south India. Govt. press Madras, 516p.  
 David B V and Kumarswami, T, 1982. Elements of Economic Entomology. Popular Book Department, Madras, 536p.  
 P. Srivastava, Dharmo K. Butani Pest management in vegetables – Part1. Researcho Book Centre, 1998  
 K.P. Srivastava, Dharmo K. Butani Pest management in vegetables – Part-2. Researcho Book Centre, 1998  
 Rachna and Benna kumari. Pest management and residual analysis in horticultural crop  
 Ramnivas sharma. Identification and management of horticulture pest.  
 T. V. Sathe. Pests of ornamental plants.  
 A. S. Atwal. Agricultural pests of south Asia and their management  
 Butani, D.K. 1984. Insects and Fruits. Periodical Expert Book Agency, New Delhi.  
 Butani, D.K. 1984. Insects and Fruits. Periodical Expert Book Agency, New Delhi  
 Metcalf, R. Land Luckman, W.H. 1982. Introduction to Insect pest management. Wiley Inter Science Publishing, New York  
 Dhalinal, .G.S. and Ramesh Arora Integrated Pest Management Concept and Approaches. Kalyani Publishers, Ludhiana.  
 K.P. Srivastava .A Text Book on Applied Entomology Vol. I&II. , Kalyani Publishers, Ludhiana  
 Emmanuel, N, A. Sujatha, T.S.K. K. Kiran Patro, MLN Reddy, B. Srinivasulu, TSSK Samuel Patro. Text Book on Integrated Pest Management of Horticultural Crops Astral International Publishers, New Delhi.

**AEN(H) 355: Apiculture, Sericulture and Lac culture                    2(1+1)**

**Theory**

Introduction to beneficial insects. Importance and History of apiculture. Species of honey bees, Rock bee, Little bee, Indian bee, European bee, Italian bee and Dammar bee, lifecycle and caste determination. Bee colony maintenance, bee colony activities, starting of new colony, location site, transferring colony, replacement of queen, combining colonies, swarm prevention, colony management in different seasons, Equipment for apiary, types of bee hives and their description. Bee pasturage. Honey extraction, honey composition and value, bee wax and tissues.. Importance, History and development in India, silkworms kinds and their hosts, systematic position, distribution, lifecycles in brief, Silk glands. Mulberry silkworm-morphological features, races, rearing house and equipments, disinfection and hygiene. Grainage acid treatment, packing and transportation of eggs, Incubation, black boxing, hatching of eggs. Silkworm rearing young age /chawki rearing and old age rearing of silkworms. Feeding, spacing, environmental conditions and sanitation. Cocoon characters colour, shape, hardiness and shell ratio. Defective cocoons and stifling of cocoons. Uses of silk and by-products. Economics of silk production. Moriculture-Mulberry varieties, package of practices, Pests and diseases and their management. Lac growing areas in India, Lac insects, biology, behaviour, lac cultivation, food plants, pruning, inoculation, cropping, kinds of lac. Enemies of lac-insects.

**Practical**

Honey bee colony, different bee hives and apiculture equipment. Summer and Winter management of colony. Honey extraction and bottling. Study of pests and diseases of honeybees. Establishment of mulberry garden. Preparation of mulberry cuttings, planting methods under irrigated and rainfed conditions. Maintenance of mulberry garden-pruning, fertilization, irrigation and leaf harvest. Mulberry pests and

diseases and their management and nutritional disorders. Study of different kinds of silkworms and mulberry silkworm morphology, silk glands. Sericulture equipments for silkworm rearing. Mulberry silkworm rearing room requirements. Rearing of silkworms-chalky rearing. Rearing of silkworms late age silkworm rearing and study of mountages. Study of silkworm pests and their management. Study of silkworm diseases and its management. Lac insects-biology, behaviour, lac cultivation, food plants, pruning, inoculation, cropping, kinds of lac. Enemies of lac insects.

### **Suggested Reading:**

- Singh, S., 1975. Bee keeping in India – ICAR, New Delhi., 214p.
- Sunita, N.D, Guled ,M.B, Mulla S.R and Jagginavar,2003, Beekeeping, UAS Dharwad
- Mishra, R.C. and Rajesh Gar. 2002. Prospective in Indian Apiculture. Agrobios, Jodhpur.
- Singh, D and Singh, D.P. 2006. A hand book of Beekeeping, Agrobios (India).
- Paul DeBach and Devid Rosen 1991. Biological control by natural enemies. Cambridge University Press; 2 edition (27 June 1991)
- YA Shinde and BR Patel. Sericulture in India
- Tribhuwan Singh. Principles and Techniques of Silkworm Seed Production, Discovery publishing House Pvt. Ltd
- M.L. Narasaiah. Problems and Prospects of Sericulture. discovery publishing House Pvt. Ltd.
- Ganga,G. and Sulochana Chetty, J. 1997. An introduction to Sericulture (2nd Edn.). Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.
- Krishnaswamy, S. (Ed). 1978. Sericulture Manual - Silkworm Rearing. FAO Agri. Services bulletin, Rome.
- Singh, S. 1975. Bee keeping in India. ICAR, New Delhi.
- Glover, P.M. 1937. Lac cultivation in India. Indian Lac Research Institute, Ranchi.
- Jolly, M.S. 1987. “Appropriate sericulture techniques” International centre for training and Research in Tropical Sericulture, Mysore, 209.
- K.P.Srivastava .A Text Book on Applied Entomology Vol. I&II. , Kalyani Publishers, Ludhiyana
- B.r. David and V.V.Ramamurthy. Elements of Economic Entomology, 7<sup>th</sup> Edition. Namrutha Publications, Chennai

## **AEX(H) 356: Fundamentals of Extension Education**

**2 (1+1)**

### **Theory**

Extension education: meaning, definition, nature, scope, objectives, principles, approaches and history. Horticulture extension: process, principles and selected programmes of leading national and international forest institutes. People’s participation in Horticulture programmes. Motivation of Farmers, rural youth and voluntary organizations for Horticulture extension work Rural Development: meaning, definition, objectives and genesis. Transfer of technology programmes like lab to land programme (LLP) national demonstration (ND), front line demonstration (FLD) Krishi Vigyan Kendras (KVK), Technology Assessment and Refinement Programme (TARP) etc. of ICAR. Communication: meaning, definition, elements and selected models. Audio – visual aids: importance, classification and selection. Adoption and diffusion process, Teaching and learning-concepts and principles, Teaching steps, Programming planning process – meaning, scope, principles and steps. Evaluation: meaning, importance and methods. Scope and importance of Participatory Rural Appraisal (PRA) & Rapid Rural Appraisal (RRA). Management and administration: meaning, definition, principles and functions. Concepts of human resource development (HRD), rural leadership. ICT in Extension education, ICT use in rural India.

**Practical**

Visits to study structure, functions, linkages and extension programmes of ICFRE institutes/voluntary organizations/Mahila Mandal, Village Panchayat, State Dept. of Horticulture /All India Radio (AIR). Exercises on distortion of message, script writing for farm broadcasts and telecasts, planning, preparation & use of NPVA like poster, chart, flash cards, folders etc. and AVA like OHP & 35 mm slide projector transparencies. Identification of local leaders to study their role in extension work. Evaluation of some selected case studies of forestry extension programmes. Preparation of Village Agricultural productions plan.

**Suggested Reading:**

Adivi Reddy, A., 2001, *Extension Education*, Sree Lakshmi press, Bapatla.

Dahama, O. P. and Bhatnagar, O.P., 1998, *Education and Communication for Development*, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

Jalihal, K. A. and Veerabhadraiah, V., 2007, *Fundamentals of Extension Education and Management in Extension*, Concept publishing company, New Delhi.

Muthaiah Manoraharan, P. and Arunachalam, R., *Agricultural Extension*, Himalaya Publishing House (Mumbai).

Sagar Mondal and Ray, G. L., *Text Book On Rural Development, Entrepreneurship And Communication Skills*, Kalyani Publications.

Rathore, O. S. *et al.*, 2012, *Handbook of Extension Education*, Agrotech Publishing Academy, Udaipur.

Ray, G. L., 1991 (1<sup>st</sup> Edition), *Extension Communication and Management*, Kalyani Publishers, Ludhiana {7<sup>th</sup> revised edition - 2010}.

Supe, S. V., 2013 (2<sup>nd</sup> Edition), *A Text Book of Extension Education*, Agrotech Publishing Academy, Udaipur.

Van Den Ban, A. W. and Hawkins, H. S., *Agricultural Extension*, S. K .Jain for CBS Publishers & Distributors, New Delhi.

M Hilaris Indian agriculture and information: Soundari, New century Publications, 2011 and communication technology (ICT)

**AEC(H) 357: Horti-Business Management****3 (2+1)****Theory**

Farm management - definition, nature, characteristics and scope. Farm management principles and decision making, production function, technical relationships, cost concepts, curves and functions – factors, product, relationship – factors relationship, product relationship, optimum conditions, principles of opportunity cost-equi-marginal returns and comparative advantages, time value of money, economic of scale, returns to scale, cost of cultivation and production, break even analysis, decision making under risk and uncertainty. Farming systems and types. Planning – meaning, steps and methods of planning, types of plan, characteristics of effective plans. Organizations – forms of business organizations, organizational principles, division of labour. Unity of command, scalar pattern, job design, span of control responsibility, power authority and accountability. Direction – guiding, leading, motivating, supervising, coordination – meaning, types and methods of controlling – evaluation, control systems and devices. Budgeting as a tool for planning and control. Record keeping as a tool of control. Functional areas of management – operations management – physical facilities, implementing the plan, scheduling the work, controlling production in terms of quantity and quality. Materials management – types of inventories, inventory costs, managing the inventories, economic order quantity (EOQ). Personnel management – recruitment, selection and training, job specialization. Marketing management – definitions, planning the marketing programmes, marketing

mix and four P's. Financial management – financial statements and ratios, capital budgeting. Project management – project preparation evaluation measures.

### **Suggested Reading**

- Heady Earl O and Herald R. Jenson, 1954, *Farm Management Economics*. Prentice Hall, New Delhi
- S.S. Johl, J.R. Kapur, 2006, *Fundamentals of Farm Business Management*. Kalyani Publishers, New Delhi
- Karan Singh and Kahlon A S. *Economics of Farm Management in India*. Theory and Practice. New Delhi. Allied
- L.M. Prasad. 2001. *Principles and Practices of Management*, 9<sup>th</sup> Ed. S. Chand & Sons, New Delhi.
- Koontz Harold. *Principles of Management*. Tata McGraw-Hill Education Private Limited, New Delhi.
- P.C. Thomas. *Managerial Economics*, 9<sup>th</sup> Ed. Kalyani Publishers.
- K.K. Dewett and M.H. Navalur. *Modern Economic Theory*. S. Chand & Sons, New Delhi.
- P. Subba Rao. *Human Resource Management*. Himalaya Publications.
- S.P. Jain. *Financial Accounting*. Kalyani Publications, Ludhiana.
- Shapiro E. *Macroeconomic analysis*. Galgotia Publications Delhi
- Barry P J, Hopkins J A and Baker C B. *Financial Management in Agriculture*, 6th ed. Danville, IL Interstate Publishers.
- Gittiner, J P., *Economic analysis of agricultural projects*. The John Hopkins University Press Baltimore, USA, 1982
- Benjamin Mc Donald P 1985. *Investment Projects in Agriculture- Principles and Case studies*. Longman Group Limited. Essex. UK
- Pandey U K 1990. *An Introduction to Agricultural Finance*. Kalyani Publishers New Delhi.

## **AEC(H) 358: Entrepreneurship Development and Business Management**

**2(1+1)**

### **Theory**

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalization and the emerging business / entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to horticulture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Supply chain management and total quality management. Overview of horti inputs industry. Characteristics of Indian horticultural processing and export industry. Social Responsibility of Business. Communication Skills: meaning and process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills developing organizational and managerial skills, problem solving skills. field diary and lab record; indexing, footnote and bibliographic procedures.

### **Practical**

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, précis writing, summarizing, abstracting; Conducting market survey to the demand for product, preparing advertisements for popularization of product, news writing, preparing project proposals, individual, group presentation, features of oral presentation, presentation, evaluation of presentation and evaluation of sheet, dyadic communication-face to face conversation, telephone conversation, rate of speech and clarity of voice,

speaking and listening politeness, telephone etiquettes, organising general and group meeting, salient features of participation in seminars and conferences, conducting and participating in mock interviews.

### **Suggested Reading:**

- Benjamin MC Donald P. 1985, *Investment Projects in Agriculture- Principles and Case studies*. Longman Group Limited. Essex. UK.
- Chole, R. R. *et al.*, 2012, *Entrepreneurship Development and Communication skills*, Scientific publishers, Jodhpur.
- Gittiner, J P., 1982, *Economic Analysis of Agricultural Projects*, The John Hopkins University Press Baltimore, USA.
- Hopkins J A and Baker C B Danville, *Financial Management in Agriculture*, 6th ed Barry P J, IL Interstate Publishers.
- Kotler Philip and Armstrong, *Principles of Marketing*. Prentice-Hall.
- Pandey U. K., *An Introduction to Agricultural Finance*.
- Sagar Mondal and G. L. Ray, *Text Book on Rural Development, Entrepreneurship and Communication Skills*, Kalyani Publications.
- Somani, L. L., *Extension Education and Communication*, Agrotech, Publishing Academy, Udaipur.
- Dr. A.K. Singh, 2009. *Entrepreneurship Development and Management*. Lakshmi Publications Ltd.,
- S. Anil Kumar, S.C Poornima, M.K. Abhraham and K. Jayashree, 2008; *Entrepreneurship Development*. New Age International Publishers

### **ESDM 359: Environmental Studies and Disaster Management**

**3(2+1)**

#### **Theory**

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources. Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems, Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem:- a. Forest ecosystem, b. Grassland ecosystem, c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity -



consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity - habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of - Air, Water, Soil, Marine, Noise and Thermal pollution and Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust dies. Wasteland reclamation, Consumerism and waste products, Environment Protection Act, Air, Water, Wildlife and Forest Conservation Acts, Issues involved in enforcement of environmental legislation and Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Field work: Visit to a local area to document environmental assets river/forest/grassland/hill/mountain, visit to a local polluted site-Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc. Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

### **Practical**

Visit to local areas - river/forest/ grassland/catchment etc. to document components of ecosystem. Study of common plants, insects, birds and animals. Visit to industries to study pollution abatement techniques and case studies - solid waste management, Human population and the Environment.

### **Suggested Reading:**

A. Nandini, N. Suneetha and Sucharitha Tandon. *Environmental Studies*.

- Aswathanarayana, U. 1999. *Soil resources and the environment*. Oxford and IBH publishing Co., New Delhi. P. 173-195.
- D. D. Misra. *Fundamental Concepts in Environmental Studies*.
- Diwan, P. and P. Diwan. 1998. *Environmental Management Law and Administration*. Variety Books International, New Delhi.
- Krishnamurthy. *An Advanced Textbook on Biodiversity*.
- S. Deshwal A. Deshwal. *A Basic Course in Environmental Science*.
- Erach Bharucha 2005. Textbook of environmental studies for under graduate courses. UGC, University press, Hyderabad.
- Manohara Chary and Jayaram Reddy 2004. Principles of Environmental studies BB publishers, Hyderabad.
- William, P. Cunning Ham and Mary Ann. Inquiry and applications Cunningham 2005. Principles of Environmental science. Tata MCG raw-hill publishing company limited, New Delhi.
- Gupta, P.K. 2004 Methods in environmental analysis-water, soil and Air. Agro Bios (India). Jodhpur.
- Spencer R. Weart. The discovery of global warming.
- Daniel B. Botkin, Edward A. Keller. Environmental Science .
- Richard T. Wright and Bernard J. Nebel Environmental science: toward a sustainable agriculture.
- Linfield C. Brown. Pollution prevention and control.