DEPARTMENT OF FORESTRY

M. Sc. Environmental Science

(Semester System)

CBCS

SYLLABUS

KUMAUN UNIVERSITY NAINITAL

M. SC. ENVIRONMENTAL SCIENCE

I Semester				
S. No.	Paper	Marks		
1.	I- Physical Environment and Ecosystem Dynamics	100 (ext.75+ int.25)		
2.	II- Environmental Chemistry	100 (ext.75+ int.25)		
3.	III- Environment Conservation and Sustainable Development	100 (ext.75+ int.25)		
4.	IV- Climate Change, Remote Sensing and GIS	100 (ext.75+ int.25)		
5.	V-Practical: Practical, Field Study, Seminar and Training	100 (ext.75+ int.25)		
	Total Marks	500		

II Semester

S. No.	Paper	Marks
1.	I-Environmental Pollution and Legislation	100 (ext.75+ int.25)
2.	II- Environmental Toxicology and Stress	100 (ext.75+ int.25)
3.	III- Environmental Biostatistics	100 (ext.75+ int.25)
4.	IV-Environmental Impact Assessment	100 (ext.75+ int.25)
5.	V-Practical, Field Study, Seminar and Training	100 (ext.75+ int.25)
	Total Marks	500

III Semester

S. No.	Paper	Marks		
1.	I- Natural Hazards and Disaster Management	100 (ext.75+ int.25)		
2.	II-Environmental Biotechnology 100 (ext.75+ int.25			
3.	III- Waste Management and Treatment100 (ext.75+ int.25)			
	Elective course: One elective paper will be opted from the given papers			
4.	IV-Social Issues and The Environment	100 (ext.75+ int.25)		
5.	IV-Environmental Legislation and Policy	100 (ext.75+ int.25)		
6.	V-Practical, Field Study, Seminar and Training 100 (ext.75+ int.25)			
	(Compulsory)			
	Total Marks	500		

IV Semester S. No. Marks Paper 1. I-Energy Sources and Management 100 (ext.75+ int.25) 2. 100 (ext.75+ int.25) II-Research Methodology

Elective course: One elective paper will be opted from the given papers

3.	III-Natural	Resources	and	Biodiversity	100 (ext.75+ int.25)
	Conservation				
4.	III- Ecotourism: Concept and Approaches				100 (ext.75+ int.25)
	Open elec	tive course: D	issertati	on/ Elective pape	r will be opted
5.	VI- Dissertati	on			100 (ext.75+ int.25)
6.	VI- Analytic	Fechniques			100 (ext.75+ int.25)
7.	V- Practical,	Seminar, Tra	ining a	nd Project on	100 (ext.75+ int.25)
	Special Proble	em (Compulso	ry)	U	
	Total Marks				500

M. Sc. Environmental Science Choice Based Credit System (CBCS) Syllabus COURSE OUTLINE

Semester	Paper	Title (Core and Elective Courses)	Credits ThTu Pr		
	KUE 111	PHYSICAL ENVIRONMENT AND ECOSYSTEM DYNAMICS	4 (3+0+1)		
	KUE 112	ENVIRONMENTAL CHEMISTRY	4 (3+0+1)		
Somestor I	KUE 113	ENVIRONMENT CONSERVATION AND SUSTAINABLE DEVELOPMENT	4 (3+0+1)		
Semester - I	KUE 114	CLIMATE CHANGE, REMOTE SENSING AND GIS	4 (3+0+1)		
	KUE 115	PRACTICAL, FIELD STUDY, SEMINAR AND TRAINING	4 (0+0+4)		
	TOTAL CREDIT				
	KUE 121	ENVIRONMENTAL POLLUTION AND LEGISLATION	4 (3+0+1)		
	KUE 122	ENVIRONMENTAL TOXICOLOGY AND STRESS	4 (3+0+1)		
Compostor II	KUE 123	ENVIRONMENTAL BIOSTATISTICS	4 (3+0+1)		
Semester - 11	KUE 124	ENVIRONMENTAL IMPACT ASSESSMENT	4 (3+0+1)		
	KUE 125	PRACTICAL, FIELD STUDY, SEMINAR AND TRAINING	4 (0+0+4)		
		TOTAL CREDIT	20		
	KUE 211	NATURAL HAZARDS AND DISASTER MANAGEMENT	4 (3+0+1)		
	KUE 212	ENVIRONMENTAL BIOTECHNOLOGY	4 (4+0+0)		
	KUE 213	WASTE MANAGEMENT AND TREATMENT	4 (3+0+1)		
Somostor III	ELECTIVE COURSE: ONE PAPER WILL BE OPTED FROM THE FOLLOWING GIVEN PAPERS				
Semester - III	KUE 214	SOCIAL ISSUES AND THE ENVIRONMENT	4 (3+0+1)		
	KUE 215	ENVIRONMENTAL LEGISLATION AND POLICY	4 (3+0+1)		
	KUE 216	PRACTICAL, FIELD STUDY, SEMINAR AND TRAINING (COMPULSORY)	4 (0+0+4)		
TOTAL CREDIT					
	KUE 221	ENERGY SOURCES AND MANAGEMENT	4 (3+0+1)		
	KUE 222	RESEARCH METHODOLOGY	4 (3+0+1)		
	ELECTIVE COURSE: ONE PAPER WILL BE OPTED FROM THE FOLLOWING GIVEN PAPERS				
	KUE 223	NATURAL RESOURCES AND BIODIVERSITY CONSERVATION	4 (3+0+1)		
Semester - IV	KUE 224	ECOTOURISM: CONCEPT AND APPROACHES	4 (3+0+1)		
	OPEN ELECTIVE COURSE: DISSERTATION/ ELECTIVE PAPER WILL BE OPTED				
	KUE 225	DISSERTATION	4 (0+0+4)		
	KUE 226	ANALYTIC TECHNIQUES	4 (3+0+1)		
	KUE 227	PRACTICAL, SEMINAR, TRAINING AND PROJECT ON SPECIAL PROBLEM (COMPULSORY)	4 (0+0+4)		
		TOTAL CREDIT	20		

M. Sc. Environmental Science

I – SEMESTER

CORE COURSE

PAPER-I: PHYSICAL ENVIRONMENT AND ECOSYSTEM DYNAMICS

Course No.: KUE 111

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

Unit I: Fundamentals of Environmental Science; Origin of Earth; Geological Time Scale; Internal Structure of Earth; Rocks and Minerals; Classification of Rocks as Igneous, Sedimentary and Metamorphic.

Unit II: Composition of Atmosphere, Lithosphere, Hydrosphere and Biosphere.

Unit III: Soil - Its Formation, Composition and Soil Types, Soil Classification Based on Particle Size, Soil loss, Weathering, Erosion, Transport, Sedimentation, Control of Soil Erosion and Conservation.

Unit IV: Environmental Factors- Climatic Factors, Physiographic Factors, Edaphic Factors and Biotic Factors.

Unit V: Ecosystems: Types, Structure and Function; Major Types of Terrestrial and Aquatic Ecosystem; Important Ecological Concept: Energy Flow in Ecosystem, Food Chains, Food Web and Ecological Pyramids; Biogeochemical Cycle of C, N, S, P and Hydrological Cycle.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER II. ENVIRONMENTAL CHEMISTRY Course No.: KUE 1112

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

Unit I: Thermodynamics States of the System; First and Second Law of Thermodynamics; Adiabatic Transformation; Carnot Cycle; Entropy and Gibbs free energy.

Unit II: Chemical Potential; Chemical Equilibrium; Acid-Base Reactions; Solubility and Solubility Product; Carbonate Equilibria (System).

Unit III: Structure and Physiochemical Properties of Water; Acidity and Alkalinity; Reaction of Gases in Water; Chelation and Polyphosphate in Water.

Unit IV: Thermo-Chemical and Photochemical Reaction in Atmosphere; Stages of Matter, Colloidal Properties, Chemistry of Particulate and Gaseous Pollutants; Photochemical Smog Formation; Acid-Base Reaction in the Atmosphere (Acid Rain); Ozone Formation and Depletion Processes.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER III. ENVIRONMENT CONSERVATION AND SUSTAINABLE DEVELOPMENT Course No.: KUE 113 Total Credit: 4(LTP)

Course Outline: Theory/Lecture

Unit I: Biodiversity: Definition and Types; Importance of Biodiversity; Threats of Biodiversity; Conservation of Biodiversity and Biodiversity in India.

Unit II: Types of Biodiversity: Species Biodiversity, Genetic Biodiversity, Ecosystem Biodiversity and Molecular Biodiversity.

Unit III: Conservation of Biodiversity, Ex-Situ and In-Situ Conservation; National Park, Wildlife Sanctuaries and Biosphere Reserves in India; Hot-Spots and Keystone Species.

Unit IV: Red List Species: Rare, Endangered, Endemic and Threatened Species of India.

Unit V: Global Environmental Change and Sustainable Issue; International Program for Sustainable Strategies; World Conservation Strategy; UNCED; Agenda 21 and Commission on Sustainable Strategies.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

Course Outline: Theory/Lecture

Unit I: Climate Change: An Overview; Greenhouse Effect; Greenhouse Gases; Global Warming and Possible Effect of Global Warming.

Unit II: Climatology; Tropical Cyclone, Hurricanes and Tsunami; Atmospheric Stability and Environmental Lapse Rate.

Unit III: Tools to Study the Climate Change; Approaches to deal with Global Warming; Climate Change Mitigation; Impact of Climate Change in the Mountain, Glacial and Coastal region. Role of National and International Organization in policy, planning and sustainable development.

Unit IV: Remote Sensing and Geographical Information System; Application of Remote Sensing and Geographical Information System in Environment Monitoring and Management; Map Projection; Surveying; Understanding of Geographic Data and Global Positioning System.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-V: PRACTICAL, FIELD STUDY, SEMINAR AND TRAININGCourse No.: KUE 115Total credits: 4(LTP)

In this paper, the assignments related to project report/field training/study, seminar including practical works will be given to the students so that the skill, entrepreneurship and value addition related task could be developed.

II – SEMESTER

CORE COURSE

PAPER-I: ENVIRONMENTAL POLLUTION AND LEGISLATION

Course No.: KUE 121

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Definition of Pollutions, Types, Major Sources and Effects of Pollution; Prevention and Control of Environmental Pollution.

UNIT II: Major Pollutions: Air Pollutions; Water Pollutions; Soil Pollutions; Noise Pollutions and Radioactive Pollutions - Types, Major Sources and Effects.

UNIT III: Quality Standards of Air, Water and Noise; Acid Rain; Organochlorines and Organophosphate.

UNIT IV: Central and State Boards for the Prevention and Control of Environmental Pollution; Powers and Functions of Pollution Control Boards; Penalties and Procedure; Duties and Responsibilities of Citizens for Environmental Protection;

UNIT V: Environment (Protection) Act 1986; Hazardous Waste (Management and Handling) Rules 1989; Bio-Medical Waste (Management and Handling) Rules 1998; Issues Involved in Enforcement of Environmental Legislation; Public Awareness and Public Interest Litigations; Its Role in Control of Environmental Pollution in India.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-II: ENVIRONMENTAL TOXICOLOGY AND STRESS Course No.: KUE 122

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Principles of Toxicology; Dose-Response Relationship; Lethal Dose and Concentration; Exposure of Toxicants;

UNIT II: Route and Sites of Exposure; Translocation of Toxicants; Biotransformation; Interaction of Toxicants; Mechanisms of Action of Toxicants; Toxicity Tests; Target and Non-Target Organ Toxicity.

UNIT III: Teratogenicity, Carcinogenicity, Immunotoxicity, Occupational Factor and Health Hazards; Potency v/s Toxicity; and Metal Toxicity.

UNIT IV: Concept of Environmental Stress; Chemistry of Free Radicals and there Living System; High Temperature, UV Light, Drought, Salinity Stress; Effect of Metabolic System and Mechanism of Adaptation.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-III: ENVIRONMENTAL BIOSTATISTICS

Course No.: KUE 123

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Biostatistics- An Introduction; Sampling, Data Collection and Recording; Central Tendency-Concept; Arithmetic Mean, Mode, Median for Ungrouped and Grouped Data.

UNIT II: Measures of Dispersion- Absolute and Relative Measures; Range, Standard Deviation Variance, Quartile Deviation and Coefficient of Variability. Difference among Means, Skewness and Kurtosis.

UNIT III: Hypothesis Testing and Significance; Correlation, Linear Models, Correlation Coefficients Regressions and Multiple Regressions.

UNIT IV: Probability- Normal, Poisson and Binomial Distribution; T and Chi Square Test; F-Test- One Way ANOVA and Two Ways ANOVA;

UNIT V: Computer Applications in Environmental Modelling; Computer-Based Modelling for Population and Population Studies and Validation and Forecasting.

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-IV: ENVIRONMENTAL IMPACT ASSESSMENT Course No.: KUE 124

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Introduction of Environmental Impact Analysis; Environmental Impact Statement; Environmental Management Plan and EIA;

UNIT II: Impact Assessment Methodologies; Guidelines for Environmental Audit; Environmental Planning; Clean Development Mechanism (CDM).

UNIT III: Provision of Constitution of India Regarding Environment (48A & 51A); Environment (Protection) Act 1986; Public Liability Insurance Act 1991 & Rules 1991; Scheme of Labelling Environmentally Friendly Products (Eco-Marks); IUCN; Red Data Book; ISO 14000.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-V: PRACTICAL, FIELD STUDY, SEMINAR AND TRAINING Course No.: KUE 125 Total credits: 4(LTP)

In this paper, the assignments related to project report/field training/study, seminar including practical works will be given to the students so that the skill, entrepreneurship and value addition related task could be developed.

III – SEMESTER

CORE COURSE

PAPER-I: NATURAL HAZARDS AND DISASTER MANAGEMENT (Compulsory)

Course No.: KUE 211

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Introduction of Natural Hazards; Safety and Loss Prevention; Legal Frame Work; Health and Safety Executives; Economics of Loss Prevention; Cost of Losses and Prevention; Damage Insurance.

UNIT II: Hazard Identification and Safety Audit; Method of Hazard Identification; Hazard Indices; Hazard Quantification;

UNIT III: General Modelling Approaches; Empirical Tools; Computation Codes; Phenomenological Models; Explosion Hazards; Explosion Fundamentals;

UNIT IV: Variety of Modelling Approaches for Different Categories of Explosion; Fire Hazards; Dispersion Hazards; Heavy Gas Dispersion and Hazards Mitigation.

Practical

✤ Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-II: ENVIRONMENTAL BIOTECHNOLOGY (Compulsory) Course No.: KUE 212

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Microorganism: Classification, Characteristics, Occurrence and Distribution; Photoautotrophs, Chemolithotrophs, Organotrophs, Parasites and their Environmental Importance.

UNIT II: Soil Microorganisms and Interactions Relatives to Soil Fertility; Detection of Microbial Toxins;

UNIT III: Brief Account of Important Viral; Bacterial and Fungal Diseases of Plants; Types of Amino Acids; Posttranslational Modifications and their Significance; Genetic Material.

UNIT IV: DNA- Structural Forms and their Characteristics; RNA-Structural Forms and their Characteristics. Biological Significance of Different Forms. Recombinant DNA-Origin and Current Status; Steps of Preparation; Toolkit of Enzymes for Manipulation of DNA-Restriction Enzymes, Polymerases (DNA/RNA Polymerases, Transferase, Reverse Transcriptase), Other DNA Modifying Enzymes (Nucleases, Ligase, Phosphatases, Polynucleotide Kinase).

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-III: WASTE MANAGEMENT AND TREATMENT (Compulsory) Course No.: KUE 213 Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Solid Wastes: Sources; Generation; Classification and Composition. Solid Waste Management Methods- Sanitary Land Filling; Recycling; Composting; Vermi Composting; Incineration;

UNIT II: Energy Recovery from Organic Waste; Solid Waste Collection; Transportation; Processing; Recovery and Disposal.

UNIT III: Hazardous Waste Management; Sources and Classification; Physicochemical Properties; Hospital Waste; Land Filling, Site Selection Criteria, Landfill Layout, Landfill Sections, Occurrence of Gases and Leachate in Landfills: Composition and Characteristics, Generation Factors and Leachate, Pyrolysis.

UNIT IV: Incineration Waste Characterization, Combustion, Wastewater Treatment, Agriculture, Process Industry, Mineral, Metallurgical Industry, Disposal and Recycling of Waste.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

ELECTIVE COURSE: ONE PAPER WILL BE OPTED FROM THE GIVEN PAPERS

PAPER-IV: SOCIAL ISSUES AND THE ENVIRONMENT (OPTIONAL)

Course No.: KUE 214

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Population Growth; Population Explosion; Environment and Human Health; Human Rights and Public Awareness.

UNIT II: Urban Problem Related to Energy; Water Conservation; Rain Water Harvesting and Watershed Management; Resettlement and Rehabilitation of People; Wasteland Reclamation and Issues Involved in Enforcement of Environmental Legislation;

UNIT IV: World Consumerism Patterns; Eco Labelling (Eco-Mark) and Environment Friendly Products.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-IV: ENVIRONMENTAL LEGISLATION AND POLICY (OPTIONAL) Course No.: KUE 215 Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Constitution of India; Fundamental Rights; Fundamental Duties; National Green Tribunal; Legal Definitions (Environmental Pollution, Natural Resource, Biodiversity, Forest, Sustainable Development).

UNIT II: Article 48A (The Protection and Improvement of Environment and Safeguarding of Forests and Wildlife); Article 51A (Fundamental Duties); Environmental Legislation- History and Policy; Ancient Period- Worship of Water, Air, Trees; Forest Act 1865; Independent India- Van Mahotsava 1950; National Forest Policy 1894, 1952, 1988 and 2018.

UNIT III: Legislative Instruments- The Indian Forest Act 1927; The Wildlife (Protection) Act 1972; The Water (Prevention and Control of Pollution) Act 1974; The Forests (Conservation) Act 1980; The Air (Prevention and Control of Pollution) Act 1981; The Environment (Protection) Act 1986; Motor Vehicle Act 1988; The Public Liability Insurance Act 1991; Noise Pollution (Regulation and Control) Rules 2000; The Biological Diversity Act 2002; The Schedule Tribes and other Traditional Dwellers (Recognition of Forests Rights) Act 2006; The National Green Tribunal Act 2010;

UNIT IV: Scheme and Labelling of Environment Friendly Products; Stockholm Conference 1972; United Nations Conference on Environment and Development 1992; Rio De Janeiro (Rio Declaration, Agenda 21); Convention on Biological Diversity, Montreal Protocol 1987; Kyoto Protocol 1997.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-V: PRACTICAL, FIELD STUDY, SEMINAR AND TRAINING Course No.: KUE 116 Total credits: 4(LTP)

In this paper, the assignments related to project report/field training/study, seminar including practical works will be given to the students so that the skill, entrepreneurship and value addition related task could be developed.

IV – SEMESTER

CORE COURSE

PAPER-I: ENERGY SOURCES AND MANAGEMENT (Compulsory)

Course No.: KUE 221

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: The Energy Resources, Use and Crises; Conventional and Non-Conventional Sources of Energy; Global Change and Sustainable Issues.

UNIT II: Concept of Minimum Viable Population; Response of Ecosystem to Exploitations and Eco-Restoration; Importance of Energy; Per Capita Energy Consumption.

UNIT III: Energy Alternatives- Nuclear Energy, Solar, Geothermal, Biomass, Hydro Energy and Wind Energy; Fossil Fuels and Minerals- Coal Petroleum and Natural Gas, Biogas; Indian Renewable Energy Development Agency (IREDA) and Energy Legislation;

UNIT IV: General and Detailed Energy Auditing Procedure; Audit Pentagon; Resources Abundance; Consumption, End Users and Environmental Impact; Analysis of Energy Use; Use of Cost and Consumption Based Indices; The Role of Energy Manager; Monitoring and Targeting Techniques; Roles and Responsibility of Ministry.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-II: RESEARCH METHODOLOGY (Compulsory)

Course No.: KUE 222

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Nature and Types of Research; Selection of Research Problem; Formulation of Research Problem; Objectives, Sources of Identifying a Problems; Definition of the Problem; Generation of Research Questions.

UNIT II: Hypothesis, Estimation and Testing of Hypothesis; Planning for Literature Survey; Planning for Field Work, Collection and Recording of Data and Use of Statistical Tools; Interpretation of Data and Deriving Inferences and Conclusion.

UNIT III: Designing and Sampling- Random, Stratified, Cluster and Systematic Sampling; Principles of Experimental Designs; Types of Experimental Designs- CRD, RBD, LSD, Row –Column (Alpha) Designs, Split Plot and Strip Plot Designs.

UNIT IV: Writing of Project Proposal and Preparation of Research Project Report, Thesis and Dissertation; Writing of Scientific Articles and Technical Bulletins.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

ELECTIVE COURSE: ONE PAPER WILL BE OPTED FROM THE GIVEN PAPERS

PAPER-III: NATURAL RESOURCES AND BIODIVERSITY CONSERVATION (Optional) Course No.: KUE 223 Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Natural Resources: Classification; Concepts and Approach's; Degradation and Conservation of Natural Resources; Resources and Reserves.

UNIT II: Major Natural Resources: Land Resources, Forest Resources, Water Resources, Mineral Resources, Food and Energy Resources.

UNIT III: Biodiversity Concepts and Patterns; Value of Biodiversity; Levels of Biodiversity-Community Diversity (Alpha, Beta and Gamma Biodiversity), Gradients of Biodiversity (Latitudinal, Insular); Ecosystems Diversity- Biomes, Mangroves, Coral Reefs, Wetlands and Terrestrial Diversity. Habitat Loss and Fragmentation.

UNIT IV: Introduction of Exotic Species; Extinction of Species; IUCN Categorized-Endangered, Threatened, Vulnerable Species; Red Data Book; Human Intervention and Biodiversity Loss.

UNIT V: Methods of Conservation- In Situ (Biosphere Reserves, National Parks, Sanctuaries, Sacred Groves Etc.) & Ex Situ (Botanical Gardens, Zoological Gardens, Gene Banks, Pollen, Seed and Seedling Banks, Tissue Culture and DNA Banks Etc.) and Modes of Conservation; Biodiversity Conservation Laws.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-III: ECOTOURISM: CONCEPT AND APPROACHES (Optional) Course No.: KUE 224 Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Principles of Ecotourism-Types, Concepts, Origin, Objectives, Benefits.

UNIT II: Concepts of Tourism- Classification, Religious Tourism, Cultural Tourism, Heritage Tourism, Monumental Tourism, Adventure Tourism, Mass Tourism, Sustainable Tourism; Consumptive and Non-Consumptive Tourism and Places of Interests of Ecotourism.

UNIT III: Eco-circuit of the Western Ghats; Rain Forest Ecotourism; Mountain Ecotourism; Polar, Islands and Coasts Ecotourism.

UNIT IV: Impact of Ecotourism; Types and Degree of Impacts from Ecotourism Activities; Socio-Cultural Impacts; Ecotourism Related Organization; Disasters and Ecotourism;

UNIT V: Protected Areas Network in India; Factors Influencing Wildlife Management Such as Habitats, Population, Behaviour, Food Habits, Health, etc.; Tools for Data Collection and Analysis.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

OPEN ELECTIVE COURSE: DISSERTATION/ ELECTIVE PAPER WILL BE OPTED

PAPER-IV: DISSERTATION (Optional) Course No.: KUE 225

Total Credit: 4(LTP)

The dissertation topic will be given by the concern teacher to the student in the field of environment, forest ecology, biodiversity, ecotourism, physiology, environment management, pollutions, waste management, climate change etc.

PAPER-IV: ANALYTIC TECHNIQUES (Optional)

Course No.: KUE 226

Total Credit: 4(LTP)

Course Outline: Theory/Lecture

UNIT I: Vegetation Analysis- Density, Frequency, Abundance, Basal Area, Mean Basal Area and Total Basal Area, Important Value Index (IVI) and Provenance Value (PV).

UNIT II: Species Richness and Evenness; Species Diversity; Concentration of Dominance.

UNIT III: Effect of Climatic Parameters: Rainfall, High and Low Temperature, Humidity, Topography, Latitude and Longitude, Aspect, Slope, Snow and Frost on Vegetation.

UNIT IV: Soil Physical and Chemical Properties- Soil Colour, Texture, Moisture, Water Holding Capacity, Bulk Density and Porosity etc. Carbon, Nitrogen, Phosphorus, Potassium, Calcium and pH etc. Microscopy, Chromatography, GC, IR, FTIR.

Practical

Practical will includes all the exercises as given by respective subject teachers covering all the topics from the theory papers.

PAPER-V: PRACTICAL, SEMINAR, TRAINING AND PROJECT ON SPECIAL PROBLEM Course No.: KUE 227 Total credits: 4(LTP)

In this paper, the assignments related to project on special problem/field training/study, seminar including practical works will be given to the students so that the skill, entrepreneurship and value addition related task could be developed.