

TUMKUR



UNIVERSITY

**Ph.D. - ENVIRONMENTAL SCIENCE**  
**Course Structure & Revised Syllabus for Entrance Exam**

**UNIT I- RESEARCH METHODOLOGY AND STATISTICS:**

Characteristics and types of scientific research; organizing scientific research (experimental design, research methodology, sampling designs); importance and scope of Statistics; Primary and secondary data; Sampling of data; Diagrammatic (Line, bar, pie diagram) and Graphic (Histogram, frequency polygon, frequency curve, cumulative frequency curve) representation of data, Measures of central tendency – Mean (AM, GM and HM), Mode and Median; Measures of dispersion, skewness and kurtosis; Probability Distribution (Binomial distribution, Poison distribution and Normal distribution); Statistical Tests: Chi square tests, Co-relation and regression, Analysis of variance (one way and two way analysis of variance); computer application and environment system analysis.

**UNIT II: RESEARCH ETHICS & IPR**

Perspective of ethics, personal vs. professional ethics. Moral reasoning, ethical theories, deontological, utilitarianism, ethical leadership (integrity and ingenuity). Framework for ethical decision making. Plagiarism software, intellectual property rights, types, patents, copy rights, trade marks, design rights, geographical indications. Patentable and non-patentable, world intellectual property rights organization (WIPO).

**UNIT III: COMPUTER APPLICATIONS**

Concept of computer hardware, languages, and softwares. Introduction to spreadsheet applications, features, using formulas and functions, data storing, features for statistical data analysis, generating charts/graph and other features using Microsoft excel or similar. Introduction to presentation tools, features and functions, power point presentation, internet browsing, WWW, use of search engines, Environmental data bases, Computer networking LAN and WAN.

**UNIT IV- ECOSYSTEM, POPULATION DYNAMICS AND NATURAL RESOURCES:**

Principle and concept of ecosystem, types of ecosystems, biomes, eco-tones and edge effect, ecological niche, ecological indicator; biogeochemical cycles and their significance; ecological pyramids, food chain, food web ecosystem stability, ecological succession; characteristics of population, concept of carrying capacity, population growth and regulation, population fluctuation, dispersion and meta- population; concept of r and k species, key stone species; community structure, diversity, dominance, stratification, periodicity, fluctuation within community, Natural resources; characteristics and classification; Exploitation of minerals on environment, demand and supply scenario in India, energy conservation measures; renewable and non-renewable resources.

ಅಧ್ಯಕ್ಷರು

ದಾಕ್ಷರಲ್ ಸಮಿತಿ.....

ತುಮಕೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ತುಮಕೂರು

## UNIT V- ENVIRONMENTAL CHEMISTRY AND GREEN TECHNOLOGY:

Concept and scope of environmental chemistry, Stoichiometry, Gibb's energy, chemical potential; Chemical equilibrium, Acid-base reaction, solubility product, solubility of gases in water; Pesticides (classification, degradation, analysis, pollution due to pesticides and DDT problems, organochlorides, organophosphates, organo-carbamates, herbicides; synthetic polymers, Thermo-chemical and Photochemical reaction in the atmosphere, Oxygen and Ozone chemistry, Air pollutants; photochemical smog, O<sub>3</sub>, N<sub>2</sub>O, HC, CFCs and PAN; Global warming; principles of sustainable and green chemistry; introduction to nano-materials and green nanotechnology and its applications, Biofuel production (bio-ethanol and biodiesel).

## UNIT VI- ECOTOXICOLOGY


Origin and scope of toxicology, classification of toxicants, natural and synthetic toxins, sources of toxicants; toxicity, types of toxins and basic mechanism of action; dose response relationship, LD<sub>50</sub>, LC<sub>50</sub>, toxicity testing, acute toxicity tests; sub-acute and chronic toxicity tests, environmental toxicants, xenobiotics; impacts of Arsenic, Cadmium, Lead, Mercury, Carbon-Monoxide, Nitrous Oxide, Sulphur Dioxide, Ozone, Cyanide, pesticides; health impacts of toxicants on human and aquatic life, long-term effects- chronic, carcinogenic, mutagenic and teratogenicity effects; environmental factors affecting health, occupational diseases- Asbestos, Benzidine, Chromium, Nickel compounds, Arsenic, Cadmium; water-borne diseases.

## UNIT VI- ENVIRONMENT IMPACT ASSESSMENT:

Origin and benefits of EIA, sources and collection of data for EIA; measurement of Impact (physical, social, economic, natural); EIA Methodology (outline of EIA process, screening, scoping, purpose of scoping, impact implications, baseline studies and superimposition of projected plant emission impacts; reliability of database; intrinsic and external database supports and interpretation; checklist, matrices, overlays and geographical information system, impact analysis and predictions); Public hearing as part of EIA; EIA report; Social Impact Assessment (SIA), Strategic Environmental Assessment (SEA), Public involvement, Public Hearing compulsion, restoration, and rehabilitation methodologies, Mitigation criteria, Environmental Management Systems (EMS).

## UNIT VII- EARTH & ATMOSPHERIC SCIENCES

Definition, evolution, and history of Earth, formation of core, mantle, crust, magma generation, plate tectonics; Continental drift theory; earth's magnetic field, types of seismic waves; formations and classification of rocks, rock cycle, fold, and fault, weathering and their types; soil profile, soil classification, soils of India; layers of atmosphere, energy budget, temperature measurements and controls, environmental lapse rate, humidity, mixing ratio, dry and wet adiabatic lapse rate, clouds-types and their characteristics and atmospheric stability; elements of weather and climate, precipitation and types of storms, Indian monsoon, El Nino, La Nina effect, and western disturbances, geostrophic wind and gradient wind, cyclones; forms of cloud condensation.

  
ಅಧ್ಯಕ್ಷರು  
ಡಾಕ್ಟರಲ್ ಸಮಿತಿ.....  
ತುಮಕೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ  
ತುಮಕೂರು

## UNIT VIII- GLOBAL ENVIRONMENTAL ISSUES

Definition and sources of pollution, different types of pollution (sources, impacts and management of air pollution, water pollution, noise pollution, soil pollution, thermal pollution, radiation pollution; Natural and man-made radiation, sources of ionizing radiation, types of ionizing radiation, radiation dose and units, direct and indirect effects, dose limits, radiation hazard; impact of radiations on biological molecules (proteins, nucleic acids, lipid and carbohydrates), ozone in the atmosphere, ozone depletion, ozone hole, worldwide, ozone trends, consequence of ozone depletion; nature and development of acid rain and its impacts.

## UNIT IX- ENVIRONMENTAL GOVERNANCE

Environmental Policy in India, Indian Constitution and Environmental Protection; Environment (Protection) Act, 1986; Powers of CPCB & SPCB; Hazardous wastes (Management, Handling and Transportation) Rules, 2008; Public Liability Insurance Act, 1991; Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981; Noise pollution (Regulation and Control) Rules, 2000; Wildlife (Protection) Act, 1972; National Forest Policy; Forest Conservation Act, 1986; Biological Diversity Act, 2002; International Environmental Law; Green Economy (Green economy, Role of UNEP, Brundtland Commission, Economic Growth and Environment); Stockholm Convention (1972); Basel Convention (1989, 1992); Earth Summit at Johannesburg (2002); Earth Summit Rio De Janeiro (1992, 2012); Kyoto Protocol, 1997; Montreal Protocol, 1987; Ramsar Convention on Wetland, 1971; Paris Agreement (2015); Rotterdam Convention; Agenda 21, Sustainable Development Goals; Role of International Environmental Agencies (UNEP, GEF, UNFCCC and IPCC); Carbon Trading; Carbon Credits; Carbon Sequestration; carbon footprint.



ಅಧ್ಯಕ್ಷರು  
ಡಾಕ್ಟರಲ್ ಸಮಿತಿ.....  
ತುಮಕೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ  
ತುಮಕೂರು