SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR

SYLLABUS EFFECTIVE FROM: 2018-19
MSC (ENVIRONMENTAL SCIENCE AND TECHNOLOGY (EST))
SEMESTER - IV

PS04CEST21: WASTE MANAGEMENT AND CONTROL TECHNOLOGY

Solid Waste handling and Management: sources, types, quantitative estimation, methods of collection, storage, transportation. Biological and chemical techniques for energy and other resource recovery: composting, termigradation, Incineration of solid wastes. Disposal in landfills: site selection, design, and operation of sanitary landfills; Leachate and landfill gas management; landfill closure and post-closure environmental monitoring; landfill remediation. Regulatory aspects of municipal solid waste management. Solid wastes management and handling rules, 2000.

Biomedical Waste management: definition, health and environmental issues. Category of waste, segregation, collection and transportation. Treatment systems. Biomedical Waste Management and Handling Rules, 1998. Electronic waste (E-waste): Sources and types, constituents of E-wastes, recycling of e-waste and its environmental consequences, Transboundary movement and management of e-wastes.

Hazardous waste management**:** Types, Recycle, Disposal: site selection criteria, hydrological assessment and design consideration for land disposal facilities and regulations. TSDF concept Hazardous waste disposal site clean up, site safety and sampling plans, remediation and feasibility study, Hazardous waste reduction and Recycling-Regulatory aspects of HWM. Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2010.

Nano-Science and Technology: Types of nonmaterial, nanoparticles in aquatic and terrestrial and atmospheric environment, Instruments used in studying nanoparticles, Occupational exposure to nanoparticles, Toxicological properties of nanoparticles and nanoparticles to cure human diseases and in mitigating water pollution

Suggested Books

1. Besselviere, E and Schwartz. 1975. Treatment of Industrial Wastes, McGraw Hill.
2. King, R. W. and Magid, J. 1982. Industrial Hazards and Safety, Handbook, Butterworth
3. LaGrega. 2004. Hazardous Waste Management. McGraw Hills.
4. Mahajan 1985. Pollution control in process industries. Tata McGraw Hill
5. Ronald E. Hester Roy M. Harrison 2007 Nanotechnology: Consequences for Human Health and the Environment.

PS04CEST22: ENVIRONMENTAL RESOURCES AND CONSERVATION

Energy and Environment - Environmental Conservation- Natural resources and their conservation, Non-conventional Energy sources – process, mechanisms, mitigation of fuel, coal, oils & natural gas, Conventional / Renewable sources of energy- hydroelectric power, solar, tidal, wind, geothermal energy.

Fossil fuels and related environmental impacts, Household energy conservation, Urbanization and environment, Environmental impacts of mining, Wasteland development and reclamation, Energy use pattern in India and the world, Bioresource management – social forestry, Grassland, Cropland, Freshwater, Marine, Wildlife management , role of regional bodies, MoEFCC, NBA, WWF, CITES, TRAFFIC, IUCN, redlist categories, Red data book.

Biodiversity: Concept, Types- genetic, species, ecosystem, importance of biodiversity, principles of biodiversity conservation, Alpha, Beta and Gama diversity, Hot spots, mega diversity countries, dwindling or extinct of biodiversity, monitoring(case study), management and in-situ and ex-situ conservation strategies. Threatened and endangered flora and fauna of Gujarat. Wildlife: reasons for decline, anthropogenic pressures, biosphere reserves, sanctuaries, national parks of Gujarat. Anthropogenic pressures on protected areas (Case study),.

Forestry- Characters used for classification of forest, major types of forests- Tropical wet ever green, tropical semi-every green, moist deciduous forest, thorny forest, pine and alpine forests, Vegetation types of Himalayas. Uses of biodiversity : MFP (minor forest produce), Ethnobotany, conservation of forests. **,** Agroforestry, Forest management systems.

Suggested Books.

1. CEE. 1999. Energy & Environment. Enviro Scape Publications.
2. Christopherson, R.W. 1998. Geosystems. Prentice Hall Inc., NJ.
3. Cotton, C.G. 2001. Fundamentals of Ethnobotany. Prentice Hall.
4. Dwivedi, A.P. 1999. Forests: Non-timber Resources. International Book Distributors.
5. Jain. S.K. 2000. Manual of Ethnobotany.
6. Kumar & Asija. 2010. Biodiversity: Principles and Conservation. Agrobios, India.
7. Negi, M.S. 2005. Forests of India. MoEF Publications.
8. Negi, S.S. 2005. Handbook of Forestry. International Book Distributors.
9. Odum, E.P. Fundamentals of Ecology. Nataraj Publishers, Dehradun
10. Safi & Raza. 1992. Forest Ecosystems of the World. Rawat Publications.
11. Singh, S.P. 1999. Handbook of Agroforestry. Agrotech Press.
12. Singh, V.P. 2004. Tropical Forest Ecosystem: Structure and Functions. Scientific Publications.

PS04CEST23: Practicals based on PS04CEST21 and PS04CEST22

Characterization of municipal solid waste including heavy metals: Particle density, ignitibility, bulk density, moisture content, porosity, proximate analysis, , sulphide, TS,TDS, Cr, Fe, Cu,

Scientific Presentations: Dissertation, thesis and Report writing, scientific reference writing, Tabular and graphical representation, Research Paper presentation: Importance of clear title, abstract or summary. Introduction, Review of Literature, Materials & Methods, Results, and Discussion, Bibliography, Plagiarism, Examples

Study of minimum size of quadrate, minimum number of quadrate, Community structure by quadrate – a) Qualitative community structure- Odum's index, Koth's index, Shannon's index, b) Quantitative community structure – frequency, density, abundance.
Minor Forest Produce, Medicinal Plants.

Field Visit- Field visit to be made to study the national park, protected areas and prepare report and submit at the time of examination (Information on collection of MFP, Ethno-botanical and medicinal plants and anthropogenic pressures, Visit to Medicinal garden, AAU, Anand , Solar Research Station for Biogas Plant (SPRERI), Vallabh Vidyanagar**.**

PS04CEST24: Viva Voce

PS04CEST25: Project work/ Dissertaion is offered compulsorily in fourth semester in Industry or Reseach centers.

Suggested Books for Practical

1. APHA. 2012. Standard Methods for the Examination of Water and Wastewater. American Public Health Association, New York.
2. Gupta, P.K. Methods for Environmental Analyses. 242 pp.
3. Maiti, S.K. 2004. Practical Manual for Water, Soil, Noise and Air Analyses. Vols. I & II.
4. Trivedy, R.K. and Goel, P.K. 2004. Chemical and Biological Methods for Water Pollution. Karad, MH.