**KAHM Unity Women’s College, Manjeri**

**Post Graduate Department of Chemistry**

**Certificate Course 2021-2022**

**Syllabus for**

**CHE05CC07 – “GREEN METHODS FOR AN EVERGREEN EARTH”**

**Module I:** (3 hrs)

Introduction to Environmental pollution

 Concepts and definition – Pollutant, contaminant, receptor and sink – Classification of pollutants – Global, regional, local, persistent and non-persistent pollutants.

**Module II**: (6 hrs)

Air Pollution and control measures

Need for clean air, Composition of air, Tropospheric pollution – Gaseous air pollutants –Hydrocarbons, oxides of sulphur, nitrogen and carbon – Global warming, greenhouse effect, acid rain – Particulates – Smog: London smog and photochemical smog – effects and control of photochemical smog – stratospheric pollution - depletion of ozone layer, chlorofluorocarbons - Automobile pollution. Control of air pollution – Alternate refrigerants.

Air pollution control measures – Gravitational settling chamber, fabric filter, wet scrubber, catalytic converters, stacks and chimneys, cyclone collectors, Cottrell electrostatic precipitator, extraction ventilator, zoning and green belt.

**Module III**: (9 hrs)

Water Pollution and control measures

Importance of water. Impurities in water, international standards for drinking water – cause of pollution – natural and anthropogenic – Marine water pollution – Underground water pollution. Source of water pollution – Industrial waste, Municipal waste, Agricultural waste, Radioactive waste, Petroleum, Pharmaceutical, heavy metal, pesticides, soaps and detergents. Types of water pollutants: Biological agents, physical agents and chemical agents Eutrophication - biomagnification and bioaccumulation. oil pollution in water.

Water quality parameters: DO, BOD, COD, alkalinity, hardness, chloride, fluoride and nitrate. Toxic metals in water and their effects:

Water treatment methods - Primary, secondary and tertiary methods - Aerobic and anaerobic oxidation - Sedimentation, coagulation, filtration, disinfection, desalination and ion exchange - USAB process and deep well injection.

**Module IV**: (9 hrs)

Soil Pollution and control measures

Soil pollution: Sources by industrial and urban wastes. Pollution due to plastics, pesticides, biomedical waste and e-waste (source, effects and control measures)

 Control of soil pollution - Solid waste Management – Open dumping, landfilling, incineration, re-use,

reclamation, recycle, composting, non-degradable, degradable and biodegradable wastes. Hazardous waste.

**Module V**

Green chemistry: Green chemistry principles, need of green chemistry, examples.

References

1. A. K. Ahluwalia, Environmental Chemistry, The Energy and Resources Institute, 2017.

2. Balram Pani, Textbook of Environmental Chemistry, I. K. International Pvt Ltd, 2010.

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