Syllabus of Certificate Course
in
Waste Management: Challenges and Opportunities

Name of Program	Certificate Course	Program Code	
Name of the Course	Waste Management: Challenges and Opportunities	Course Code	24 EVS CEC 01
Hours per Week	02	Credits	02
Maximum Marks	50	Time of Examination	3 hours

Note: The examiner has to set a total of nine questions (two from each unit and one compulsory question consisting of short answer from all units. The candidate has to attempt one question each from each unit along the compulsory question (5 x 7 = 35 marks)

Course Objectives:

- Understanding about the core concept of waste management.
- Introduce learners with existing knowledge and practices regarding waste Management.
- Enhance the Learners' ability regarding effective waste management.
- Analysis of trends in waste generation, waste classification and technique for targeting zero waste goals.
- Familiarize the learners with the scope and possibilities of improvement in this sector of waste management.

Course Learning Outcomes:

- Comprehensive understanding of waste generation and management
- Existing status of waste management in India
- Familiarize regarding new Waste Management Rules, 2016 and their status of compliance.

Unit I

Solid waste: sources, generation, classification & composition. Solid waste management methods- Sanitary landfilling, Composting, Vermicomposting, incineration, energy recovery from organic waste, Waste Recycling.
Community Engaement: Swachh Bharat Mission, Amrit sarovar mission etc.

Unit II

Hazardous waste: Types, characteristics and health impacts. Hazardous treatment Methods and final disposal. E-Waste Management: Introduction- Composition, classification and its generation, Current disposal methods of e-waste, Effects of E-waste on the environment and human health, Single use plastic waste management, Plastic Waste Management Rules, 2016 and amendment, 2022.

Unit III

Industrial waste: Waste Water treatment -Primary, Secondary, Tertiary/advanced treatment methods, Sludge treatment methods, Indian standards for disposal of treated wastewaters on land and in natural streams, Fly ash generation and utilisation.

Unit IV

Agriculture waste: The Solid Waste Management Rules, 2016, The Construction and Demolition Waste Management Rules, 2016, The e-waste (Management) Rules 2016, The Batteries (Management and Handling) Rules, 2010 with Amendments, The Bio-Medical Waste Management Rules, 2016, Hazardous Waste Management & Handling rules, 1989 & 2000 (amendments).

Suggested readings:

1. Christensen, H. T., Solid Waste Technology & Management, Wiley, 2010.
2. Haug, T. R., The Practical Handbook Of Compost Engineering, Lewis Publishers, 1993
3. J.A. Nathanson ,Basic Environmental Technology: Water Supply Waste Management and

Pollution Control ,2003

4. Trivedi R.K.and Kumar, A. Ecotechnology For Pollution Control & Environmental Management ,1998
5. Tchobanoglous, G. And Kreith, F ,Handbook of Solid Waste Management, Mcgraw Hill, 2nd Edition, 2002.
6. Reinhart, R. D. and Townsend, G. T., Landfill Bioreactor Design & Operation, CRC Press, 1997, 1st Edition
7. Ronald L. Droste, Ronald L. Gehr, Theory and Practice of Water and Wastewater Treatment, 2nd Edition.2019
8. Salpekar A., Solid Waste Pollution, Jnanada Prakashan,2008
9. Agarwal, S.K., Water Pollution, A.P.H. Publishing Corporation 2005.
10. Bill T. Ray, Environmental Engineering, PWS Publishing Company,1995