B.E. Semester: VII

Civil Engineering
Subject Name: HAZARDOUS WASTE MANAGEMENT (CV704-C)

A. Course Objective:

- To take up the basic concepts of Environmental Engineering and management.
- To introduce students to basic concepts of planning and management of hazardous waste management.
- The content involves importance of necessity of hazardous waste management.
- To understand the awareness regarding hazardous waste related health and environmental problem.

B. Teaching /Examination Scheme:

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	02	00	05	05	03	70	30	20	30	150

C. Detailed Syllabus:

1. Definition, Identification And Classification Of Hazardous Solid Waste
2. Hazardous Waste Management: Waste Minimization; Waste Exchange; Recycling
3. Treatment Technologies: Biological, Chemical; Physico-Chemical Treatment: Incineration, Stabilization, Solidification
4. Disposal Of Hazardous Waste
5. Biomedical Waste Management: Sources; Generation; Classification; Storage; Transportation; Disposal; Waste Treatment: Disinfection, Irradiation, And Incineration.

D. Lesson Planning:

Sr.No.	Title of the Unit	Minimum Hours	Weightage
1.	Definition, Identification And Classification Of Hazardous Waste	04	10%
2.	Hazardous Waste Management: Waste Minimization; Waste Exchange; Recycling	05	15%
3.	Treatment Technologies: Biological, Chemical;	18	40%

	Physico-Chemical Treatment: Incineration, Stabilization, Solidification		
4.	Disposal Of Hazardous Waste	08	10%
5.	Biomedical Waste Management: Sources; Generation; Classification; Storage; Transportation; Disposal; Waste Treatment: Disinfection, Irradiation, And Incineration.	10	25%

E List of Tutorials:

Sr. No.	Title
1	Introduction to hazardous waste
2	Introduction to hazardous waste management
3	Treatment technologies
4	Disposal of hazardous waste
5	Biomedical waste management
6	Presentation and discussion on data collected from various sites given by subject coordinator.

F Instructional method and pedagogy (Continuous Internal Assessment Scheme) (CIA):

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

G. Students Learning Outcomes:

On the completion of the course one should be able to understand:

- Concepts of hazardous waste management.
- How to treat waste.

- How to dispose waste.
- Be able to plan and design landfill site.

H. Recommended Study Materials

A. Reference Books:

1. Environmental Engineering by Arcadio Sincero and Gregoria Sincero, Second Edition, Prentice -Hall India
2. Intigrated Solid Waste Management : Engineering Principles and Management Issues by George Tchobanoglous, McGraw-Hill Publication
3. Hazardous Waste Management by M LaGrega and others, McGraw-Hill Publication

B. Web Materials:

1. http://nptel.iitm.ac.in
2. http://www.britannica.com/EBchecked/topic/257926/hazardous-waste
3. www.epa.gov/solidwaste/hazard/tsd/index.htm
4. www.envfor.nic.in/legis/hsm.htm
5. www.cpcb.nic.in/upload/NewItems/NewItem_149_Protocol.pdf