Paper Code: ENV-21	**Roll No.**									

M.Tech.
(SEM II) EVEN SEMESTER EXAMINATION, 2015-16
SOLID WASTE MANAGEMENT

[Time: 3 hrs.] **[Max. Marks: 100]**

1. Attempt any **two** parts of the following:- **[10x2=20]**

   (a) What are the various types of special type of solid waste? What are their characteristics? Write a typical physical composition of municipal solid in an Indian City.

   (b) What are proximate and ultimate analyses of solid waste? Discuss the role of density compaction ratio in solid waste collection and planning.

   (c) Derive an empirical organic formula for the solid waste shown in table below. Assume any data if required.

Component	Newspaper	Other papers	Cardboard	Glass	Plastics
Mass (%)	15	24	33	4.2	0.49

Component	Aluminum	Ferrous	Yard waste	Food waste	Dirt	Sum
Mass (%)	0.13	1.18	17.97	1.67	2.01	100

2. Attempt any **four** parts of the following:- **[5x4=20]**

   (a) Draw a inter relation diagram of various components of a solid waste management system.

   (b) Discuss various methods of estimation of solid waste quantities. Elaborate load count and mass volume analysis.

   (c) Write salient features of solid waste management rule 2000.

   (d) What do you understand by onsite handling and storage of solid waste?

   (e) What is biomedical waste? Is it a special waste?

   (f) Define physical, chemical and biological transformation of solid wastes?

3. Attempt any **two** parts of the following:- **[10x2=20]**

   (a) Discuss haul container system and stationary container system. Also write expression for total time per trip for both types.

   (b) How will you decide the solid waste collection route(s) in a locality? Discuss in detail.

(c) Discuss the role of Reduce-Recovery-Recycle (3R) in a solid waste management system. What will be the pro(s) and con(s) of Recovery and Recycle at source?

4. Attempt any **two** parts of the following:- **[10x2=20]**

(a) What is engineered landfill? How would you control leachate movement in a landfill?

(b) Discuss various factors involved in locating a landfill site.

(c) Discuss the significance of daily operating capacity and ultimate capacity in landfill operational plan. Also give key points of landfill filling plans.

5. Attempt any **four** parts of the following:- **[5x4=20]**

(a) What is pyrolysis? How waste is treated in a pyrolysis process?

(b) Discuss waste to energy (WTE) option for waste treatment.

(c) Give some methods of thermal treatment of solid waste. Elaborate any one.

(d) Summarize some of the main reasons of failure of waste to energy options in Indian Cities.

(e) Write note on physical properties of solid waste.

(f) What are the methods used for the treatment and disposal of biomedical waste?