



Register Number:.....

**B.E DEGREE EXAMINATIONS: NOV/DEC 2014**

(Regulation 2009)

Seventh Semester

**CIVIL ENGINEERING**

CEE211 : Municipal Solid Waste Management

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The maximum percentage of MSW component in a typical composition of MSW is
  - a) Food waste
  - b) Paper
  - c) Glass
  - d) Garden trimmings
2. Hand sorting technique can be used for the segregation of \_\_\_\_\_ from MSW
  - a) Iron
  - b) Wood
  - c) Paper
  - d) All the above
3. The most commonly adopted method of MSW disposal method in our country
  - a) Incineration
  - b) pyrolysis
  - c) Thermal Insulation
  - d) Land fill
4. Most commonly used sealant for landfills is
  - a) Asphalt
  - b) concrete
  - c) Bentonite
  - d) Ruber latex
5. The quantity of cover material required for 25 m<sup>3</sup> of solid waste is
  - a) 15 m<sup>3</sup>
  - b) 5 m<sup>3</sup>
  - c) 25 m<sup>3</sup>
  - d) 10 m<sup>3</sup>
6. The chemical conversion process (pyrolysis) of MSW is also known as
  - a) composting
  - b) Destructive distillation
  - c) Incineration
  - d) Wet oxidation

7. The pneumatic transport of MSW could be adopted for
  - a) Institutions
  - b) Industrial Area
  - c) High rise Apartments
  - d) Commercial Areas
8. The main conversion end products from aerobic and anaerobic decomposition of MSW are ----- respectively
  - a) Compost and CO<sub>2</sub>
  - b) CH<sub>4</sub> and CO<sub>2</sub>
  - c) Compost and Methane
  - d) Compost and O<sub>2</sub>
9. The best method for ferrous materials separation from the MSW is
  - a) Eddy current separation
  - b) Electro static separation
  - c) Magnetic separation
  - d) Hand sorting separation
10. The Bangaluru method of MSW composting is also called as
  - a) Aerobic composting
  - b) Anaerobic composting
  - c) Alkaline hydrolysis
  - d) fermentation

**PART B (10 x 2 = 20 Marks)**

11. What are the general sources of Municipal Solid Waste Generation?
12. Mention the uses of Wind Screen in MSW Transport
13. List the physical and chemical properties of a MSW.
14. Define the term 'compost' and mention its uses.
15. Differentiate Windrow composting and Vermi composting?
16. Mention any four biologically converted products from MSW
17. What is leachate? And why it has to be treated?
18. Define the term Incineration in MSW Management
19. What are the draw backs in land fill method of MSW disposal.
20. Find the energy content of the MSW when the available carbon, hydrogen, oxygen, sulphur is 40, 7,50,0.2 percent by mass respectively.

**PART C (5 x 14 = 70 Marks)**

21. a) (i) Estimate the Moisture Content and Density of the Solid Waste sample with the following composition (take 5000 kg of sample). (8)

Component	% by mass	Moisture Content %	Density kg/m <sup>3</sup>
Paper	40	6	85
Food waste	20	70	290
Garden trimmings	20	60	105
Card board	5	5	50
Plastics	5	2	65
Wood	5	20	240
Tin cans	5	3	90

(ii) What are the ill effects of improper disposal of MSW? (6)

**(OR)**

b) (i) Draw the flow chart of functional elements of an effective Municipal Solid Waste Management (MSWM) system and explain them. (8)

(ii) How will you assess the individual components of MSW in the field? (6)

22. a) (i) Explain the factors to be considered in the on site storage of MSW. (8)

(ii) Discuss the role of NGO's and an individual in MSWM. (6)

**(OR)**

b) (i) Why processing techniques are used in MSWM? List out the factors that should be considered in evaluating onsite processing equipments. (8)

(ii) Classify the MSW collection systems? Compare the merits and demerits of them. (6)

23. a) (i) Discuss the important factors that must be considered in the design of Transfer Station in MSWM. (8)

(ii) List the rules and factors to be considered while laying out the routes for MSW collection from a community? (6)

**(OR)**

b) (i) What do you mean by Break Even Point (BEP) Analysis? Where will you use the same in an effective Municipal Solid Waste Management programme? (8)

(ii) Write short notes on different colour storage bins that are used in a MSWM programme (6)

24. a) (i) Determine the amount of air required to oxidize 3000 Kg of waste having the chemical formula  $C_{60} H_{160} O_{50} N$  (8)

(ii) How will you evaluate a potential land fill site? (6)

**(OR)**

b) (i) List out and explain in detail the important design considerations for Aerobic Composting Process (8)

(ii) Write short notes on Land farming and deep well injection methods of MSW disposal. (6)

25. a) (i) Write a brief note on gasification and wet oxidation. (8)

(ii) How will you obtain Refuse Derived Fuels (RDF) from the MSW? Draw a flow chart and explain (6)

**(OR)**

b) (i) Discuss the important factors that should be considered in the design and execution of engineered land fill (8)

(ii) Write short notes on MSW Management and Handling Rules 2000 given by MoEF/New Delhi (6)

\*\*\*\*\*