40+40+40+7

(140)

B.E Civil VII CBSGS

Solid Waste Mgt

21.12.16

QP Code : 849001

(3 Hours) **[Total Marks : 80**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **three** questions out of remaining **five** questions.
(3) Assume suitable data if necessary.
(4) **All** questions carry **equal** marks.

1. (a) Explain the functional elements of municipal solid waste management. **5**
(b) Estimate the moisture content of municipal solid waste sample with the following composition. **5**

Component	% by mass	moisture content %
Food waste	20	70
Paper	40	6
Card board	10	5
Plastics	10	2
Garden Trimnings	10	60
Wood	5	20
Tin cans	5	3

(c) Explain the sources of municipal solid waste. **5**
(d) Write a note on E-waste. **5**

2. (a) Explain the physical and chemical characteristics of municipal solid waste. **10**
(b) Explain the importance of re-use and recycling in context to solid waste management. **5**
(c) Why transfer stations are necessary? What are the various types. **5**

3. (a) Estimate the theoretical volume of methane gas that could be expected from the anaerobic digestion of a tonne of waste having the composition $C_{55}\ H_{110}\ O_{35}\ N_1$ **10**

$$C_aH_bO_cN_d + \left(\frac{4a-b-2c+3d}{4}\right)H_2O \rightarrow$$

$$\frac{4a+b-2c-3d}{8}CH_4 + \frac{4a-b+2c+3d}{8}CO_2 + dNH_3$$

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(b) What is landfill? Explain the types of landfill with neat sketch. 10

20

4. Write short notes on any **four** :–
   (a) Pyrolysis
   (b) Hazardous waste
   (c) Sampling of solid waste
   (d) Incinerator
   (e) Legal aspects of solid waste disposal
   (f) Segregation

5. (a) Write in brief about Bio-medical waste management. 6
   (b) Calculate the energy content of solid waste having following composition using modified dulong's formula 6

Component	% by mass
Carbon	36.3
Hydrogen	7.3
Oxygen	51.1
Nitrogen	0.5
Sulphur	0.1
Ash	4.7

   (c) With the help of neat sketch explain the hauled container system. 8

6. (a) Determine the amount of air required to oxidise completely 1 tonne of waste having chemical equation $C_{50}H_{100}O_{40}N$ 10

$$C_aH_bO_cN_d + \left(\frac{4a+b-2c-3d}{4}\right)O_2 \rightarrow aCO_2 +$$

$$+\frac{b-3d}{2}H_2O + dNH_3$$

   (b) Explain house to house collection method of solid waste management. 5
   (c) What are the factors which affects the composting process. 5