[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no. 1 is compulsory.
2. Solve any three questions out of remaining five.
3. Assume data if required and mention the same.
4. Draw the sketch if required.

Q.1 Solve **any four** out of the following: (20)

A) Explain factors affecting generation rate of solid waste.
B) Write a note on E - waste.
C) Why transfer stations are necessary? What are their various types?
D) Write a note on material recovery facility.
E) Differentiate SWM in developing & developed nations.

Q.2 A) Explain physical, chemical and biological transformation of solid waste. Explain the importance of transformation in SWM in general. (10)

B) Describe the various types of collection systems employed for House-to-House. Compare the systems and state the best one with reasons. (10)

Q.3 A) Estimate the theoretical volume of methane gas that could be expected from anaerobic digestion of one tone of waste having the composition of $C_{55}H_{10}O_{35}N_2$. (10)

$C_aH_bO_cN_d + [(4a - b - 2c + 3d)/4]\ H_2O \rightarrow [(4a + b - 2c - 3d)/8]CH_4 + [(4a - b + 2c + 3d)/8]CO_2 + dNH_3$

B) i) Explain in brief about Bio-medical waste management. (05)
ii) What is leachate? How it is controlled? (05)

Q.4 A) Classify solid waste with respect to source, generation, type and characteristics. (10)

B) Draw a neat sketch of hauled container system and stationary containers system. Explain points of differentiation in both. (10)

Q.5 A) i) Calculate the energy content of solid waste having following composition. (05)

Components	% by mass
Carbon	35
Hydrogen	10
Oxygen	40
Nitrogen	8
Sulphur	3
Ash	4

ii) What are the factors which affect the composting process? (05)

B) i) Explain the functional elements of SWM with neat sketch. (05)
ii) What are the factors to be considered while selecting landfill site. (05)

Q.6 Write short note on **any four**. (20)

A) Pyrolysis
B) Trench method of landfilling.
C) Vermicomposting
D) Segregation
E) Incinerator

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