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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 20CV6PESWM **Max Marks: 100**
Course: Solid Waste Management

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the following terms: **06**
(i) Solid waste (ii) Hazardous waste (iii) Garbage chutes.

b) With the help of flow diagram, explain the six functional elements associated with solid waste management system. **06**

c) Estimate the energy content of a solid waste sample, with the following data. What is the energy content on a dry basis and on the ash free basis? Assume the moisture content as 20% and ash content as 5% (based on 100kg sample) **08**

Components	Food waste	Paper	Card board	Plastics	Garden trimmings	wood	Tin cans
% by mass	15	45	10	10	10	05	05
EnergykJ/kg	4,650	16,750	16,300	32,600	6,500	18,600	700

OR

2 a) Explain the various factors responsible for generation of solid waste. **06**

b) Distinguish between hauled and stationary container collection system with a neat sketch. **06**

c) An area consisting of 800 homes contributes solid waste. Estimate the unit waste generation, if the observation location is a local transfer station and period of generation is 1 week. The waste is carried in two types of vehicles namely Compactor trucks and Flat bed trucks whose volumes are 15 m^3 and 1.15m^3 respectively. If the density of material in these trucks are 300kg/m^3 and 100kg/m^3 for Compactor and Flat bed trucks respectively. Assume 6 persons per home, 10 compactor loads and 25 Flat bed truck loads in a week. **08**

UNIT - II

3 a) Explain the various factors to be considered in the selection of site for a sanitary land fill. **06**

b) Explain briefly mechanical volume reduction and mechanical size reduction of solid waste. **06**

c) Enumerate different collection services, with their merits and demerits. Determine the landfill area required for a municipality with a population of 50000 for the following data **08**

(i) Solid waste generation =450g/p/d;
(ii) Compacted density of landfill=604Kg/cum;
(iii) Average depth of compacted landfill=3m.

UNIT - III

4 a) Discuss the factors influencing anaerobic composting process with their desirable values. **06**

b) With neat sketches, explain Indore process and Bangalore process of composting of municipal solid waste. **06**

c) Determine the amount and volume of air required to oxidize completely one ton of waste having the chemical equation $C_{50}H_{100}O_{40}N$. Assume air contains 23.15% of oxygen by weight and density of air as 1.2928kg/m^3. **08**

UNIT - IV

5 a) Explain the term landfill leachate. Discuss the factors affecting operation and control of land fill leachate in a land fill scenario. **06**

b) Explain the control of movements of gases in a sanitary landfill by vents and barrier system. **06**

c) With neat sketches, explain the area method and trench method of land filling techniques along with relative merits and demerits of each method. **08**

UNIT - V

6 a) What are the applications of Double layer model in SWM? **06**

b) Elaborate on Fundamentals of crystal structures- unit cells, lattice planes. **06**

c) Discuss about XANES. **08**

OR

7 a) Discuss about principles and applications of SEM. **06**

b) What is Miller indices and how can we obtain the same. **06**

c) Describe with illustration about Triple Layer model. **08**

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