Exam Date & Time: 08-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, APR/MAY 2024

SOLID AND HAZARDOUS WASTE MANAGEMENT [CHE 4058]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) (a) Discuss how accumulation of solid waste results in water and groundwater pollution. (2)

A) (b) Summarize the responsibilities of municipal authority with respect to legal legislations. (2). (4)

B) The organic portion of a solid waste sample given as

Component	Percent by mass (moist mass)
Food wastes	15
Paper	45
Cardboard	5
Plastics	5
Yard wastes	10

(4)

Solve and Calculate the mass percentage of carbon, hydrogen, oxygen, nitrogen, Sulphur and ash for the waste sample.

C) Discuss about the wastes obtained from municipal services. (2)

2) Explain the terms: field capacity, proximate analysis, facultative decomposition, destructive distillation. (4)

A)

B) Distinguish between (a) compaction and levelling in sanitary landfill.

(b) haul time and at-site time.

(c) alley storage collection and curb-side collection. (3)

C) With the help of a diagram, discuss the working of static pile method of composting. (3)

3) With a neat diagram, explain the working of magnetic field separator for the separation of particles. (3)

A)

B) Plastic is separated from a commingled MSW (having 6% of plastic content) with a trommel screen, capacity 150 tons/hour. Determine the purity and efficiency of the screen, if the weight of underflow and weight of glass in screen underflow have been experimentally found to be 12 tons/hr and 7.0 tons/hr respectively. (4)

C) Explain any three factors that influences the efficiency of incinerator. (3)

4) Determine the amount of air required for complete combustion of 1000 kg of a waste having chemical composition as $C_{86}H_{215}O_{98}N$. The density of air is 1.2928 kg/m^3 and air contains 23.25% oxygen. (4)

A)

B) Discuss soil washing, root zone treatment as a soil remediation technique. (3)

C) Explain blending and seeding and mixing and turning as design parameters in composting. (3)

5) Demonstrate the importance of bench and lift in sanitary landfill. (2)

A)

B) Discuss vitrification, potency factor, vermicasting. (3)

C) Estimate the theoretical volume of a methane gas that will be generated in a sanitary landfill by anaerobic digestion of 1000 kg of MSW having approximate chemical formula as $C_{90}H_{150}O_{80}N$. The specific weight of methane and carbon dioxide are 0.7176 kg/m^3 and 1.9783 kg/m^3. (5)

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