

School: SOE	Level: BE	Invigilator's Sign:
Program: BCE	Year/Part: III/II	Superintendent's Sign:
Subject: Solid Waste Management (EG669CE)		Code No.

- i. Answers should be given by filling the Multiple-Choice Questions' Answer Sheet.
ii. The main answer sheet can be used for rough work.

Code No.

GROUP A (Multiple-Choice Questions) **[10x1=10]** **Time: 20 Minutes**

- Why is it difficult to recycle plastics?
(a) It is very hard (b) It comes in different sizes (c) It is adhesive
(d) It contains different types of polymer resins
- Integrated Solid Waste Management (ISWM) primarily emphasizes:
a) Landfilling only b) Open burning of waste
c) Sustainable approach involving segregation, recycling, recovery, and disposal
d) Ignoring informal waste sectors
- What is the minimum depth of the landfill required
(a) 1.5 m (b) 1.6 m (c) 1.7 m **(d) 1.8 m**
- Biodegradable wastes mainly consist of:
a) Glass, metals, plastics
b) Food waste, yard waste, paper
c) Construction debris and concrete
d) Hazardous chemical waste
- The critical parameters in composting include:
a) Temperature, moisture, C/N ratio, oxygen b) Noise, vibration, light, radiation
c) Voltage, current, resistance, frequency d) Salinity, pH, altitude, longitude
- The waste-to-energy method that produces biogas is:
a) Incineration b) Composting **c) Bio-methanation** d) Landfilling
-is the separation of biodegradable waste from non-biodegradable waste for proper disposal and recycling Separation
(a) Separation **(b) Segregation** (c) Removal (d) Composting
- Which of the following is not a component of a sanitary landfill?
a) Liner system b) Leachate collection system
c) Gas collection system **d) Composting pit**
- The Solid Waste Management Act in Nepal was enacted in:
a) 1996 b) 2000 **c) 2011** d) 2013
- The unit commonly used to express waste generation rate in urban areas is:
a) Liters per household per day **b) Kilograms per capita per day**
c) Tons per week per community d) Cubic meters per city per month

Multiple Choice Questions' Answer Sheet

Marks Secured: _____

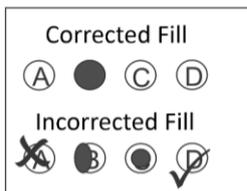
In Words: _____

Examiner's Sign: _____ Date: _____

Scrutinizer's Marks: _____

In Words: _____

Scrutinizer's Sign: _____ Date: _____



1. (A) (B) (C) (D)	6. (A) (B) (C) (D)
2. (A) (B) (C) (D)	7. (A) (B) (C) (D)
3. (A) (B) (C) (D)	8. (A) (B) (C) (D)
4. (A) (B) (C) (D)	9. (A) (B) (C) (D)
5. (A) (B) (C) (D)	10. (A) (B) (C) (D)

Manmohan Technical University
Office of the Controller of Examinations
Exam Year: 2082, Mangsir(Model Question)

School: SOE	Level: BE	Time: 3 Hours
Program: BCE	Year/Part: V	Full Marks: 50
Subject: Solid Waste Management (EG669CE)		

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

GROUP A (Multiple-Choice Questions in separate paper)

[10×1=10]

GROUP B (Short Answer Questions - **Attempt Any Eight**)

[8×2=16]

1. Why is Integrated Solid Waste Management (ISWM) preferred over conventional SWM systems? Give two reasons.
2. Arrange the ISWM hierarchy in order of priority and explain briefly why disposal is the last option.
3. Explain how socio-economic conditions influence waste generation rate (give two points).
4. Give two examples each of physical and chemical characteristics of solid waste that are important for treatment.
5. Mention two criteria for selecting an **optimal collection route** in urban areas.
6. State two differences between composting and bio-methanation processes.
7. List two major functions of a Material Recovery Facility (MRF) with examples.
8. Write two design considerations for minimizing leachate problems in sanitary landfills.
9. Mention two provisions of the SWM Act, 2011 that make it important for municipalities.

Group C (**Attempt any six questions**)

[4*6=24]

10. For a particular community, assume that refuse has the following components and bulk densities:

Component	Percentage (By Weight)	Uncompacted bulk density (Kg./ft. ³)
Miscellaneous paper	50	3.81
Garden waste	25	4.45
Glass	25	18.45

Assume that the compaction in the landfill is 44.4 Kg/ft ³. Estimate the percent volume reduction achieved during compaction of the waste. Estimate the overall uncompacted bulk density if the miscellaneous paper is removed.

11. A city generates **120 tons/day** of Municipal solid waste(MSW) with the following composition:

- Food waste: 45%
- Paper: 25%
- Plastics: 10%
- Metals: 5%
- Others: 15%

Calculate:

- a. The **mass of food waste and paper** generated per day.
- b. If 60% of food waste is composted, how many tons of compostable material is obtained?

12. The ultimate analysis of municipal solid waste (by mass %) is given as:

- Carbon (C) = 45%
- Hydrogen (H) = 6%
- Oxygen (O) = 38%
- Sulphur (S) = 1%
- Nitrogen (N) = 2%
- Moisture + Ash = 8%

Using Dulong's formula, calculate the higher calorific value (HCV) of the waste in kcal/kg.

13. Estimate the theoretical value of methane (CH_4) that could be expected from anaerobic digestion of 1.5 Tons of waste having the composition $\text{C}_{55}\text{H}_{110}\text{O}_{35}\text{N}_2$.
14. Why effective source segregation is considered a critical prerequisite for MSW processing?
15. Describe the major sources and types of municipal solid waste with examples relevant to Nepal.
16. Explain the phases of composting process with a neat sketch.

**** All the Best ****