

P. P. SAVANI UNIVERSITY

Fifth Semester of B.Sc. Examination

December-2021

SSES3130- Solid & Hazardous Waste Management

15.12.2021, Wednesday Time: 12:30 p.m. to 3:00 p.m. Maximum Marks: 60

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions

[10]

1.1 Objectives

[05]

1.1a Which of the following solid wastes describes the term 'Municipal Solid Waste'?

- A Toxic
- B Hazardous
- C Non-toxic
- D Non-hazardous

1.1b Find the correct statement

- A The waste from one process becomes the input for another process
- B All the processes related to consumption and production produce some kind of waste
- C There is no real waste in nature
- D All of the above

1.1c Which of the following statements is incorrect for plastic wastes?

- A It is used to make compost
- B It lasts for a longer period of time
- C Toxic fumes are produced when burnt
- D All of the above

1.1d Which of the following statements is true about zero waste management?

- A Separate collection of each kind of waste
- B Segregation of garbage at the source
- C Community involvement
- D All of the above

1.1e How many main components are there in integrated waste management?

- A Two
- B Three
- C Seven
- D Eleven

1.1f Which of the following methods is better for the solid waste problem?

- A Recycling
- B Landfilling
- C Both A and B
- D None of above

1.1g The term ISWM refers to

- A International Solid Waste Management
- B Integrated Solid Waste Management
- C Integrated Solid Waste Machine
- D International Solid waste Mechanism

1.1h Under which rule of Government, guidelines for solid waste management are followed today?

- A E-Waste management Rules, 2016
- B Solid Waste Management Rules, 2016
- C Municipal Solid Waste (Management and handling) Rules, 2000
- D EPA Act, 1986

1.1i What is the most expensive component of solid waste handling?

- A Collection
- B Storage
- C Treatment
- D Separation

1.1j Average composition of biodegradable waste in Municipal Solid Waste (MSW) of India is

- A 30-35%
- B 40-45%
- C 55-65%
- D 60-70%

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a Waste is a material that has further value to his owner and is not thrown away. (True/False)

1.2b Understanding of social and legal aspects is not necessary in Solid waste management. (True/False)

1.2c Resource reduction and reuse is least preferred in ISWM. (True/False)

1.2d Incinerators are designed to operate in combustion zone of ____ to ____°C.

1.2e ____ composting is suited for large volumes such as that generated by entire communities and collected by local governments.

Q.2 Short Notes (Attempt any two)

[06]

- A Describe process of energy recovery through RDF.
- B Discuss physical treatment processes used for the treatment of solid waste?
- C Write a short note on manufacturer and dealer's responsibilities under E-Waste Management Rules 2016.

Q.3 Explain in detail (Attempt any two) [14]

- A Define Waste. Discuss various types of waste?
- B Write down the salient features of Solid Waste Management Rules, 2016?
- C Explain Integrated Solid Waste Management and waste management hierarchy.

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

- 1.1a** What is the purpose of component separation transformation process?
- A Recovery of valuable materials for recycling
 - B Preparation of solid wastes by removing certain components after incineration
 - C Preparation of solid wastes by incorporating certain components prior to energy recovery
 - D All of the above
- 1.1b** What is the advantage of waste compaction?
- A Increase in the quantity of materials to be handled at the disposal site
 - B Reduced efficiency of collection and disposal of wastes
 - C Increased life of landfills
 - D All of the above
- 1.1c** What measures are adopted by industries to minimize waste?
- A Inventory management
 - B Volume reduction
 - C Recovery and reuse
 - D All of the above
- 1.1d** Which technique could eliminate waste disposal costs, reduce raw material costs and provide income from a saleable waste?
- A Shredding
 - B Volume reduction
 - C Recovery and Reuse
 - D Compaction
- 1.1e** What is the thickness of plastic liners used in Landfill?
- A 10 to 105 mm
 - B 20 to 40 mm
 - C 70 to 110 mm
 - D 30 to 100 mm
- 1.1f** Which wells test water before it moves under the disposal area to get a baseline measurement of the water's quality before it passes the disposal area?
- A Upgradient wells
 - B Downgradient wells
 - C Downhill wells
 - D Uphill wells
- 1.1g** How long should the landfill be monitored to ensure that there is no

detrimental impact on the environment?

- A 90 days
- B 80 days
- C 30 days
- D 20 days

1.1h Which amongst the following is not the essential component of hazardous waste landfill?

- A Gas collection and treatment facility
- B Leachate collection and treatment facility
- C Surface water drainage system
- D None of the above

1.1i Which is the third preferred option for waste management in the ISWM hierarchy?

- A Composting
- B Source reduction
- C Waste prevention
- D Landfills

1.1j Which gas is produced during gasification process?

- A Combustible gas
- B Non-combustible gas
- C Carbon monoxide
- D All of the above

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a After magnetic separation the RDF particles are added with binders such as sodium hydroxide and then it is mixed thoroughly. (True/False)

1.2b The sludge from anaerobic digestion, after stabilization, can be used as a soil conditioner. (True/False)

1.2c Composting is a physical process which uses naturally occurring microorganisms to convert biodegradable organic matter into a humus-like product. (True/False)

1.2d Gasification process is different from pyrolysis. (True/False)

1.2e The base of the landfill liner system shall be at least _____ meter above the highest anticipated ground water table level.

Q.2 Short Notes (Attempt any two) [06]

- A Define hazardous waste and describe its characteristics?
- B Describe 4R principle of waste management.
- C Describe briefly chemical treatment processes used for the management of solid waste.

Q.3 Explain in detail (Attempt any two) [14]

- A Describe Bangalore method of anaerobic composting.
- B Explain solid waste management in industries.
- C Explain site selection, planning and design criteria for hazardous waste landfills.