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UNIVERSITI SAINS MALAYSIA

1<sup>st</sup> Semester Examination  
2006/2007 Academic Session

October/November 2006

**EAP 585/4 – Solid And Hazardous Waste Management**

Duration: 3 hours

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**Instructions to Candidates:**

1. Ensure that this paper contains **THREE (3)** printed pages.
2. This paper contains **SIX (6)** question. Answer **FIVE (5)** question only. Marks will be given to the **FIRST FIVE (5)** question put in order on the answer script and **NOT** the **BEST FIVE (5)**
3. All questions carry the same mark.
4. All questions **CAN BE** answered in English or Bahasa Malaysia or combination of both languages.
5. Write answered question number on the cover sheet of answer script.

1. (a) Explain the meaning of 'Scheduled Wastes' in Malaysia. Give **SIX (6)** examples of this waste and suggest their main source in your answer. (6 marks)
- (b) Give **TWO (2)** types of industries that has to comply with the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987. (4 marks)
- (c) Describe any **TWO (2)** of the following hazardous wastes treatment methods:  
(i) Incineration and Pyrolysis Processes  
(ii) Advanced Electric Reactor  
(iii) Plasma Arc Technology (10 marks)
2. (a) Discuss the criteria approach for the classification of hazardous wastes. (10 marks)
- (b) Explain the classification and management of clinical wastes. (10 marks)
3. (a) List **SIX (6)** functions that a landfill cover should be able to perform. (3 marks)
- (b) How is post-closure care provided for a landfill? (7 marks)
- (c) Explain the operation and working of a Liquid Injection Incinerator with the help of a labelled diagram. (10 marks)
4. (a) Describe briefly the factor that effect solid waste generation rates. (10 marks)
- (b) Explain how to analyse the characteristics of solid waste. (10 marks)

5. (a) Describe the differences between hauled container system and stationary container system. (6 marks)
- (b) A total of 11 apartment complexes and commercial establishments have entered into a contract with a solid waste collection firm to collect their solid waste. A 20 m<sup>3</sup> vehicle is available for collection. The discarded volume of solid wastes to be collected is 96 m<sup>3</sup>/week. If it is decided to have two collections per week, determine how many trips are to be made on a collection day. Further, determine the size of the container to be provided.  
Assume that  $r = 2.5$  and for simplicity, assume that each of the 11 sources contributes the same amount of solid wastes. Make any essential assumptions if necessary. (14 marks)
- 6.(a) What do you understand by incineration of solid waste? Explain the concept of high temperature incineration and illustrate its applications. (6 marks)
- (b) Describe briefly the process of aerobic composting and discuss the factors affecting composting. (8 marks)
- (c) Penang has a landfill site which is 20m high and encompasses 10 hectare (assume a rectangular solid) and has been in operation since for 15 years. Records show they do about 0.85kg/capita/day. Assume 15% cover material. Calculate the total volume of waste disposed and estimate the population assuming a flat population curve. (6 marks)