First Semester Examination
Academic Session 2021/2022

February/March 2022

EAP585 – Solid and Hazardous Waste Management

Duration : 2 hours

Please ensure that this examination paper contains **FOUR (4)** printed pages before you begin the examination.

Instructions: This paper contains **FOUR (4)** questions. Answer **ALL** questions.

All questions **MUST BE** answered on a new page.

(1). (a). Determine the time required to complete a filling and emptying cycle for a waste collection truck serving a residential area with the following conditions:

- Truck volume is 20 m^3.
- Each location has an average of two containers of 360 L each at 75% full.
- Solid waste is picked up twice a week.
- Truck has compaction ratio 1:2.
- Pickup time is 1.58 minute per service.
- It takes 35 minute to drive to disposal site.
- Truck spends 20 minutes at the disposal site.
- Density of uncompacted waste is 150 kg/m^3 and 300 kg/m^3 for compacted waste

[10 marks]

(b). Briefly discuss the advantage and disadvantage of thermal treatment of solid waste.

[5 marks]

(c). With the aid of illustration, discuss **THREE (3)** differences between aerobic and anaerobic composting technique in solid waste treatment.

[10 marks]

(2). (a). Penang is a developed state with a high population density and having rapid development which generated around 2000 tons perday of solid waste. This situation caused garbage collection activities by MBPP and MBSP in the traffic congestion before sending it to a landfill in a remote area. Asses the suitability of having a transfer station in solid waste management.

[10 marks]

(b). Assume transportation cost is RM0.35 per tonne per kilometer to operate a local compactor truck and RM0.15 per tonne per kilometer to operate a transfer truck. A transfer station also has affixed cost of RM9.50 per tonne. If the distance to the landfill is 30 km, estimate the least expensive transportation alternative. With the support of a graph, justify whether a transfer station is required.

[15 marks]

(3). (a). An investor has hired you as a consultant to develop a new secure landfill site in your hometown. Identify the most suitable location in your hometown to construct a new secure landfill. Justify your answer based on the selected location and correlate it to the **THREE (3)** main functions of a secure landfill system.

[10 marks]

(b). Metal and metal-bearing wastes are specified as SW1 under FIRST SCHEDULE (Regulation 2). Propose the best-advanced method of metal recovery for this type of schedule waste and explain the process with the help of a sketch. Justify the rationale of the chosen method.

[15 marks]

(4). (a). Briefly discuss the differences between Environmental Quality (Scheduled Wastes) Regulations 2005 and Guidelines for Packaging, Labelling and Storage of Scheduled Wastes in Malaysia (2011).

[5 marks]

(b). Any application related to the scheduled waste handling by waste generator should be submitted to Director General.

(i). Discuss **THREE (3)** situation that required a writing permission from Director General. Your answer for each situation should at least correlate with **ONE (1)** functional element in waste management system.

[14 marks]

(ii). Give example of Writing Form or information for each situation as stated in Question 4b (i).

[6 marks]

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