KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (WATER ENGINEERING)

SET 517: SOLID WASTES MANAGEMENT 1

DATE: TUESDAY , 29TH NOVEMBER 2011 TIME: 2.00 P.M – 4.00 P.M

INSTRUCTIONS:

1) Answer **THREE** Questions
2) Question **ONE** is Compulsory
3) Answer any other **TWO** Questions

Q 1. a) A city having a population of 65,000 generates solid wastes at the rate of 2 kg/capita/day. The compacted Specific Weight of solid wastes in a landfill is 650 kg/m^3 and the average depth of compacted solid wastes in landfill is 15m. Determine the required landfill area. (15 Marks)

b) A community generates solid waste at a rate of 75 tons/day. The solid wastes has to be disposed off in landfill cells of 5 m width and 3 m lift having a slope of 3:1 in its working face. Thickness of daily soil cover is 150 mm. Determine the ratios of volume of wastes to cover soil. Assume average specific weight of wastes as: i) 350 kg/m^3, ii) 500 kg/m^3,iii) 600 kg/m^3 (25 Marks)

Q2. a) Describe solid waste management in urban environment. (4 Marks)

b) Explain the processes for restoration of degraded urban environmental management. (6 Marks)

c) Give an account on extent and nature of the problems caused by solid waste. (4 Marks)

d) List and explain three major sources of solid waste. (6 Marks)

Q3 (a) Determine the field capacity of a landfill site for the following conditions, after one year of operation, and also compute the amount of water that can be held in the waste.

Density of compacted solid waste= 600Kg/m^3

Mosture content of waste =25% by volume

Lift after one year = 6 m

Net annual rainfall = 480 mm (10 Marks)

b) State types of municipal solid waste generated and their classifications and composition. How do we separate the types of household solid waste? (10 Marks)

Q4. Briefly describe the following properties and systems in municipal solid waste handling:

i)	Physical properties	(2 Marks)
ii)	Chemical and energy properties	(2 marks)
iii)	Storage and transport	(2 marks)
iv)	Biological properties	(2 marks)
v)	Separation of household wastes	(2 marks)
vi)	Transfer stations	(2 marks)
vii)	Collection systems	(2 marks)
Viii	Waste minimization	(2 marks)
ix)	Composting and a formula related to it	(2 marks)
x)	Integrated solid waste management	(2 marks)

Q5. Estimate the theoretical volume of gas that will be generated in a sanitary landfill by anaerobic digestion of 1000 kg of municipal solid wastes having approximate chemical formula for its organic portion as C_{90} H_{150} O_{80} N_1 (20 marks)