Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS APRIL/MAY 2019

SUBJECT: SOLID WASTE MANAGMENT (CIE 4025)

Date of Exam: Time of Exam: Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A.	Differentiate between Biodegradable and non-biodegradable solid waste.	**03**	CO2
1B.	Explain the health and environmental effect associated with improper disposal of solid waste.	**03**	CO1
1C.	Discuss in detail the source based classification of solid waste.	**04**	CO2
2A.	Explain the effect of these factors on solid waste management system (i) Characteristics of waste (ii) Climate and seasonal variation	**03**	CO2
2B.	What are the composition of solid waste? Explain mass balance analysis for the estimation of solid waste quantity.	**04**	CO2
2C.	From the following data estimate the unit waste generation rate per week for a residential area consisting of 2000 homes. The observation location is a local transfer station that receives all of the wastes collected for disposal. The observation period was one week. a) Number of compactor truck loads is 11 b) Average size of the compactor truck is 20 m^3 and specific weight is 295 kg/m^3 c) Number of flatbed loads is 8 d) Average flatbed volume is 1.5m^3, specific weight is 130 kg/m^3 e) Number of loads from individual residents, private cars and trucks is 20 f) Estimated volume per domestic vehicles is 0.23m^3, specific weight is 89 kg/m^3.	**03**	CO2
3A.	What are communal containers? Discuss its disadvantages.	**02**	CO3
3B.	Explain the application of drying and dewatering in solid waste processing. Explain the methods used for drying of solid waste.	**03**	CO5
3C.	Design a Solid waste curb collection system to service a residential area with 1200 single family dwellings. Two manually loaded collection system are to be evaluated. The first involves the use of side loaded collection vehicle with a one person crew; the second involves the use of a rear loaded collection vehicle with a two person crew. Determine the size of collection vehicle required and compare the labor requirement for each collection system. Assume the following data are applicable. (i) Average number of residents per service is 4	**05**	CO3

	(ii) Solid waste generation rate per capita is 2.5 kg/capita/day (iii)Density of solid waste is 200 kg/m^3 (iv)Container per service is two 120 liter container plus 1.5 cardboard container of volume 75 lit. (v) Collection frequency once per week (vi)Compaction ratio is 2.5, haul distance is 35 miles(two and fro), length of workday is 8 hr,trips per day Nd is 2, t_1=0.3h, t_2=0.4h, off route factor is 0.15,pickup time required per pickup location for one person crew is 0.92 min/location, for two person crew is 1.35 collector-min/location, Haul time constant a = 0.016h/trip, b= 0.018mi/h, At-site time per trip is 0.10h/trip.		
4A.	Which are the processing equipment used for solid waste recycling. Explain the application of each.	**04**	CO5
4B.	Differentiate between area methods and trench method of landfilling.	**03**	CO4
4C.	With a neat sketch explain single liner system and double liner system.	**03**	CO4
5A.	Differentiate between windrow composting and aerated static pile composting.	**04**	CO5
5B.	Write a short note on (i) Bio gasification (ii) Cogeneration system in waste to energy facility	**03**	CO5
5C.	With a neat sketch explain the working of fluidized bed incinerator.	**03**	CO5