

Notes: 1- (اجب عن خمسة اسئلة فقط) 2- (الدرجات موزعة بالتساوي على كل الاسئلة) 3- (تعداد ورقة الاسئلة مع الاجابة) .

Q1:-(A): From the following data estimate the unit waste generation rate for a residential area consisting of approximately 1200 homes .The observation location is a load transfer station and the observation period is one week . No. of Compactor truck loads =9, Average size of compactor truck = 20 yd³, No. of flatbed loads=10 , Average flatbed volume = 2 yd³, No. loads from individual residents private cars & trucks = 20 , Estimated volume per domestic vehicle 8 ft³. (15 marks)

Q1:-(B) : Discuss Factors that affect Generation rates (Two only) . (5 marks)

Q2:-(A): A cannery receives on a given day 11 tons of raw produce, 6 tons of cans, 0.75 tons of cartons, and 0.4 tons of miscellaneous materials. Its products includes: 8 tons of processed produce, the remaining becoming part of the waste water , 5 tons of cans are stored for future use, and the remainder is used to package the produce. About 3% of cans used are damaged and recycled. The carton is also used for packaging, except 3% are damaged and incinerated with the other paper wastes. Of the miscellaneous materials, 85% become paper wastes that are incinerated , and the remainder is disposed of by the municipal collection agency. Draw the materials flow diagram for this activity. (15marks)

Q2:-(B): Compare between Hauled & stationary container systems. (5 marks)

(Q3):- Design a solid waste collection system to serve a residential area with 1000 single family dwellings. Assume that a two-person collection crew will be used if the following data are available: (20marks)

Average number of residents per service	3.5
Solid waste generation rate per capita	2 lb/capita/day
Density of solid waste at container	200 lb/yd ³
Container per service	2, 32 gallon containers
Type of service	50% rear -off - house, 50% alley
Collection frequency	Once per week
Collection vehicle	Rear loaded compactor, compaction ratio = 2
Round-trip-haul distance	15 mile
Length of workday	8 hours
Trips per day	2
Off-route factor	0.15
constants	a=0.016 hr/trip, b=0.018 mi/hr
At-site time per trip	0.1 hr/trip

Q4:-(A): Estimate the required landfill area annually for a community with a population of 33000 , if solid waste generation for a landfill is 6.2lb/capita/day, assume the compacted density of solid waste in landfill is 800 lb/yd³ and average depth of compacted solid wastes is 10ft . (15marks)

Q4: (B): List methods used to determine the Generation rate , then discuss one only .
(5marks)

Q5:-(A): Estimate the overall moisture content of a sample of solid wastes with the
typical composition given in table below . (15 marks)

Component	Food Waste	Paper	Cardboard	Plastic	Textile	Rubber	Leather	Garden	Wood	Glass	Tin cans	NonFerrous metals	Ferrous metal	Dirt, ash, etc
Weight, lb	15	40	4	3	2	0.5	0.5	12	2	8	6	1	2	4
Moisture content, %	70	6	5	2	10	2	10	60	20	2	3	2	3	8

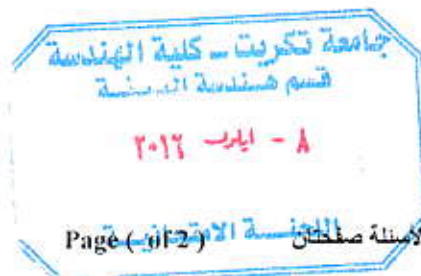
Q5:-(B): Discuss methods of handling solid wastes In high – rise apartment building.
(5marks)

Q6:-(A):Sketch materail flow diagram . (5marks)

Q6:-(B): Using the table below , estimate the volume reduction that could be achieved in the
solid wastes collected if the compacted density is equal to 20.5 lb/ft³ . (15marks)

Component	Food Waste	Paper	Cardboard	Plastic	Textile	Rubber	Leather	Garden	Wood	Glass	Tin cans	NonFerrous metals	ferrous metals	Dirt, ash, etc
Weight, lb	9.5	43.1	6.5	1.8	0.2	---	1.5	14.3	3.5	7.5	5.2	1.5	4.3	1.1
Volume, ft ³	0.53	8.45	1.05	0.45	0.05	---	0.15	2.2	0.23	0.62	0.95	0.15	0.22	0.04

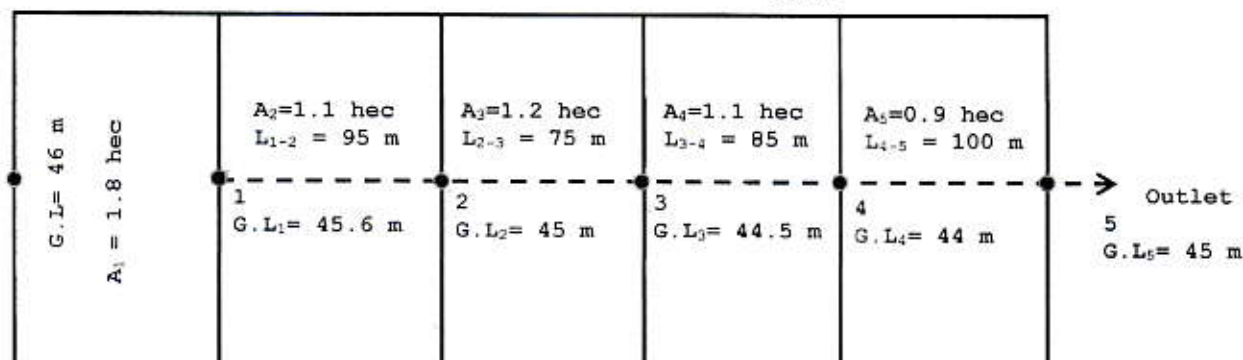
Good luck



Note: Answer Only Four Questions, and assume any reasonable value if you needed.

Q1: (25 Marks)

Design and draw the profiles for the storm sewer network that shown in figure with following information: ($C = 0.5$), (Concentration Time = 10 min), ($i = \frac{2600}{t+18}$).



Q2: (25 Marks)

For the layout that shown in Figure (1). Design the pipelines AB, BB1, BC. Assume the minimum head pressure in all points is (20 m). Using Manning's roughness (n) is (0.013).

Q3: (25 Marks)

A:- Classify the types of Sewer Network System and explain it brevity with all condition compenents for design.

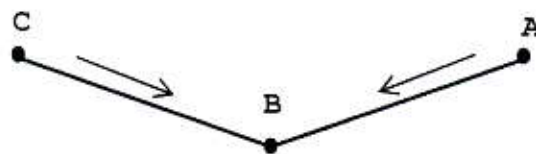
B:- Explain the (Gutter and Inlets), then sketch the Grate and Curb Inlets by details.

Q4: (25 Marks)

What is the (Number of Grate) Inlet that needed at each side of the street that shown in figure with (10 m) width and (3.5 m) clear distance with following information:

From (A to B): $S = 0.7\%$, $n = 0.013$, $T = 2.5\%$.

From (C to B): $S = 0.7\%$, $n = 0.013$, $T = 2.25\%$.



Q5: (25 Marks)

A town with (7500) persons and the annual average water demand is (450 LPCD). What will be the pressure at pump station to satisfy minimum head pressure as (25 m) at a point with distance (6.2 km) from pump station in all the cases below:

1. Max. Weekly demand with pipe size (250 mm) and ($C = 100$).
2. Peak hourly demand with pipe size (250 mm) and ($C = 120$).
3. Max. Daily demand and Min. fire flow with pipe size (350 mm) and ($C = 90$).

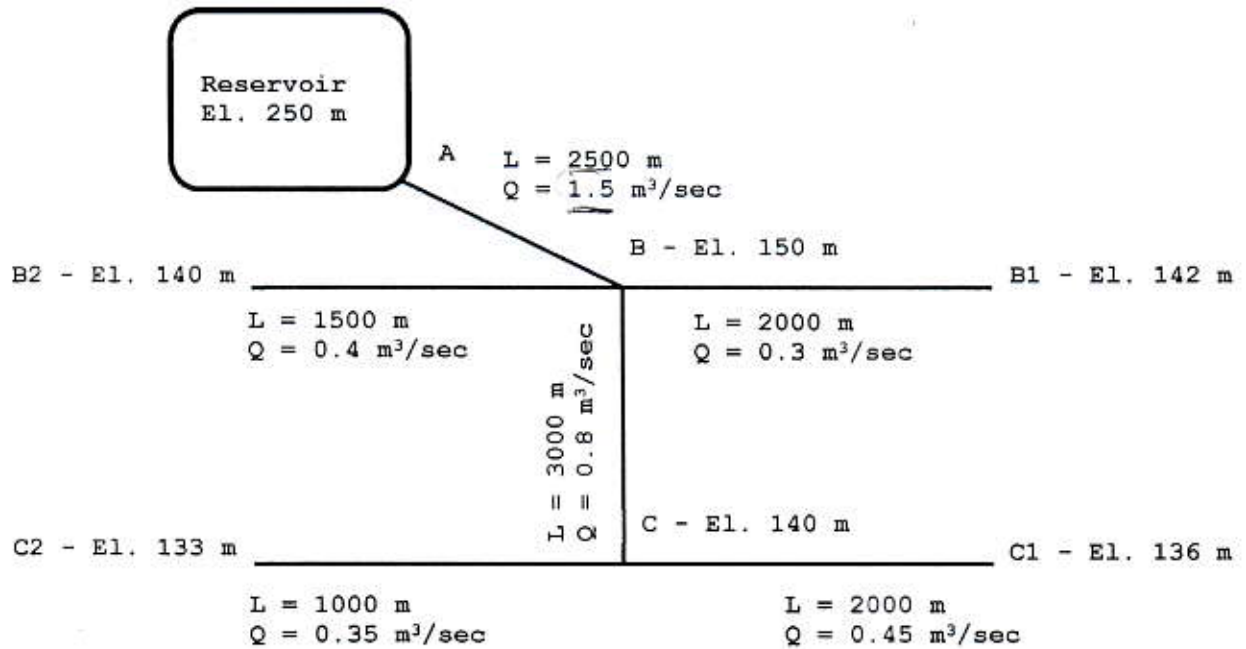


Figure (1)



«Good Luck»

(2-2)

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