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Uni. Roll No. …….

Program: B. Tech (CE)
Semester: 5th
Name of Subject: Environmental Engineering
Subject Code: PCCE-112
Paper ID: 16389

Time Allowed: 02 Hours **Max. Marks: 60**

NOTE:

1. Each question is of 10 marks.
2. Attempt any six questions out of nine
3. Any missing data may be assumed appropriately

13-01-2022(E)

1. (a) Explain the different methods of forecasting future population of a city for which a water supply scheme is to be planned.

   (b) The population statistics pertaining to a town are given below. Estimate the population expected in 1980 by geometrical increase method and incremental increase method.

Year	1930	1940	1950	1960	1970
Population	70,000	1,00,000	1,50,000	2,00,000	2,40,000

2. Estimate the moisture content and energy content (dry basis) in the solid waste sample based on 100kg of sample waste. Use following data

COMPONENTS	%BY MASS	TYPICAL MOISTURE CONTENT	TYPICAL ENERGYKJ/Kg
Food waste	20	70	4,650
Paper	50	6	16,750
Cardboard	15	5	16,300
Plastic	15	2	32,600
Garden trimming	15	60	6,500
Wood	10	20	18,600
Tin can	10	3	700

3. Explain the following terms in brief:
   (a) Landfills (b) Hazardous waste (c) Water demand
   (d) Intakes (e) Ambient air quality

4. (a) Enumerate and describe the various types of Natural Purification Methods.

   (b) Examine the properties of the stream as the effluent from wastewatertreatment plant is discharged to a surface stream. The characteristics of the effluent and stream are as follow:

EFFLUENT	STREAM
Flow = 8650m3 /d	Flow = 1.5 m3 /s
BOD_5 = 30 mg/L	BOD_5 = 2.5 mg/L
Ammonia = 9 mg/L	Ammonia = 0.5 mg/L
Nitrate = 15 mg/L	Nitrate = 4 mg/L
Chloride = 20 mg/L	Chloride = 6 mg/L

5. Explain the various stages in which Chlorination takes place and also define any one method for water softening.

6. (a) Enumerate the various sewer appurtenances.

   (b) A 350 mm diameter sewer is to flow at 0.35 depth on a grade ensuring a degree of self cleansing equivalent to that obtained at full depth at a velocity of 0.8 m/sec. Find (i) the required grade (ii) associated velocity (iii) the rate of discharge at this depth.
   Given: (i) Manning's rugosity coefficient = 0.014
   (ii) Proportionate area = 0.315
   (iii) Proportionate wetted perimeter = 0.472
   (iv) Proportionate HMD (r/R) = 0.7705

7. Enumerate and explain various treatment units used during Bio – treatment of wastewater.

8. What are the various stages involved in air sampling/stack sampling? What are various methods to control Noise Pollution.

9. An average operating data of conventional activated sludge process is as: Wastewater flow= 35000m^3 /d, volume of aeration tank= 10900m^3 , influent BOD= 250mg/l, effluent BOD= 20mg/l, MLSS= 2500mg/l, effluent suspended solids= 30mg/l, waste sludge suspended solids= 9700mg/l, quantity of waste sludge= 220m^3 /d. Determine: Hydraulic retention time, food to microorganisms ratio, efficiency of treatment plant, sludge age and recirculation ratio.

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