Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks: 100

Duration: 3 Hours

CLASS – B.Tech, SEM-VII, 2014-15

SUBJECT· Environmental Engineering II (KT) (CIViL)

- Question No. 1 is compulsory
- Attempt any four more questions from the remaining six
- Make suitable assumptions if necessary and state them clearly.
- Draw neat sketches where necessary and show all supporting calculations

Master.

Q1) Answer the following questions: (20)

a) Explain the test performed to determine biological oxygen demand in laboratory (05)

b) Explain air pollution and methods to control industrial air pollution (05)

c) Draw the flowsheet of conventional sewage treatment plant in detail. Explain in detail the function of each unit. What are the reductions of BOD and suspended solids after each unit should be mentioned. Explain in addition which treatment is required to render the wastewater safe for non-potable reuse (10)

Q2) Solve the following problems: (20)

a) An industry processes 50,000 m of textile. It produces 500 m^3 of water daily with a BOD of 1000 mg/L Compute:

   i)   The wastewater flow per 1000 m of cloth produced
   ii) BOD/1000 m of cloth manufactured
   iii) BOD equivalent population hydraulic equivalent population

Assume 25 gm BOD/person/day of wastewater at a flow rate 150 litres/person/day

b) A 5% solution of sewage sample is incubated for 5 days at 20°C. Initial dissolved oxygen in sample and control is 8 mg/l. After 5 days incubation the dissolved oxygen in sample falls to 3 mg/l and that in control to 7.8 mg/l. Determine BOD_5 of the sample What will be 5 day BOD at 20°C? Calculate the BOD at 4 days at 27°C. Assume value of K as 0.2 per day at 20°C.

c) Design a sewer to serve a population of 30,000 people, daily per capita demand is 150 litres, of which 75% finds its way into the sewer. Slope available for sewer to be laid is 1 in 700 and sewer should be designed to carry 3 times the DWF when running full. What would be the velocity of flow in sewer when running full? Assume n=0.013 in Manning's formula

d) For a circular sewer and a rectangular sewer to be hydraulically equivalent, find the relation between depth of rectangular sewer and diameter of circular sewer. Take width of rectangular sewer as 2.0 times its depth and assume that only 3 sides of rectangular sewer are wetted

Q3) Answer the following questions: (20)

a) Describe greenhouse effect and its enhancement in detail. Also write a note on acid precipitation.

b) What is air pollution? What are the sources of air pollutants? What are the effects of specific air pollutants on humans, material and plants?

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Q4) Write short notes on any <u>four</u>: (20)

    a)   Self purification of streams b) Aerobic and Anaerobic treatment of wastewater
    c) Velocity control in grit chamber   d) Trickling filter e) Air pollution episodes

Q5) Solve any <u>two</u> of the following: (20)

a) Design a conventional activated sludge plant for a city of 30,000. Sewage contribution is 200 lpcd. Settled sewage
    BOD_5 is 250 mg/l and effluent BOD_5 is 30 mg/L

b) Design a high rate trickling filter with following data
    Flow = 5 MLD
    RR = 2
    BOD influent = 300 mg/l
    BOD removed= 30 % in PST
    Final BOD – 20mg/L

c) Average operation data for activated sludge is
Sewage flow = 10 MLD, Volume of aeration tank = 12000 m^3, Influent BOD = 200 mg/L,   Effluent BOD =
10 mg/L, MLSS = 3200 mg/L, Effluent SS= 20 mg/l, Waste solids = 12000 mg/l, Quantity of waste sludge= 25 m^3.
Based on the above data find: Aeration period, F/M, % efficiency and Sludge age

Q6) Answer the following questions: (20)

a) What is soil contamination? What are the methods to remediate the contamination? Explain in short

b) Write a note on air pollution control devices for particulates and gaseous air pollutants.

Q7) Solve any two problems: (20)

a) Convert the following (any two) (05)

    i)   40 ppm of SO_2 to mg/L at 25°C ii) 3% of CO to mg/L iii) 70 mg/L of NO_2 to ppm

b) Determine sludge volume before and after digestion and percentage reduction of 500kg (dry basis) of primary
sludge with following characteristics. Assume 65% of volatile solids are destroyed during digestion.   (10)

Characteristics	Primary	Digested
Solids	5%	10%
Volatile Solids (VS)	65%	-
Sp.gr. of Fixed Solids (FS)	2.5	2.5
Sp.gr. of organic Solids (VS)	~1	~1

    b)   Write short note on i) Air Act   ii) EMS   (05)