BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR
B.E. (Civil) 5th SEMESTER FINAL EXAMINATIONS, 2012
Environmental Engineering I (CE 504)

Full Marks: 70 **Time: 3 hrs**

Use separate answer-script for each half.
Answer **any 3 (three)** questions from each half.
2 (two) marks are allotted for neatness in each half.
Assume any data necessary, if not given

FIRST HALF

1. What are the prime objectives of water and wastewater treatment? Draw a typical flow sheet of conventional treatment of municipal wastewater and mention the function of various unit processes. Define 'primary', 'secondary' and 'tertiary' treatment of wastewater with suitable examples.

(2+5+4=**11**)

2. How does the sedimentation of a discrete particle take place? Write the basic assumptions of Plain sedimentation. Show that the particles having settling velocity (v_s) are removed with a fraction of (v_s/v_o), v_o is the 'surface overflow rate'.

(3+3+5=**11**)

3. Briefly explain the general mechanism of colloid destabilization in the turbid water. How does 'Alum' act as a 'chemical coagulant'? How would you determine the 'optimum coagulant dosage'?

(4+4+3=**11**)

4. How would you estimate the 'clean bed head loss' in a stratified Filter unit? Differentiate between a 'Rapid' and a 'Slow' sand filter. A sand filter bed of depth 0.80 m and porosity 0.50 is scheduled to be expanded up to a porosity 0.70 during backwashing. Fix-up the position of 'wash water trough' from top level of the filter bed.

(3+4+4=**11**)

5. Write the desired quality of an ideal disinfectant.
   A contaminated water sample having pathogen count 10^4/100 ml needs to be disinfected up to a level of pathogen count 1/100 ml. If 1.5 ppm of Cl_2 is required for a contact period of 20 minutes, then find out the dosage required for a contact period of 15 minutes. [n = 1.1]
   Define 'Break point' in the chlorination practice and write its significance.

(3+4+4=**11**)

PTO

SECOND HALF

6. a) Name the different methods of tube well boring and indicate the conditions where each one is suitable. What do you understand by 'drawdown', 'inverted cone of depression' and 'circle of influence' in the well?
   b) What do you understand by 'well shrouding' and 'well development'?
   c) Define the terms
      i) specific yield ii) storage coefficient iii) perched aquifer

(5+3+3=11)

7. a) List the various population forecasting methods. Comment on their relative merits.
   b) Explain, how the total water demand of a town is estimated?
   c) What are the selection criteria of a site for a river intake works?

(4+4+3=11)

8. a) Explain with sketches the function of 'air relief valve' and 'pressure relief valve'.
   b) Distinguish between 'Spigot and socket joint' and 'Tyton joint'.
   c) State the various methods of water distribution system. State the different layout of distribution system and mention their merits and demerits.

(3+3+5=11)

9. a) Show the various pattern of sewage collection system of a city. Which factors mainly govern the various collection patterns?
   b) Compare between 'separate' and 'combine' system of sewerage.
   c) Why corrosion in sewer occurs? How this can be prevented?

(5+3+3=11)

10. Write short notes on the following (<u>any three</u>)
    i) Various drains and sewers section
    ii) Manhole and drop manhole
    iii) Various storm water regulators
    iv) Oil, grease traps and inverted siphon
    v) Street inlets and flushing tanks

(11)
