B.E. Civil Engineering Fifth Semester

CE501 - Environmental Engineering-II

P. Pages : 2 **GUG/W/18/1600**

Time : Three Hours * 1 2 5 9 * Max. Marks : 80

Notes : 1. All questions carry equal marks & compulsory.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Use of Drawing instrument & non programmable calculator is permitted.

1. a) State and explain various system for collection and conveyances of Sewage ? **8**

b) Calculate the velocity of flow and corresponding discharge in sewer of circular section having diameter equal to 1m. laid at a gradient of 1 in 500. The sewer runs at 0.6 depths use manning's formulae taking N = 0.012. **8**

OR

2. a) What is sewer appurtenance ? Explain various sewer appurtenances. **8**

b) The 5 day 30ºC BOD of sewage sample is 3000 mg/Lit. Calculate its 5 days and 3 days 20ºC BOD. Assume the deoxygenating constant at 20ºC. K_{20} as 0.1/d. **8**

3. a) What is BOD ? Draw BOD Curve and explain various stages of BOD. Also state the significance of BOD ? **8**

b) A main combined sewer is to be designed to serve a area of 12 sq. km with a population density 250 person/hectare. The average rate of sewage flow 250 lit/c/d. The maximum flow is 100% in excess of average together with the rainfall equivalent of 15 min. in 24 hrs. All of which are runoff. Determine the capacity of the sewer. Taking the velocity of flow as 3 m/sec. Determine the size of circular sewer. **8**

OR

4. a) Draw a layout of conventional sewage treatment plant and explain in brief function of each unit. **8**

b) Design a grit chamber to handle a flow of 10 MLD. The minimum dia. of particles expected to be removed are 0.2 mm with a specific gravity of 2.65 consider the water temp. of 20ºC. **8**

5. a) Design a suitable bar screen for a plan treating peak flow of 50 MLD. **8**

b) Design a primary settling tank of a rectangular shape of a town having a population of 50,000 with a water supply of 180 LPCD. Assume suitable data if needed. **8**

OR

6. a) What is activated sludge. Describe with a sketch any one modification of activated sludge process. **8**

b) Design a septic tank for the following data : **8**
i) Number of people = 300
ii) Sewage production = 100 LPCD
iii) De sludging period = 2 years
iv) Length : Width = 4:1
Also determine the size of circular soak pit if the effluent from the septic tank is to be discharged in it. Assume the percolating capacity of filtering media as 1250 lit/m^2/d.

7. a) What is trickling filter ? Explain its working with neat sketch. **8**

b) What are the objectives of biological treatment process ? Explain sludge digestion process with a neat sketch of sludge digester. **8**

OR

8. a) Explain various treatment of industrial waste before discharge into public sewer. **8**

b) Write the "land disposal of sewage". **8**

9. a) Write in brief about oxygen sag curve. **8**

b) A large stream has a rate of re-aeration K2 = 0.55 and a rate of deoxygenating K1 = 0.23/d. The DO deficit of the mixture of stream water and waste water at the point of reference. DO is 4 mg/lit and the ultimate BOD of the waste water 75 mg/l. **8**
Calculate
i) The DO deficit at a point 1 day distance from the point of reference.
ii) The critical deficit and the critical time.

OR

10. a) What is sewage sickness. Describe the method to prevent sewage sickness. **8**

b) What is self-purification of natural stream. State and explain various factors affecting self-purification of natural stream. **8**

****