B.E.(with Credits)-Regular-Semester 2012-Civil Engineering Sem V

CE501 - Environmental Engineering-II

P. Pages : 2 **GUG/W/16/3680**

Time : Three Hours * 3 9 4 5 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Solve all question.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and Chemical equations should be given wherever necessary.
6. Retain the construction lines.
7. Illustrate your answers wherever necessary with the help of neat sketches.
8. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
9. Use of D.A. Law's "Pocket book for Mechanical Engineers" is permitted.
10. Discuss the reaction, mechanism wherever necessary.
11. Use of non programmable calculator is allowed.

1. a) State and explain various systems for collection and conveyance of sewage. **8**

b) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to I m, laid at a gradient of I in 500. The Sewer runs at 0.6 depth. Use Manning's formula taking N = 0.012. **8**

OR

2. a) Find the relation between the side of a square section of one sewer and the diameter of a circular section of another sewer when both are hydraulically equivalent. **8**

b) What should be the characteristics of materials to be used for sewers ? Mention the advantages and disadvantage of cement concrete sewer. **8**

3. a) Explain the necessity of providing the manhole in the sewer line. Describe, with the help of a neat sketch the components of a manhole. **8**

b) What are the different types of storm water regulator ? Explain the working of an overflow weir. **8**

OR

4. a) What is Biochemical oxygen demand ? Also explain the significance of COD to BOD ratio. **8**

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

5. a) What is the purpose of primary treatment of municipal wastes ? Write a flow diagram of a typical primary treatment system and indicate the various units. **8**

b) Design a bar screen for a peak average flow of 40 MLD. **8**

OR

6. a) Design a grit chamber having rectangular cross-section and a proportional flow weir as the velocity control device for following data : **10**

i) Maximum flow = 20 MLD
ii) Ave. temp. = 20°C
iii) Dia. of smallest grit particles to be removed = 0.2 mm
iv) Specific gravity = 2.65

b) Explain briefly the salient features and performance of primary sedimentation tanks used in wastewater treatment. **6**

7. a) What is activated sludge ? Describe with sketches any one modification of activated sludge process. **8**

b) An average operating data for activated sludge process is as follows - **8**

i) Waste water flow = 0.15 m^3/sec
ii) Vol. of aeration tank = 3000 m^3
iii) Influent SS = 400 mg/l
iv) Solid settled after 30 min = 25%
v) MLSS = 5000 mg/l
vi) Sludge Wastage Rate = 120 m^3/d with VSS of 15000 mg/l

Determine :

i) Sludge volume index
ii) Return sludge ratio
iii) Mean cell residence time

OR

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

b) Design a septic tank for the following data - **8**

i) No. of people = 300
ii) Sewage production = 100 litres / capita / day
iii) Desludging period = 2 year
iv) Length : Width = 4:1

Also determine the size of circular soak pit if the effluent from this septic tank is to be discharged in it, assuming the percolating capacity of the filtering media is 1250 litres/m^3/day.

9. a) A large stream has a rate of reaeration $k_2 = 0.55$ and a rate of deoxygenation $k_1 = 0.23$ per day. The DO deficit of the mixture of steam water and waste water at the point of reference Do is 4.0 mg/l and the ultimate BOD of the waste is 75 mg/l- **8**

Calculate -

i) The Do deficit at a point one day distance from the point of reference and
ii) the critical deficit and the critical time.

b) Draw an 'Oxygen sag curve' and explain the process of self-purification. **8**

OR

10. a) Explain in brief various chemical as well as physio-chemical methods used for treating industrial wastewater. **8**

b) Write a brief note on the land disposal method of sewage disposal, What is sewage sickness. **8**

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