



## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

### Eighth Semester, B.E. – Civil Engineering Semester End Examination; June/July - 2015 Industrial Wastewater Treatment

Time: 3 hrs

Max. Marks: 100

**Note:** i) Answer any **FIVE** full questions selecting at least **TWO** full questions from each part.  
ii) Any missing data may be suitably assumed.

#### PART – A

1. a. Define Industrial waste water. List effects of Industrial waste water on stream quality. Explain any two of them. 10
- b. Write note on stream quality survey. 10
2. a. Sketch and briefly explain “oxygen sag curve”. Give Streeter Phelps equation to represent the oxygen sag curve. 10
- b. Just below the point where a continuous discharge of pollution mixing with a river. The BOD is 10.9 mg/L and DO is 7.6 mg/L. The river and waste mixture has a temperature of 20°C.  
Deoxygenation constant  $K_d = 0.20/\text{day}$                       Reaeration constant  $K_r = 0.41/\text{day}$  10  
DO saturation value at 20°C = 9.1 mg/L                      Average flow speed = 0.3 m/s  
Find the time and distance downstream at which the oxygen deficit is a maximum and minimum value of DO.
3. Explain any four of the following with example. 20
  - i) Volume reduction                      ii) By product recovery                      iii) Segregation of waste
  - iv) Equalization                      v) Changing the process to decrease the waste.
4. a. Explain briefly removal of organic solids in industrial waste water. 10
- b. Briefly explain sludge treatment. 10

#### PART – B

5. a. Bring out the feasibility of joint treatment of Industrial wastewater and domestic sewage. Discuss the advantages and disadvantages of joint treatment. 10
- b. Discuss briefly discharge of raw and partially treated waste water on streams. 10
6. a. With the help of a flow diagram write the origin and characteristics of waste water from sugar Industry. Write their effects on water bodies. 10
- b. With the help of a flow diagram, explain the treatment of distillery waste water. 10
7. a. List the characteristics of Dairy Industry effluent and sketch treatment flow sheet. 10
- b. List the sources, characteristics and effects of Tanning Industry effluents. 10
8. a. List the typical characteristics of combined effluents of pulp and paper industry. 10
- b. Give treatment flow sheet of pharmaceutical Industry explain in brief. 10