



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

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Civil Engineering

Semester End Examination; Dec - 2017/Jan - 2018

Water Supply Engineering

Time: 3 hrs

Max. Marks: 100

- Note:** i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
ii) Assume missing data suitably.

UNIT - I

- 1 a. State the objectives of water supply scheme. Explain how these objectives are achieved? 8
b. What is meant by design period? Discuss the factors affecting design period. 5
c. Determine the future population of a town by the Geometric increase method for the year 2021 given the following data: 7

Year	1961	1971	1981	1991
Population in thousands	93	111	132	161

- 2 a. Distinguish between Infiltration gallery and Infiltration well. 6
b. Distinguish between the terms submerged intake and exposed intake with suitable illustrations (sketches). 7
c. For water supply of a town, water is pumped from a river 3 km away into reservoirs. The maximum difference of levels of water in river and the reservoir is 20 m. The population of the town is 80,000 and per capita water demand is 120 LPCD. If the pumps are to operate for a total of 8 hours and the efficiency of pump is 80%, determine the horse power of the pumps. Take friction factor of 0.03, velocity of flow is 2 m/s. $Q_{\max} = 1.5 Q_{\text{avg}}$. 7

UNIT - II

- 3 a. Enumerate the various physical and chemical characteristics of testing of Raw water supplies. 6
b. State the WHO drinking water standard and ill effects of any four heavy metals in water. 8
c. Write a note on Water borne diseases and their control. 6
4 a. Clearly differentiate between Grab sample, composite sample and integrated sample with reference to water sampling. 7
b. Briefly explain the complete treatment process of a water supply scheme with flow chart. 7
c. Define Aeration. Write objectives of Aeration and also its limitations. 6

UNIT - III

- 5 a. Write different methods of feeding coagulants to water. Explain any one of them with neat sketch. 10
- b. At a water treatment plant 12 million litres of water is treated daily using alum dosage of 16 mg per litre. Find; 10
- i) The total quantity of alum used daily
- ii) Amount of carbon dioxide released.
- 6 a. Prove theoretically that the surface loading and not the depth, is the measure of effective removal of particles in an ideal sedimentation tank. Mention the assumptions made in the theory. 10
- b. The maximum daily demand at a water purification plant has been estimated of 12 million litres per day. Design the dimensions of a suitable sedimentation, tank for the raw supplies, assuming a detention period of 6 hours and velocity is 20 cm/min. 10

UNIT - IV

- 7 a. Explain in detail the mechanisms involved in water filtration. 10
- b. Determine the dimensions of a set of Ten rapid sand filter to treat water for a population of one million with average rate of 200 LPCD. Assume a Peak Factor of 1.8, 4% water used for back washing and half an hour lost per day for back washing. Assume rate of filtration = 5000 L/hrs/m². 10
- 8 a. What is meant by disinfection of water? Discuss the theory of disinfection by chlorine. 8
- b. Write note on: 6
- i) Break point chlorination ii) Super chlorination.
- c. Calculate the quantity of bleaching powder required per day for disinfecting 4 million litres/day. The dose of chlorine has to be 0.5 mg/litre and bleaching powder contains 30% available Chlorine. 6

UNIT - V

- 9 a. Describe the various methods of distribution of water and discuss the advantages and disadvantages of each. 6
- b. Explain in detail to find capacity of service reservoirs by using mass curve method. 8
- c. Explain the location and use of sluice valve, reflex valve and air valve. 6
- 10 a. Explain the limesoda method of removal of Hardness and what are its advantages and disadvantages? 6
- b. Explain the treatment of water with the activated carbon. 6
- c. What is meant by defluoridation? Explain with a line diagram the Nalagonda technique of defluoridation. 8