NOTE: (i) Attempt ALL questions.
   (ii) All questions carry Equal marks.
   (iii) Be Precise in your answer.

Attempt any four out of the following. \((4\times2.5=10)\)

a) What are the factors which affect the per capita demand of the city?

b) What is meant by water hammer?

c) What are the common sources of water for water supply scheme?

d) What is the purpose of sanitation?

e) Explain Canal intake with neat sketch?

Attempt any four out of the following. \((4\times2.5=10)\)

a) What is per capita demand? Give the breakup of domestic water demand.

b) Explain expansion joint with neat sketch.

c) Explain any three methods of estimating the future population of a town.
3. Attempt any two out of the following. (2×5=10)
   a) Calculate the velocity in a sewer of circular section having diameter of 1.2 m. laid at a gradient of 1 in 500. Also find the discharge through the sewer when running half full. Use Manning formula taking N=0.013
   b) Explain advantages and disadvantages of steel pipes.
   c) Briefly explain design guidelines for distribution system.

4. Attempt any two out of the following. (2×5=10)
   a) Explain Slow Sand filter in detail?
   b) Explain different methods of water distribution with neat sketches with advantages and disadvantages?
   c) Briefly explain with neat sketch the methods of laying and testing of water supply pipelines.

5. Attempt any two out of the following. (2×5=10)
   a) Explain the Newton-Raphson Methods used for pipe network analysis in water distribution system.
   b) What are the various sewerage systems? Discuss the relative merits and demerits of the partially separates and combine system.
   c) In two periods of 20 years a town has grown from 40,000 to 1,60,000 and then to 3,000. Determine,
     (i) the saturation population,
     (ii) The equation of logistic curve.