

CM-8003 (1) (CBGS)

B.E. VIII Semester

Examination, November 2019

Choice Based Grading System (CBGS)

Process Piping Design

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Differentiate between Pipes and Tubes. Estimate the safe working pressure for a 10 cm diameter, schedule 40 pipe, carbon steel, butt welded, working temperature 100° C. The safe working stress for butt welded steel pipe up to 125° C is 41.2 N/mm².
b) Write a detail note on IS and BS codes for pipes used in chemical process industries.
2. Explain the different minor losses occurring in piping systems. Two pipes each 300 mm long are available for connecting to a reservoir from which a flow of 0.085 m³/s is required. If the diameter of the two pipes are 0.30 m and 0.15 m respectively. Determine the ratio of head loss when the pipes are connected in series to the head loss when they are connected in parallel. Neglect minor losses.
3. Write the short notes on the following :
 - a) Significance of Reynold number in pipe design
 - b) Pressure drop for Newtonian fluids through pipe
 - c) Role of schedule number in piping design

4. a) Discuss the method to calculate loss of head due to friction in a tapered pipe.
b) Tell about friction loss relationship for non Newtonian fluids.
5. Oil is flowing in a pipe line at a rate of 0.6 m³/sec. The energy loss in the pipe line is 9 m per km. 367.5 kW pumps with efficiency of 80% are available for the pumping stations. At what intervals should the pumping stations be located? Assume the density of oil is same as water.
6. a) A Pipe line 20 cm in diameter 70m long conveys oil of specific gravity 0.95 and viscosity 0.23 NS/m². If the velocity of oil is 1.38 m/s. Find the difference in pressure between the two ends of the pipe.
b) Discuss Non-Newtonian fluids with suitable examples.
7. Write short notes on following
 - a) Role of Software in piping design
 - b) Coupling of Pipes
 - c) Lockhart Martinelli Relations
8. A 900 mm diameter steel pipe carries water at the rate of 1.5 m³/s. The pipe wall has a thickness of 1cm. The elastic modulus of steel is 2×10^{11} N/m² and bulk modulus of water is 2.1×10^9 N/m². Determine the increase in pressure if the valve at the end of 3.5 km long pipe line is closed in 3.5 sec.
