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B TECH
(SEM VI) THEORY EXAMINATION 2018-19
PIPING DESIGN

Time: 3 Hours   *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   2 x 10 = 20
   a) Define Time dependent fluid.
   b) Define station piping and cross country pipeline
   c) Write the Reynolds number and its significance
   d) Define Nominal pipe diameter
   e) Define the Working pressure in piping.
   f) Define Kinematic viscosity also write its importance in industry
   g) Write the Effect of temperature in piping.
   h) Define pipe grade
   i) Define equivalent pipe size.
   j) Write the importance of code and standards

SECTION B

2. **Attempt any *three* of the following:**   10x3=30
   a) Derive the equation of heat loss in pipedue to friction.
   b) At sudden enlargement of water line from 0.2m to 0.4 m diameter pipe, the hydraulic gradient rise by 0.8 cm, calculate the rate of flow
   c) A horizontal pipe of diameter d_1 has a sudden expansion to a diameter d_2. At what ratio d_1/d_2 would the differential pressure on either side of the expansion be a maximum?
   d) Explain the with help of neat sketch
      i.   Hydraulic gradient
      ii.   Pipe in series
      iii. Pipe in parallel
      iv.   Total gradient line
   e) What do you understand by minor losses in pipes? When can these losses be neglected?

SECTION C

3. **Attempt any *one* part of the following:**   10x1=10
   a) Water is pumped through a 600 mm diameter pipe with a head loss of 20 m. it is intended to reduce the power consumption by laying another parallel pipe of appropriate diameter laid by the side of the existing pipeline with the same overall length and the same friction.
   b) Write the code and specification of fittings. What are the different types of valve fittings used in plant?

4. **Attempt any *one* part of the following:**   10x1=10
   a) Explain the selection criteria of pipe material for laying pressure pipeline.
   b) Give the classification of valve based on there working. Also discuss design code of valve. With the help of neat sketch explain construction and working of globe valve also writes its application.

5. **Attempt any *one* part of the following:** 10x1=10

    a) Water is delivered by a 10 cm galvanized iron pipe at a rate of 40 l/sec. calculate the pressure difference between two points 50 m apart on the horizontal line. If one point is 15 m higher then the other, what will be the difference in pressure? Take f = 0.005 and draw the hydraulic gradient and total energy line.

    b) What do you mean by power transmission through pipe? Discuss the condition for maximum transmission of power.

6. **Attempt any *one* part of the following:** 10x1=10

    a) What is the different pipe flanges used in station piping explain them with neat and clean sketch.

    b) Water flows through a 20 inch pipe at 5700 gal/min. calculate friction factor using the Colebrook – white equation Assume 0.375 inch pipe wall thickness and an absolute roughness of 0.002 inch. Use a specific gravity of 1 and viscosity 1 cSt. What is the head loss due to friction in 2500 ft of pipe?

7. **Attempt any *one* part of the following:** 10x1=10

    a) A 16 inch crude oil pipeline (0.250 inch wall thickness) is 30 miles long from point A to point B. the flow rate at thr inlet is 4000 bbl/hr. the crude oil properties are specific gravity of 0.85 and viscosity of 10 cSt at a flowing temperature of 70 ° F calculate the pressure required at A without any loop Assume 50 psi delivery pressure at the terminus B and a flat pipeline elevation profile.

    b) Determine the flow in each pipe of the network shown in figure Assume *f = 0.02* for all the pipes