ME Mech Sem I choice based   May 2017

(3 Hours)   **(Total Marks : 80)**

1. Question one is compulsory
2. Attempt any three from question No.02 to 06
3. Use of ASME code, TEMA code .API code is permissible.
4. Use illustrative diagrams wherever applicable

Q.1 Attempt any four.   20

    1. State general design procedure of a process equipment design.
    2. Explain the following terms
        a. Welded joint efficiency
        b. Corrosion allowance
    3. Draw a neat sketch of various types of support.
    4. Explain the structure of ASME section VIII, Division 1.
    5. Explain process flow diagram and process and instrumentation diagram.

Q.2 1. A pressure vessel is constructed of SA 516-70 material and has an inside   10
      diameter of 2 meter. The internal design pressure is 70 N/m^2.The
      corrosion allowance is 0.003175m and the joint efficiency is 0.85. What
      is the required thickness of vessel if the allowable stress is 20000N/m^2.

    2. Define following terms related with design of pressure vessel.   10
        a. Welded joint efficiency
        b. Corrosion allowance
        c. Selection of Material as per ASME section II

Q.3 1. State various types of front end, shell type and rear ends of heat   10
      exchanger and draw sketch of each.
    2. Explain the following terms related with vessel support.   10
        a. Base plate
        b. Skirt bearing plate
        c. Wing girder

Q.4 1. A propeller operating at 350 rpm speed in a vessel of 1200 mm diameter   12
      with following data:
      Internal pressure in vessel – 0.3 N/mm^2
      Specific gravity of liquid in vessel – 1.1
      Diameter of agitator – 300 mm
      Power Number – 0.9
      Overhang of shaft from bearing support – 1500 mm
      Shaft material – steel
      Permissible shear stress – 50 N/mm2
      Elastic limit in tension – 250 N/mm^2
      Modulus of elasticity – 2 x 10^5 N/mm^2
      Design the shaft based on equivalent bending and critical speed.

    2. Explain the bottom design of cylindrical tank with neat sketch   8

[Turn over]

Q.5 1. A cylindrical storage tank with open top has the following data: 10
        Tank diameter – 9m
        Tank height – 7.5 m
        Material of construction – carbon steel
        Permissible stress – 120 N/mm^2
        Corrosion allowance – 2 mm
        Design – shell plate thickness at various heights and wind girder.

      2. Determine actual and maximum allowable period of vibration
        Diameter – 950 mm   10
        Height – 30000 mm
        Gravity acceleration – 9.81 m/s2
        Thickness – 20 mm
        Shear force – 6400 N
        Weight of tower – 160000N
        Weight of tower per foot of height – 1600 N

Q.6 1. State the importance of following code and standards   10
        a. ASME code
        b. API code
        c. TEMA code
      2. Explain the following   10
        a. Process flow diagram
        b. Process and Instrumentation Diagram

****