BE/MECH/SEM8/CBSGS

(3 Hours) [Total Marks: 80]

2 4 MAY 2019

1. Question one is compulsory
2. Attempt any three from Q.2 to Q.6
3. Assume data wherever necessary
4. Figure to the right indicate full marks.

Q.1   Attempt any four of the following   20
   a) Write a note on design of rectangular tank..
   b) State the procedure for spherical shell subjected to an external pressure.
   c) Draw a neat sketch of Pressure vessel showing all the welded category joints.
   d) Write a note agitator and its application.
   e) Write a note on limphet coil jacket

Q.2   a) Calculate the thickness of ellipsoidal head (2:1)for following design data input.   12
      Material of construction – SA 515 gr 70
      Design Temperature – 400°c.
      Design Pressure – 20 bar
      Inside diameter – 2000 mm
      Height – 3000 mm
      Corrosion allowance – 1.5 mm
      Radiography – Full
      Allowable stress – 101 Mpa
      Design code – ASME Section VIII, Div 1
   a) Explain with reference to pressure vessels   8
      i.   Corrosion allowance
      ii.   Welded joint efficiency

Q.3   a) Explain ASME section VIII DIV 1.   10
      b) Write a note on Design of skirt support.   10

Q.4   a) A propeller operating at 350 rpm speed in a vessel of 1200 mm diameter with   12
      following data: Design shaft based on equivalent bending and critical speed.
      Internal pressure in a vessel   0.3 N/mm^2
      Specific gravity of liquid in vessel   1.1
      Diameter of agitator   300 mm

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Power number	0.9
Overhang of shaft from bearing support	1500 mm
Shaft material	Steel
Permissible shear stress	50 N/mm^2
Elastic limit in tension	250 N/mm^2
Modulus of elasticity	2 x 10^5 N/mm^2

    b) State the various types of baffles used in agitator and draw a neat sketch of each.   8

Q.5   a) A cylindrical storage tank with open top has following data.   10

Tank diameter	20 m
Tank height	12 m
Density of liquid	1000 kg/m^3
Permissible stress	165 N/mm^2
Modulus of elasticity	2 x 10^5 N/mm^2
Corrosion allowance	2 mm
Material of construction	Carbon steel
Density of MOC	7850 kg/m^3

Design

    i.   Shell plate thickness at various height.

    ii.   Wind girder

    b) Discuss with reference to vessel support   10

       1. Base plate,

       2. Skirt bearing plate

Q.6   Attempt **any four**   20

    a) State the types of opening used in pressure vessel and explain any one.

    b) Classify agitator

    c) Draw shell and tube heat exchanger showing all the components..

    d) Write a note on gasket selection and design.

    e) Explain Process Data Sheet and PID

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