

Duration: 3 hours

Total Marks: 80

- N. B. (i) Question number **one is compulsory**.
(ii) Answer any **three** questions from the rest.
(ii) Assume suitable data wherever necessary.

- Q. 1 Write short note on any **four** 20
- (a) Explain standards and codes.
 - (b) List types and explain any one type of flange..
 - (c) List types and explain any one type of jacket in detail..
 - (d) Explain types of losses in storage vessels.
 - (e) List and Explain tall column internals.
- Q.2 (a) Design a pressure vessel subjected to internal pressure for the following data: 12
- Shell and head data: Design pressure = 0.6 N/mm^2 ,
ID of the shell = 1200 mm
Permissible stress for head and shell material = 140 N/mm^2 , MoC = S S
Flange, gasket and bolt data: Gasket factor = 3.75,
Min gasket seating stress = 52 N/mm^2
Flange material same as shell material. Permissible stress for bolt material = 140 N/mm^2
Nozzle data : ID of nozzle = 150 mm. (Nozzle welded to head), MoC: SS
Design should include: Shell, flanged joint
- Q.2(b) Write design procedure to calculate nozzle and reinforcement ring dimensions. 08
- Q3 (a) Write the detail stresses developed in tall column to calculate height. 10
- Q.3(b) Write design procedure to calculate the shaft diameter of the agitated vessel. 10
- Q 4 (a) Draw neat diagram of 10
- a. Fixed tube heat exchanger
 - b. Calandria evaporator.
- Q 4(b) Explain with neat diagram different types of agitators. 10

Q 5(a) Design a U-tube heat exchanger for the following data- 12

(i)Shell Side:-

No. of shells and passes– 1, Fluid – Water,
Design Pressure – 0.45N/mm^2 M.O.C. – Carbon Steel, Shell ID = 400 mm,
Permissible stress for C.S. – 100N/mm^2
Standard torrispherical head,
M.O.C. for head and all flanges- Carbon steel,
Gasket on shell side – Flat metal jacketed asbestos
Gasket factor – 3.75,
Gasket seating stress - 53N/mm^2

(ii)Tube Side:-

Tube and tube sheet material – S.S., No. of tubes – 60
Outside diameter – 20mm, Fluid – Carbon Dioxide,
Design Pressure – 1.5N/mm^2 Permissible stress for S.S. – 105N/mm^2
Design should include- (a) Shell, (b) Head, (c) Flange joint (shell and tube)

Q5 (b) Explain with neat diagram constructional features of high-pressure vessel. 08

Q.6 (a) Explain in detail any one method of NDT with neat diagram. 10

Q6 (b) Explain in detail process flow diagram. 10
