Q. P. Code: 26425

(4 Hours)

Total Marks: 80

N.B.: (1) Question No.1 is compulsory.
(2) Attempt any THREE out of remaining FIVE questions.
(3) Assume any suitable data if necessary and indicate it clearly.

1. Write short notes on **any four** of the following:- (20)
   (a) Stress concentration at openings in vessel.
   (b) Baffles in agitation system.
   (c) Code and standards.
   (d) Significance of design pressure and design temperature.
   (e) Supports for horizontal pressure vessels.

2. (a) Design a pressure vessel for the following specification/data: (15)

   (i) Shell :

   Internal Diameter = 1200 mm Internal pressure = 0.4 N/mm2

   Material = Stainless Steel (SS), with permissible stress at 150^o = 120 N/mm^2

   (ii) Head: (Standard Torispherical) Material: Same as shell

   Crown radius = 1200 mm Knuckle radius = 100 mm (iii)

   Flanges: Material = Carbon steel (IS –2002)-(CS)

   Permissible stress for CS = 95 N/mm^2

   Gasket = Asbestos material Gasket factor (m) = 2

   Minimum design seating stress = 11 N/mm^2

   (iv) Bolts : Material = Hot rolled carbon steel

   Permissible stress at 200 ^oC = 54.5 N/mm^2

   Permissible stress (upto 50^oC) = 59 N/mm^2

   The design should consists of the following:

   (i) Shell (ii) Head and (iii) Flanges

   (b) Draw proportionate diagram of above mentioned pressure vessel, show: - (05)
   (i) Sectional Front View (ii)Top View

3. (a) A cylindrical storage tank with conical roof has the following data: (14)

Tank Diameter	= 12 m	Tank height	= 12 m
Material of construction: Steel (IS: 2041)		with Permissible stress	= 140 N/mm^2
Density	= 7.7 gm/cc	Modulus of elasticity	= 2 x 10^5 N/mm^2
Corrosion Allowance	= 1.5mm	Sp. Gravity of liquid	= 1
Superimposed Load	= 1225 N/m^2	Slope angle	= 1:5

   (i) Size and arrangement of shell plates
   (ii) Design of conical roof
   (iii) Bottom Design

(b) Draw to a recommended scale: (06)
(i) Storage tank (sectional F.V)
(ii) Arrangement of shell and plates
(iii)Bottom Details

4. (a) Write a design procedure for agitator vessel,include (15)
   (i) Agitator Shaft
   (ii) Blade Assembly
   (iii) Stuffing Box

(b) Draw a proportionate drawing of Stuffing Box. (05)

5. (a) Describe the design procedure for reaction vessel with- (10)
   (i) Plain Jacket
   (ii) Half coil jacket

(b) Describe the design procedure for skirt support for a vertical cylindrical vessel.The design must include:-
(i) Design of Skirt thickness
(ii) Design of Skirt Bearing plate
(iii) Design of Anchor Bolts (10)

6.Write short notes on **any four** of the following:- (20)
   (i) Different types of flanges.
   (ii) Types of Pressure vessel Heads
   (iii) Radiographic testing of pressure vessels.
   (iv) Bracket support.
   (v) Theories of failure of component subjected to combined stresses.
