Total No. of Questions : 6]

SEAT No. :

P1386

[Total No. of Pages : 2

TE/Insem/APR-36
T.E. (Chemical Engineering)
CHEMICAL ENGINEERING DESIGN - I
(2012 Pattern)

Time : 1½ Hours] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain various losses associated with the storage of volatile liquids. **[4]**

b) Explain the optimum proportioning of a storage tank. **[6]**

OR

Q2) a) A tall vertical vessel 1.7 m in diameter and 15 m in high is to be provided with skirt supports. Weight of the vessel with all its attachments is 80,000 kg. Diameter of skirt is equal to diameter of the vessel. Height of skirt is 2.4 m. Wind pressure acting over vessel is 100 kg/m^2 seismic coefficient = 0.08, permissible tensile stress of skirt material = 960 kg/cm^2, permissible compressive stress is 1/3 of yield stress of material. Yield stress is 2400 kg/cm^2. Estimate the thickness of the skirt support. **[10]**

Q3) Discuss in detail the stresses generated in the shell of tall vessel. **[10]**

OR

Q4) A storage tank of diameter 12m is proposes to have a self supporting conical roof with permissible slop of 1 in 5. Check the suitability of 10mm thick plates for conical roof construction. Material of construction is structural carbon steel having density of 7850kg/m^3. Superimposed load is 1250N/m^2. If plates of given thickness are not suitable, suggest the required thickness for roof plates. Modulus of elasticity for material is 2×10^5N/mm^2. **[10]**

P.T.O.

Q5) a) Discuss the step by step procedure for designing of shell and tube heat exchanger. () **[6]**

b) Write a short note on LMTD. **[4]**

OR

Q6) 1800 kg/hr of an organic liquid is to be cooled from 100C to 60C by water available at 15°C. The maximum temperature to which water can be heated is 42°C. Water is circulated through annulus of concentric tube (Double Pipe) heat exchanger. ID of inner tube=12.5mm

OD of inner tube=14.5mm

ID of outer tube=22mm

The properties of fluids are given below :

Properties	Organic liquid	Water
Density (kg/m^3)	1078	995
Viscosity (mNs/m^2)	3.2	0.853
Cp (J/kgK)	2650	4180
K(W/mK)	0.261	0.614

Design the double pipe heat exchanger by neglecting fouling and tube wall resistance. **[10]**

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