

Total No. of Questions : 6]

P2155

SEAT No. :

[Total No. of Pages : 2

TE/Insem./APR-46

T.E. (Chemical)

309350 : CHEMICAL ENGINEERING DESIGN - I

(Semester - II) (2015 Pattern)

Time : 1 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) Figures to the right indicate full marks.
- 2) You are advised to attempt not more than three question.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.
- 6) Assume suitable data, if necessary.

Q1) a) Discuss the stresses in cone type of roof. [5]

b) Give the step by step method for designing of rectangular tanks as per IS : 804. [5]

OR

Q2) a) Discuss the various losses in storage vessels. [5]

b) A storage vessel is to be covered by using a conical roof. Check the possibility of 10 mm thick plates for the construction of conical roof with permissible slope of 1 in 6. The superimposed load = 1250 N/m<sup>2</sup>, density of steel = 7700 kg/m<sup>3</sup>. Diameter of vessel = 10 m. If the plates are not suitable, suggest the required thickness of roof plates. [5]

Q3) a) Discuss the stresses in the shell of tall vertical column. [5]

b) Give the detail design procedure for design of saddle support. [5]

OR

P.T.O.

Q4) Design the skirt support for a cylindrical vertical vessel with the help of following data. [10]

Diameter of the vessel = 3000 mm.

Height of the vessel = 37500 mm.

Weight of the vessel with attachments = 200000 Kg.

Diameter of skirt = 3000 mm.

Height of skirt = 4800 mm.

Wind pressure = 1285 N/mm<sup>2</sup>.

Yield point = 200 N/mm<sup>2</sup>.

Permissible stress of concrete = 35 N/mm<sup>2</sup>.

Q5) a) Write a short note on plate type heat exchangers. [5]

b) Discuss the step by step procedure for designing the Shell and Tube Heat Exchanger. [5]

OR

Q6) A 1800 Kg/hr of an organic liquid is to be cooled from 100°C to 60°C by water available at 15°C. The maximum temperature to which water can be heated is 42°C. Water is circulated through the annulus of concentric tube heat exchanger. ID of inner tube = 12.5 mm, OD of inner tube = 14.5 mm. ID of outer tube = 22 mm. Design the heat exchanger. Neglect fouling and tube wall resistance. [10]

Properties	Ethylene Glycol	Water
Density, Kg/m <sup>3</sup>	1078	995
Viscosity, NS/m <sup>2</sup>	$3.2 \times 10^{-3}$	$0.855 \times 10^{-3}$
Specific Heat, J/Kg°K	2650	4180
Thermal Conductivity, W/m°K	0.261	0.614

3333