Total No. of Questions : 10]

SEAT No. :

P4448

[Total No. of Pages :3

[5255] - 114

M.E. (Mechanical) (Design Engg)

PROCESS EQUIPMENT DESIGN

(2008 Pattern) (Semester - I) (Elective - II) (502205 B)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answer will be valued as a whole.***
6) ***Use of logarithmic tables, slide rules, Mollier chart, electronic steam table and electronic pocket calculator and steam table is allowed.***
7) ***Assume suitable data, if necessary giving reasons.***

SECTION - I

Q1) a) Explain significance of following preliminaries in process equipment design. **[8]**

i) Dilation of pressure vessel.

ii) Design stress.

iii) Weld joint efficiency.

iv) Corrosion allowance.

b) A storage tank 8 m in diameter and 9.5 m in height has to be provided with self supported conical roof. The slope of self supported conical roof is 1 in 5. Roof is subjected to a superimposed load of 118 kg/m^2. Density of plate material is 7500 kg/m^3. E = 2 × 10^6 kg/cm^2. Calculate minimum thickness required for fabrication of self supported conical roof. **[8]**

[redacted]

P.T.O.

Q2) a) What is intragranular corrosion and stress corrosion? Explain the ways to avoid or reduce these types of corrosion. **[8]**

b) Explain the method for calculating thickness of torispherical head subjected to i. internal and external pressure. **[8]**

Q3) a) Explain skirt supports and design aspect related t them. **[8]**

b) Describe gasket factor? Explain gasket selection and classification. **[8]**

Q4) a) A pressure vessel is to be designed for an internal pressure of $0.8N/mm^2$. The vessel has nominal diameter of 1.3 m. The material used for vessel has permissible stress of $150N/mm^2$. If the weight of vessel and its content is 3000kg and torque due to offset piping is 550 N.m. Find stresses due to combined loading. **[10]**

b) Explain reinforcement of nozzles. **[6]**

Q5) Write short notes on **[18]**

a) Expansion joint used in process piping systems.

b) Floating roof type storage tank.

c) Protective coatings and their applications.

SECTION - II

Q6) a) Explain design considerations for shell and tube heat exchanger. **[8]**

b) Differentiate between vacuum filters and centrifugal filters. Explain either rotary disc filter or leaf filter. **[8]**

Q7) a) What are the types of baffles used in heat exchanger? **[6]**

b) Explain effect of wind load and seismic load on tall vessels. **[6]**

c) What types of loses are possible in storage of volatile liquids. **[4]**

Q8 a) Explain important features of packed or plate columns. **[8]**

b) With neat sketches explain construction, working and main design considerations of rotary drier. Give it's applications. **[8]**

Q9) a) Give classification of vacuum pumps or explain any one metering pump. **[8]**

b) What are integral, fabricated and formed nozzles. **[8]**

Q10) Write short note on: **[18]**

a) Types of agitators.

b) Vacuum Crystallizer.

c) Process flow diagrams.

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