

Printed Pages : 3



ECH603

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 151603**

Roll No.

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### **B. Tech.**

(SEM. VI) THEORY EXAMINATION, 2014-15  
**PROCESS EQUIPMENT DESIGN**

Time : 2 Hours]

[Total Marks : 50

- Note:**(i) Attempt all questions.  
(ii) Assume suitable data if missing.  
(iii) Standard Data Books are allowed.

- 1 Attempt any **four** parts parts of the following: [3×4=12]
- (a) Discuss various mechanical properties of materials to be considered in the construction of chemical process equipment.
  - (b) Discuss the effect of Temperature and Pressure on the mechanical properties of a material.
  - (c) How Will you determine the rate of corrosion? Discuss the effect of stress on corrosion.
  - (d) What is Entrainment and Weep Point?
  - (e) Write various steps in designing a nozzle for pressure vessel.
  - (f) Discuss the applications and use of various codes and standards in design.

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- 2 Attempt any **four** parts of the followings: [3×4=12]
- What are different types of vessel support? Discuss one of them in brief.
  - Explain the utility and purpose of ‘Horton-Sphere.
  - Discuss the effect of wind loads in case of tall vessel.
  - Write a short note on Bolts and Flange.
  - Explain the Design of Domed ends.
  - What are the commonly used types of compensation for opening in process vessel?
- 3 Attempt any **two** parts of the followings: [7×2=14]
- Compare the various steps in heat Exchanger design of kern’s method and bell’s method.
  - Enumerate various steps in the design of Spray Drier.
  - What are the different reasons which make a pipeline critical requiring flexibility analysis? Describe one simple method for flexibility analysis.
- 4 Attempt any **two** parts of the following: [6×2=12]
- Mention the procedure and design equation of Distillation Column having sieve trays.
  - Explain the construction and performance of a packed tower with a neat sketch and also derive the following expression for packed absorption tower,  

$$Z_t = H_{o_u} \cdot N_{o_u}$$
 Where  $Z_t$ -Total Height of Tower  
 $H_{o_u}$  - Height of overall transfer unit  
 $N_{o_u}$  - Number of overall transfer unit

- (c) A vacuum distillation column is to be operated under a top pressure of 50 mm Hg. The plates are supported on rings 75 mm wide, 10 mm deep. The column diameter is 1 m and plate spacing 0.5m. Check if the support rings will act as effective stiffening rings. The material of construction is carbon steel and the maximum operating temperature is 50°C. If the vessel thickness is 10.mm, check if this is sufficient.
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