

**Note:**

1. **Question No. 1** is compulsory.
2. Attempt **any three** questions out of remaining **five** questions.
3. Assume suitable data wherever necessary.
4. Figures to right indicate full marks.

- Q.1** Answer the following
- |            |  |    |
|------------|--|----|
|            | a. Which factors are considered for satisfactory design of process equipment?                          | 5  |
|            | b. Which types of heads are selected for pressure vessels subjected to external pressure? Why?         | 5  |
|            | c. What are the standards used during design of storage tank?  | 5  |
|            | d. Discuss the design of skirt bearing plate.  | 5  |
| <b>Q.2</b> | a. Design a procedure for determining shell thickness at different heights of distillation column.     | 10 |
|            | b. Discuss the procedure for finding the total time required for batch sterilization.                  | 10 |
| <b>Q.3</b> | a. Outline the procedure for design of double pipe heat exchanger as per TEMA and IS-4503.             | 10 |
|            | b. Explain construction and working with industrial applications of standard vertical tube evaporator. | 10 |
| <b>Q.4</b> | a. Discuss the selection criteria for material of construction.  | 10 |
|            | b. Explain the role of flanges and nozzles in pressure vessel.   | 10 |
| <b>Q.5</b> | a. Draw the symbols for the following  | 10 |
|            | i) Level controller ii) Pressure transmitter iii) Flow indicator                                       |    |
|            | iv) Transducer v) Globe valve vi) Liquid mixer vii) Distillation column                                |    |
|            | viii) Water cooler ix) Pneumatic signal x) check valve   |    |
|            | b. Illustrate how code and standards are useful in vessel design.                                      | 10 |
| <b>Q.6</b> | Write a short note on  |    |
|            | a. Mechanically agitated stirred tank fermenter  | 5  |
|            | b. PFD   | 5  |
|            | c. Skirt support   | 5  |
|            | d. Self supported storage tank   | 5  |

-----

**Q. P. Code: 27698**