

Reg. No.

--	--	--	--	--	--	--	--	--	--

**M.E./M.TECH. DEGREE EXAMINATIONS, MAY/JUNE 2017**

**SECOND SEMESTER**

**COMPUTER AIDED DESIGN**

**CD16009-DESIGN OF PRESSURE VESSEL AND PIPING**

**(Regulation 2016)**

**Q. Code: 455913**

**Time: Three Hours**

**Maximum : 100 Marks**

Answer **ALL** questions

**PART A - (10 X 2 = 20 Marks)**

1. List the methods for experimental determination of stresses in pressure vessels.
2. Define Ligament efficiency.
3. What is dilation of a pressure vessel? Give an expression for dilation of a conical vessel.
4. Mention a few cases where discontinuity stresses play a role.
5. What are localized stresses? Give their significance in pressure vessels.
6. Define stress concentration. What is its effect?
7. What are the prime factors for critical load of buckling?
8. Give an expression for inelastic collapse pressure in thick cylinders.
9. Mention the types of pipes used in process industry.
10. What are the normal failure modes in pipes?

**PART B - (5 X16 = 80 Marks)**

11. (a) Describe the theory of Moiré method to determine principal strains and their directions in pressure vessels. (16)

**(OR)**

- (b) Explain the working of
- (i) HUGGENBERGER strain gauges. (8)
  - (ii) Photo elasticity method of stress measurement. (8)

12. (a) A flat circular head on a cylindrical pressure vessel is subjected to an internal pressure of 6 bar. A discontinuity analysis of the head to cylinder juncture gives a value  $P_0 = 1000 \text{ N}$  and  $M_0 = 500 \text{ N-m/m}$  of circumference. What is the total maximum stress occurring at the center of the flat head on the outside surface and inside surface if it is 12 mm thick and its radius is 150 mm. (16)

(OR)

- (b) Describe the general theory of membrane stresses in pressure vessels. Hence deduce expressions for cylindrical, spherical and conical vessels. (16)
13. (a) Explain the principles involved in the design of bolted joints and gaskets in pressure vessels. (16)

(OR)

- (b) Discuss various kinds of pressure vessel supports and attachments. (16)
14. (a) Deduce an expression for external buckling pressure of a circular ring. How the expression will be modified for long cylinder or tube. (16)

(OR)

- (b) Describe the interaction method for estimating failure by buckling under combined external pressure and axial loading. (16)
15. (a) Draw and explain the piping lay-out of a simple hydro-electric power plant. (16)

(OR)

- (b) Explain the following:
- (i) Stress analysis in pipes. (8)
  - (ii) Flow diagram of a binary vapour power cycle. (8)