17457

15116

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any TEN of the following : **20**

a) What is the difference between a boiler mounting and accessory ?

b) Define 'Wind load'.

c) Explain the term 'Design pressure'.

d) Define 'Piping load'.

e) Define the term "Poisson's ratio'.

f) Explain the need for multi-shell construction for pressure vessel shell ?

Marks

g) With neat labelled sketch/s give the constructional difference in the stacked and built-up plates.

h) Find the dilation of an elliptical vessel if its internal pressure is 1.5 N/mm^2, thickness is 18 mm and diameter is 3 m. Take; a/b = 2, μ = 0.3 and E = 2 × 10^5 MPa.

i) Draw a neat labelled sketch of a semi-ellipsoidal head.

j) Draw a neat labelled sketch of support skirts.

k) A special shell of 2 m diameter is made up of 10 mm thick plates. Calculate the change in diameter of the shell, when internal pressure is 1.6 N/mm^2. Take the value of E = 200 GPa and μ = 0.3.

l) Draw a neat labelled sketch of support lugs.

m) Draw a neat labelled sketch of a torispherical head.

n) Write the properties of any one Al alloy.

o) Draw welding symbols for;

(i) Spot weld

(ii) Plug weld

2. Attempt any TWO of the following : **16**

a) (i) Define thermal stress. Write the formula giving proper notations.

(ii) Explain stress induced in bi-metallic joints.

b) A pressure vessel consists of a cylinder with 1m inside diameter and closed by hemispherical ends. The pressure intensity of the fluid inside the vessel is not to exceed 2 N/mm^2. The material of vessel is steel, whose ultimate strength in tension is 420 MPa. Calculate, the required wall thickness of the cylinder, considering a FOS = 6 and thickness of the head.

c) (i) What is meant by stress concentration ?

(ii) With neat labelled sketches, give the remedies to avoid stress concentration.

Marks

3. Attempt any TWO of the following : **16**

a) With neat labelled sketches, explain;

(i) Stresses in cylinder

(ii) Stresses in sphere.

b) With neat labelled sketches, explain;

(i) Saddles

(ii) Shell stiffeners

c) Explain the need for nozzle reinforcement. Draw neat labelled sketches for the reinforcement methods.

4. Attempt any TWO of the following : **16**

a) Give the terminology used in pressure vessels.

b) Explain any one ferrous material for corrosive service in pressure vessel fabrication.

c) State and explain weld defects giving their causes and remedies.

5. Attempt any FOUR of the following : **16**

a) Define ligament efficiency. List any four factors to be considered in determining it.

b) Explain 'design approach' for pressure vessels.

c) Draw and explain membrane stress analysis in torispherical heads.

d) What are nozzles ? Classify them.

e) Explain any one method of attaching protective layers.

f) Explain the visual inspection method.

Marks

6. Attempt any FOUR of the following : **16**

a) What is a pressure vessel ? How are pressure vessels classified ?

b) With neat sketch, list stresses induced in a flanged joint.

c) Draw and explain membrane stress analysis in conical heads.

d) Define :

(i) Fatigue concentration factor

(ii) Stress concentration factor

e) List steps to be considered in selection of material for hydrogen service.

f) Draw a neat labelled sketch for SMAW process.

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