



Final Assessment Test – May 2024

Course: BMEE302L - Metal Casting and Welding

Class NBR(s): 4568 / 4571 / 4575 / 4627 / 4628

Slot: G1+TG1

Time: Three Hours

Max. Marks: 100

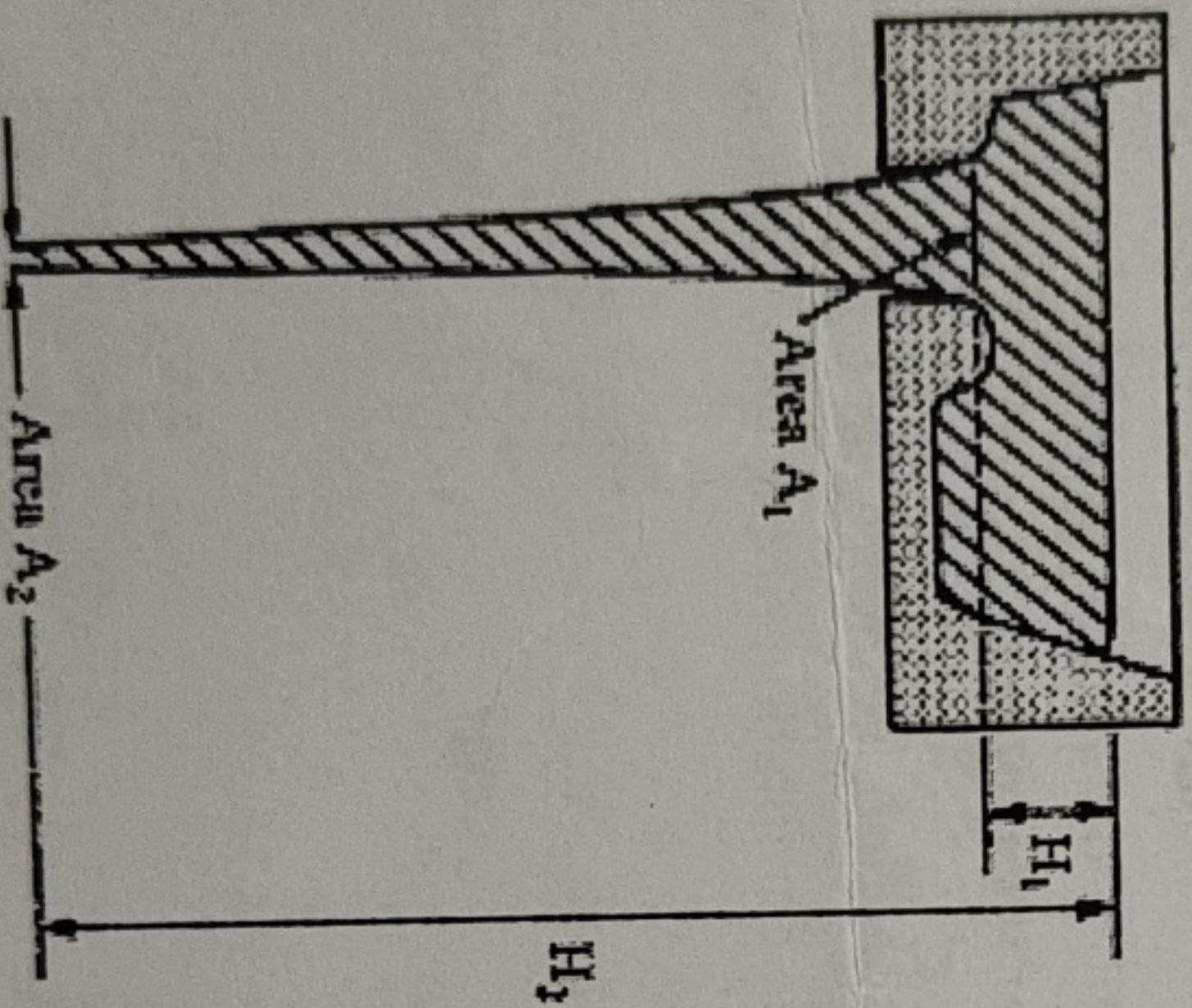
- KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions

(10 X 10 = 100 Marks)

- 3. Draw a graph showing the relationship between the specific volume and the temperature of a metal during shrinkage when cooled from a liquid state to room temperature. Where the risers adjust for shrinkage should be marked on the graph.

H1 is the metal head in the pouring basin and H2 is the entire metal head; the sprue is tapering in the picture below. The top and bottom cross-sectional areas of the sprue are A1 and A2, respectively. Find the velocities of metal flow at the sprue's upper and lower ends. In addition, find the relationship between the cross-sectional areas and the heads H1, H2.



Tapered Sprue

- 4. Select the casting method that makes use of the dump box and the hot metal pattern. Explain the process in detail.

- 5. One of the permanent moulding processes involves a dynamic action. Identify the process, classify it using detailed diagrams, and write their applications.

- 6. Identify the furnace that is suited for the continuous operation, which is utilized to melt the cast iron. Draw a schematic diagram of the furnace. Describe the exothermic and endothermic reactions that take place on such a furnace.

✓ List the various types of arc welding processes. Determine the most appropriate arc welding technique for using a continuous wire electrode. Outline the steps involved and the metals that are transferred during the process.

✓ 7.a) Flame can also be used to weld two metal parts together. Identify the technique of using flames in fusion welding, including its various forms of flame and uses.

OR

7.b) List the details of the autogenous joining process. Determine which of the typical welding procedures involves the joining of two or more sheets of metal without the utilization of any filler material.

8.a) What is the carbon equivalent of a steel that has the following chemical composition: 0.16% carbon, 0.84% manganese, 0.09% nickel, 0.25% chromium, 0.052% copper, and 0.40% molybdenum?

OR

✓ 8.b) The formation of which intermetallic compound occurs at the grain boundaries in the HAZ of austenitic stainless steels? This phenomenon is referred to as sensitisation.

✓ 9. The addition of manganese into heavy plate fabrications containing 0.3% residual sulphur can be used to prevent defects. The presence of residual sulphur has the capacity to cause complications in the welded connection. Identify the problematic area and implement the requisite measures to retain authority over the defect.

10. It is common practice to specify that the inspection for hydrogen cracking should be carried out between 48 and 72 hours after the completion of the weld. Why is this the case?

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