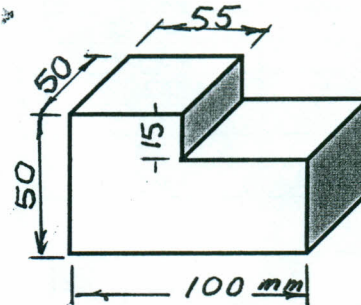


Please, Answer the following questions:-

CASTING PART [45]

Q1-a) Design the gating and risering systems for the Bronze mechanical part as show in the Figure, where $\gamma_s = 8.92 \text{ gr/cm}^3$, $\gamma_L = 8.90 \text{ gr/cm}^3$, $\mu = 0.3$, $t_{av} = 20\text{mm}$, and its small casting.[Assume any missing data]. [10]

b) Describe some special types of patterns and indicate the production circumstances in which each would used? [4]



Q2-a) Explain the basic difference between die pressure casting and centrifugal casting from the stand point of the equipment and the methods by which they are made? [5]

b) Of what material the patterns are made? [3]

c) Describe briefly the CO₂ method of making cores and list some of its advantages. [4]

Q3-a) Explain the term hot spot and what features of Casting design could lead to it. How will a hot spot manifest itself as a casting defect? [6]

b) What is the propose of feeding a casting? [5]

c) Describe the process of shell moulding and give its advantages. For what applications it will best fit? [8]

WELDING PART [45]

Q1-a) Which welding process can be used to weld two steel parts without melting them or without adding filler metal? [12]

b) What factors must be Considered when selecting a coated welding rod? [6]

c) What do you understand by straight polarity and reverse polarity when arc welding with direct current? Is there any choice of polarity in A.C. welding and why? [8]

Q2-a) what are the principal component parts of the equipment used for Submerged arc welding? [8]

b) Explain the principle of atomic hydrogen welding, and the role of hydrogen in this welding? [7]

c) Explain carefully Laser welding method. [10]

P.T.O.

Good Luck
Prof. Dr Eng. M. SAMUEL

انظر خلفه

Table (1) Gating Ratio

| Material | Area of Spure | Area of Runner | Area of Ingat |
|----------------|---------------|----------------|---------------|
| Cast Iron | 4 | 3 | 2 |
| Steel | 1.11 | 1.06 | 1.0 |
| Aluminum alloy | 1.0 | 3.0 | 3.0 |

Table (2) Shrinkage Allowances

| Pouring Material | Shrinkage % |
|------------------|-------------|
| Carbon Steel | 1.81-2.0 |
| Mangan. Steel | 2.2-2.4 |
| C.I (Thin) | 1.0-1.25 |
| C.I.(Thick) | 0.5-1.0 |
| Aluminum Alloys | 1.25 |
| Zink | 1.5 |
| Bronze | 1.5 |
| Tin | 0.5 |

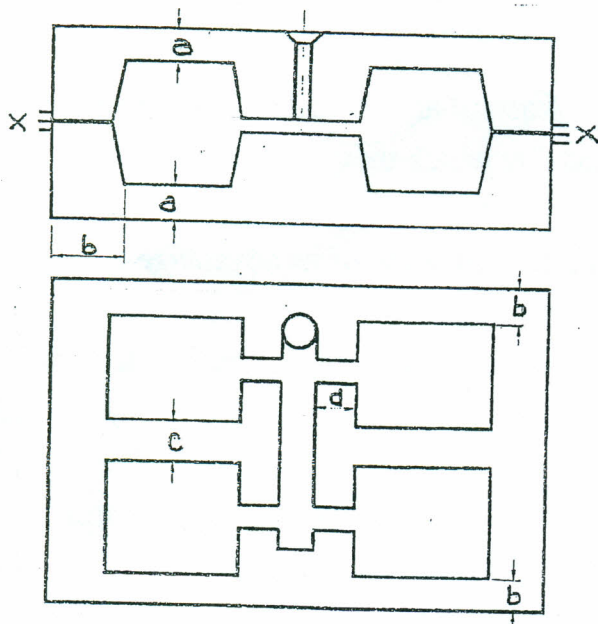


Table (3) Machining Allowances

| Casting Size mm | Allowances (mm) | | |
|---------------------------|-----------------|---------|---------------|
| | Upper Surface | Surface | Inner Surface |
| Cast Iron | | | |
| Up to 150 | 5 | 3 | 3 |
| 150 - 300 | 6 | 3 | 3 |
| 300 - 500 | 6 | 5 | 6 |
| 500 - 900 | 8 | 5 | 6 |
| 900-1500 | 4 | 6 | 8 |
| Ingots Steel | | | |
| Up to 150 | 6 | 3 | 3 |
| 150 - 300 | 6 | 5 | 6 |
| 300 - 500 | 8 | 6 | 6 |
| 500 - 900 | 10 | 6 | 7 |
| 900 - 1500 | 13 | 7 | 8 |
| Non-Ferrous Metals | | | |
| Up to 75 | 2 | 2 | 2 |
| 75 - 200 | 3 | 2 | 3 |
| 200-300 | 4 | 2 | 3 |
| 300-500 | 4 | 3 | 3 |
| 500-900 | 5 | 4 | 4 |
| 900-1500 | 6 | 4 | 4 |

Table (4) S Factor

| Avg. Thickness (mm) | Small Casting | Medium Casting | Heavy Casting |
|---------------------|---------------|----------------|---------------|
| 2.5-4.0 | 1.1 | 1.55 | -- |
| 4.0-8.0 | 1.25 | 1.77 | -- |
| 8.0-16 | 1.5 | 2.12 | -- |
| 30-50 | 1.75 | 2.24 | 0.5 |
| 80-120 | -- | -- | 0.8 |
| 230-300 | -- | -- | 1.7 |
| 300-600 | -- | -- | 2.6 |

Table (5) Distance between Flask and Mould cavity

| Casting Weight (Kg) | The Distance (mm) | | | |
|---------------------|-------------------|-----|-----|-----|
| | a | b | c | d |
| Up to 5 | 40 | 30 | 30 | 30 |
| 5 - 10 | 50 | 40 | 40 | 30 |
| 10 - 25 | 60 | 50 | 50 | 30 |
| 25 - 50 | 70 | 50 | 60 | 40 |
| 50 - 100 | 90 | 60 | 70 | 50 |
| 100-250 | 100 | 70 | 100 | 60 |
| 250-500 | 120 | 80 | -- | 70 |
| 500-1000 | 150 | 90 | -- | 120 |
| 1000-2000 | 200 | 100 | -- | 150 |

Table (6) Flask Dimensions

| | |
|-----------------------------------|---|
| Length and Width of Gating System | Up to 500 mm - steps by 50 mm |
| | 500-1000 mm- steps by 100 mm |
| | Over 1000 mm- steps by 200 mm |
| Height Of Gating System | Up to 100 mm - steps by 10 mm, than 120, 150 mm |
| | Over 150 mm - steps by 50 mm |

RISERING CURVE

