

((Answer only five questions))

- Q1: A- A sprue from the top of which the metal is poured while casting has the following dimensions; Diameter = 100 m, Length= 200 m. The molten metal level in the pouring basin is taken as 60mm from the top of the sprue for design purpose. If a flow rate of  $625 \text{ cm}^3/\text{s}$  is to be achieved, what should be the bottom diameter of the sprue to prevent metal aspiration? (12)  
B- What are the aspect must be taken into consideration while designing forging dies? (8)
- Q2: A-What is the type of mold used in Centrifugal casting process? And what are its features? (12)  
B-Give brief explanation for the followings: (8)  
Master dies, Bloom, Micro porosity, Core shift
- Q3: A- What is the value of the angle of contact needed to get 60% of the original thickness for the square cross sectional beam of aluminum 20 mm thick, if the radius of the roller used for the process is 120 mm? (12)  
B-What happens when the blank pressure is too low? And what happens when it is too high? (8)
- Q4: A- Give reasons for the followings: (12)  
1- In shell molding casting the fine sand is coated with a thermosetting resin.  
2- Increasing the Chromium and Nickel content for Stainless steel casting.  
3- Using Scale modeling method in design of non-conventional forming processes.  
4- It is necessary to subdividing the deep drawing process into a numbers of drawing steps.  
B- What kind of forming process can be used for manufacture the followings products: (8)  
Rails, Gear, Tooth paste tubes, Discs.
- Q5: A-Tube made of St37 with  $D_o = 56 \text{ mm}$ ,  $d_o = 42 \text{ mm}$  is drawn to  $D_1 = 50 \text{ mm}$  and  $d_1 = 38 \text{ mm}$ , where  $R_m = 800 \text{ N/mm}^2$ . Find 1- Drawing force. 2- Permissible drawing force. 3- Can the cross-sectional reduction is achieved in one drawing? Where  $K_{strm} = 580 \text{ N/mm}^2$ . (12)  
B-What are the advantages and disadvantages of extrusion process? (8)
- Q6: A- Describe the electromagnetic forming process with any necessary schematics. (12)  
B- What are the factors controlling part flatness in stamping die? (8)