TERBUKA

UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	METAL CASTING PROCESS
COURSE CODE	:	BDD 40603
PROGRAMME CODE	:	BDD
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **FIVE (5)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

Q1   (a)   Explain why is it important to provide a means of venting gases from the mold cavity?

(4 marks)

(b)   Analyze the roles of casting volume and surface area as they relate to the total solidification time and Chvorinov's rule?

(5 marks)

(c)   Evaluate how does sand affect the quality aspects of the casting?

(5 marks)

(d)   Support with some of the possible approaches that can be taken to prevent the formation of gas porosity in a metal casting?

(6 marks)

Q2   (a)   Explain what is fluidity, and how can it be measured?

(4 marks)

(b)   Analyze what is a misrun and analyze the causes for them to form?

(5 marks)

(c)   Evaluate the defect which can form in sand castings if the pouring temperature is too high and fluidity is too great?

(5 marks)

(d)   Evaluate why is it important to design the geometry of the gating system to control the rate of metal flow as it travels from the pouring cup into the mold cavity?

(6 marks)

Q3   (a)   Describe the two stages of solidification?

(4 marks)

(b)   Evaluate some of the key features observed in the cooling curve of a pure metal.

(5 marks)

(c)   Propose the correlation between cooling rate and final properties of a casting?

(7 marks)

(d)   Describe the chill zone of a casting, and why does it form?

(4 marks)

Q4 (a) Evaluate the features which affect the life of a permanent mold?

(6 marks)

(b) If you need only five units of casting, which process would you use? Discuss your reason.

(5 marks)

(c) Analyze some of the major disadvantages of expandable-mold casting process?

(5 marks)

(d) Explain why are allowances provided in the production of patterns?

(4 marks)

Q5 During pouring into a sand mold, the molten metal can be poured into the downsprue at a constant flow rate during the time it takes to fill the mold. At the end of pouring the sprue is filled and there is negligible metal in the pouring cup. The downsprue is 6.0 in long. Its crosssectional area at the top = 0.8 in^2 and at the base = 0.6 in^2. The crosssectional area of the runner leading from the sprue also = 0.6 in2, and it is 8.0 in long before leading into the mold cavity, whose volume = 65 in^3. The volume of the riser located along the runner near the mold cavity = 25 in^3. It takes a total of 3.0 sec to fill the entire mold (including cavity, riser, runner, and sprue. This is more than the theoretical time required, indicating a loss of velocity due to friction in the sprue and runner. Find:-

(a) The theoretical velocity and flow rate at the base of the down sprue

(5 marks)

(b) The total volume of the mold

(4 marks)

(c) The actual velocity and flow rate at the base of the sprue

(5 marks)

(d) The loss of head in the gating system due to friction

(6 marks)

Q6 A cylindrical riser is to be used for a sand casting mold. For a given cylinder volume, determine the diameter-to-length ratio that will maximize the time to solidify.

(20 marks)

-END OF QUESTIONS -

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