Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Regular Examination January / February 2011

Subject code: 712801N

Subject Name: Advance Casting Technology

Date: 31 /01 /2011 **Time: 02.30 pm – 05.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe the major activities in metal casting through a flow-chart. Identify major Research and development thrust areas of metal casting in India.	**07**
	(b)	List comparative advantages and limitations of sand casting process with respect to machining and forging process.	**07**
Q.2	**(a)**	Compare the amount of heat transferred during solidification (from pouring temperature to solidus temperature) of aluminium, copper and iron castings.	**07**
	(b)	Demarcate the difference between investment casting and replicast process.	**07**
		OR	
	(b)	Outline the difference between hot chamber die casting and cold chamber die casting in terms of metals and applications	**07**
Q.3	**(a)**	Discuss lost foam casting process in context of variety of metals, size range, tolerances, surface finish, and cost, tooling and casting integrity.	**07**
	(b)	Explain the process of casting solidification in terms of freezing range, temperature profile and grain growth in a mould.	**07**
		OR	
Q.3	**(a)**	Explain evaporative casting.	**07**
	(b)	Elaborate solidification analysis and state the equation for unsteady state heat transfer involved in solidification of metal in a mould.	**07**
Q.4	**(a)**	"Fluidity is not a physical property but a technological characteristic" justify and also briefly explain the means to quantify it.	**07**
	(b)	Determine the optimal filling time of the bracket casting of grey cast iron assuming a single cavity mould with one feeder. The fluidity length is 400 mm. Check if the average pouring rate is less than 2Kg/s. Consider the following values for grey cast iron $K_o = 1.0$, $K_f = 1.0$, $K_s = 1.1$, $K_t = 1.4$, $K_w = 1.0$, $P = 0.4$, $t = 20$ mm, casting weight(without feeder and gating) = 3.863 Kg, Total casting weight = 7 Kg	**07**
		OR	
Q.4	**(a)**	Describe the following terms in context of fluidity : Metallostatic head, Viscosity, surface tension, heat diffusivity, back pressure, friction and turbulence	**07**
	(b)	State the assumptions made for deriving an equation for solidification time of a simple shaped casting and thereby derive Chovorinov's equation. State the applications of the equation.	**07**
Q.5	**(a)**	State and describe the casting defects due to improper melting.	**07**
	(b)	State general guidelines for process-friendly casting design.	**07**
		OR	
Q.5	**(a)**	Draw the schematic diagram for Ultrasonic flaw detection and explain the procedure.	**07**
	(b)	Write a short note on collaborative engineering.	**07**

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