Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2712801 **Date: 17/05/2016**

Subject Name: Advance Casting Technology

Time:02:30 pm to 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 and compare the merits and demerits of Metal Casting process with other mfg. process.	07
	(b)	Differentiate between: (1) Natural sand Vs Synthetic sand (2) Facing sand Vs backing sand (3) Base sand Vs mixed sand.	07
Q.2	(a)	Elaborate solidification analysis and state the equation for unsteady state heat transfer involved in solidification of metal in a mould.	07
	(b)	Draw a fishbone diagram indicating all factors affecting casting fluidity.	07
		OR	
	(b)	The metal contracts in volume as it cool in the mould. Discuss the stages in which the contraction of the metal takes place.	07
Q.3	(a)	With a neat sketch, give the principle of operation, merits-demerits and applications of centrifugal casting process.	07
	(b)	Select suitable molding process for following components, stating proper reasons. (1) Paper Mill Rolls (2) Watch cases (3) Turbine blade (4) Large steel valve (5) Gear box casing (6) Fly wheel (7) Car engine cylinder	07
		OR	
Q.3	(a)	Differentiate between dendrite, nucleus and crystal grain. Suggest methods to get uniform grain size in a casting having thick and thin sections.	07
	(b)	Sketch risering and gating systems normally used for common castings like: gear wheel, bearing sleeve, valve body and bearing support.	07
Q.4	(a)	Describe the important considerations and design steps of gating system for non-ferrous alloys.	07
	(b)	State the basic requirements for effective function of a riser. State and explain any three commonly used methods for calculating riser size.	07
		OR	
Q.4	(a)	State general guidelines for process-friendly casting design.	07
	(b)	Explain the principles of fluid flow involved in the design of sprue, runner and gating deriving the expressions.	07
Q.5	(a)	What are the operations in melting and refining steel in direct arc furnace? Describe the reactions involved in dephospherisation and desulphurisation.	07
	(b)	Explain the description, causes and prevention of the following casting defects: (i) Cross-Joint (ii) Slag Inclusion (iii) Blow Holes (iv) Shrinkage (v) Core Shift (vi) Metal Penetration (vii) Cold Cracks	07
		OR	
Q.5	(a)	Explain the principle, application and limitations of (i) Dye penetrant testing (ii) Magnetic particle testing.	07
	(b)	List the typical tasks which can be done by computers in foundry application and explain briefly typical software used with its advantages.	07