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Total number of printed pages – 2

B. Tech
PCMT 4305

Sixth Semester (Special/Back) Examination – 2013

SOLIDIFICATION AND CASTING

BRANCH(S) : MM, MME

QUESTION CODE : E 319

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions :

2 × 10

- What do you mean by “Ammonia drying” ?
- What is mushy zone ?
- What are the uses of a master pattern ?
- Mention two purposes of core.
- Draw the cooling temperature profile of a pure metal and an alloy.
- What are the three types of volume shrinkages that occur during solidification ?
- What are the materials to be used for pattern and making of mold in investment casting processes ?
- _____ is the most effective nucleating agent for graphite formation in cast iron and _____ is the cause for graphite in the form of spherulites.
- What do you mean by equilibrium solidification ?
- What are the four crucible furnaces used for melting of Cu and Al alloys ?



P.T.O.

2. (a) Describe the different types of crystal growing techniques for growth of single crystal. 5
- (b) Explain the solidification of pure metals with cooling curves. 5
3. (a) Describe the heterogeneous nucleation in solidification process. 5
- (b) Explain the crystallization and grain refinement process on impurities particles. 5
4. Explain the types of gates and risers. Describe the requirements and purposes of the components in gating systems. 10
5. (a) Describe the kinetics of continuous growth with suitable free energy curves. 5
- (b) What is lateral growth ? Differentiate between continuous growth and lateral growth. 5
6. (a) Draw and explain the temperature profile of unidirectional solidification of an alloy. 5
- (b) Discuss different types of castings processes. What are the steps to prepare a mold for investment casting ? 5
7. (a) Discuss the solidification process of Fe-C alloys with suitable sketches. 5
- (b) Discuss the types of inclusion in castings formed during solidification process. 5
8. Write short notes on (any **two**) : (5 x 2)
 - (a) Constitutional supercooling
 - (b) Segregation in castings
 - (c) Chvorinov's rule
 - (d) Solute distribution.

