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Total number of printed pages – 2

B. Tech
PCMT 4305

Sixth Semester Back Examination – 2015

SOLIDIFICATION AND CASTING

BRANCH (S) : MM, MME

QUESTION CODE : M 243

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

- The amount of feed metal requirement in case of steel is larger than that of cast-iron, explain.
- What is the main difference in quality between a sand casting and a casting in a metal mould ?
- Is superheat required for melting ? Justify your answer.
- What do you mean by equilibrium solidification ?
- State chvorinov's rule.
- Draw the cooling temperature profile of a pure metal and an alloy.
- Write down the functions of "Feeder head" in the gating system.
- Could low carbon steel be melted in cupola ? If not give scientific reasoning.
- Why is aluminium preferred to be produced by cold chamber die casting than Hot chamber die casting ?
- Is eutectic freezing slower than peritectic freezing ? Justify your answer.

P.T.O.

2. Derive an expression for alloy solidification and explain the varying composition profile of solute during solidification, assuming no diffusion in solid and diffusional mixing in liquid. 6+4
3. Discuss the casting defects which may be directly attributed to the moulding sand and pouring metal used for steel casting. Explain the remedial measures you would like to adopt to overcome these defects. 7+3
4. (a) Describe in detail "Lost wax casting" process and explain why it is also called precision casting. 7
(b) Why is investment casting so versatile as to shapes and produces excellent dimensional control? 3
5. (a) Explain Constitutional Super Cooling. 5
(b) Derive an expression to find out the critical radius for homogeneous nucleation, assuming the nucleating solid is a sphere. 5
6. (a) Define gating ratio and explain its importance in relation to flow distribution in different kinds of gating system. 4
(b) Explain in brief the types of gating systems used and their advantages and limitations. 6
7. (a) Why is directional solidification essential in casting? 3
(b) What is casting yield and explain different techniques available for improving casting yield? 2+5
8. Write short notes any **two** of the following : 5×2
(a) Lost foam process
(b) Vacuum sealed casting
(c) Cellular growth
(d) Dendritic solidification.

