

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
FOUNDRY TECHNOLOGY
(Metallurgy & Material Technology)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Among the various allowances provided on pattern which are positive allowances and which are negative allowances. Explain the reasons for the same with suitable examples. [7+5+4]
(b) Explain the terms: (i) Cope (ii) drag (iii) CHEEK.
(c) Explain the green in green sand molding.
2. (a) What are the ingredients of molding sands? Give the typical composition of green molding sand for grey iron foundry practice. [8+8]
(b) Explain the effect of the following additives on the behavior/ properties of sand molds.
3. With neat sketches explain the investment casting process. What are the advantages, disadvantages and applications of the above process. [16]
4. Distinguish fully between the following:
(a) Open riser and Blind riser. [6+5+5]
(b) Gating ratio and gating system
(c) Top gating and Bottom gating.
5. (a) Distinguish fully among the following: [9+7]
 - i. Liquid contraction
 - ii. Solidification contraction
 - iii. Solid contraction
(b) Compare and contrast constitutional supercooling and conventional supercooling.
6. (a) Discuss briefly the various methods of determining gas solubility in aluminium alloys. [8+8]
(b) Explain the melt treatments given in the founding of Al-Mg alloys.
7. What is full mold process. Explain the process fully. What are the advantages disadvantages and applications of the above process. [16]
8. (a) From which source do Blowholes appear to originate most frequently? Explain them. [8+8]

- (b) Explain specifically how mold restraint could contribute to hot tears in castings.

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1. (a) Explain the color coding system that is being employed for patterns. [4]
(b) With the help of neat sketches Explain the following. [4X3=12]
 - i. Cope & drag pattern
 - ii. Follow Board pattern
 - iii. Gated pattern.
2. (a) 'The quality requirement of core sand is much more stringent than that of molding sand'. Justify your answer stating reasons. [8+8]
(b) What is sand conditioning ? Explain in detail various sand conditioning techniques.
3. (a) Explain the basic differences between die castings and other types of castings from the stand point of the methods by which they are made. [8+8]
(b) Describe briefly the various design features of die casting machines.
4. (a) Calculate the pouring time and gating dimensions for a steel casting with the plate dimensions 300 mm × 100 mm × 160 mm. Assume the sprue height as 300 mm and the gating ratio is 1:2 : 1 :5. [8+8]
(b) Calculate the upward force on the core used in making a casting of low carbon steel of 300 mm × 300 mm × 25 mm, using a bottom gate with a sprue 150 mm high entering at the bottom edge of the casting.
5. (a) Distinguish between long range freezing and short range freezing. [8+8]
(b) What is ingot segregation in castings. How it is controlled.
6. (a) Explain the working principle of various types of furnaces used in foundries with the help of neat sketches. [8+8]
(b) Describe the working of a side blown converter for making steel castings in a foundry.
7. (a) With the help of a neat sketch explain the working of 'Reciprocating mold process of continuous slab casting'. [8+8]
(b) Explain with the help of a neat sketch 'William continuous casting process for steel making'.

8. List the casting defects due to faulty gating system and suggest remedies to eliminate them. [16]

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1. "The growing demand of high precision and intricate castings helped considerably the development of Foundry Industry". Substantiate your answer suitable examples. [16]
2. How is grain fineness of base sand for use in molding specified? Mention the procedure to test fineness and its effect on the following. [4X4=16]
 - (a) green strength.
 - (b) Permeability.
 - (c) Collapsibility.
 - (d) Surface finish.
3. (a) List in descending order of importance the various metals and alloys that are employed for making die castings, with suitable explanation. [8+8]
(b) Explain under what production conditions does plaster mold casting seem to be justified.
4. Explain the important functions of a riser. Explain with neat sketches the various types of risers designed. What are the advantages, disadvantages/ limitations of each one of them? [16]
5. Explain the factors that contribute to the following defects during casting solidification. [4X4=16]
 - (a) Hot tears
 - (b) Cold cracks
 - (c) Shrinkage cavities
 - (d) Warpage/distortion
6. Discuss critically the Aluminum and aluminium alloys foundry practice in the background of [4X4=16]
 - (a) Molding methods and materials
 - (b) Melting techniques and solidification
 - (c) gating and risering principles
 - (d) finishing and fettling operations.

7. What is full mold process. Explain the process fully. What are the advantages disadvantages and applications of the above process. [16]
8. (a) Write short notes on casting defects and their control in cast Iron castings. [8+8=16]
- (b) State the defects formed in casting due to defective sand mix and explain them.

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1. (a) Compare the advantages and limitations of wood as pattern material to metals and plastics. [8+8]
(b) What is the purpose of colouring patterns? Explain the common pattern colour code.
2. (a) What is the function of clay in molding sand. What are the various types of clays. Give their chemical formula. If clay is mixed in more quantity or in less quantity. What will happen? What is the right percentage of clay in properly prepared molding sands. [10+6]
(b) Why does foundry sand deteriorate with use and how is its quality restored.
3. (a) Discuss the criterion for the selection of a centrifugal casting process. How do you find out the speed of rotation in a centrifugal casting process. [5+5+6]
(b) Explain why steel castings are not made by pressure-die casting process.
(c) Differentiate between centrifugal casting process centrifuging process.
4. Discuss different factors favouring riser efficiency with reference to the following: [6+5+5]
(a) Chvorinov's rule (b) Shape factor (c) Caine's curve.
5. (a) Distinguish fully between Homogeneous Nucleation and Heterogeneous Nucleation. [8+8]
(b) Calculate the size of critical radius and the number of atoms in the critical radius the number of atoms in the critical nucleus when solid copper forms by homogeneous nucleation for the following data.
Surface free energy $\sigma = 177 \times 10^{-3} J/m^3$
Freezing temp of copper = $1085^\circ C$
Latent heat of fusion = $1628 \times 10^6 J/m^3$
Under cooling temp = $236^\circ C$
Lattice parameter of Cu = 3.61 SoA
6. (a) Explain the advantages and limitations of hot blast cupola and water cooled cupola. [8+8]
(b) Explain with a neat sketch, the electric arc furnace and mention its relative merits and demerits.

7. What is full mold process. Explain the process fully. What are the advantages disadvantages and applications of the above process. [16]
8. What are the various casting defects that form due to incomplete / improper feeding? Explain them with suitable figures and suggest suitable remedial measures. [16]
