

IV B.Tech. I Semester Regular Examinations, November -2005
ADVANCED METAL CASTING
(Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Draw a neat sketch of hot blast cupola. Label the important sections of the cupola. Explain the operation of this cupola.
(b) What is a refractory? What are the general requirements of refractories? Explain any two types of refractories. [8+8]
2. (a) With a neat sketch explain the working of Basic open hearth furnace. Explain the lining details, chemistry of the process and operation of the furnace.
(b) With a sketch explain the Electric arc furnace and discuss its advantages and limitations. [8+8]
3. (a) Differentiate between grey Iron and malleable Iron. Explain how grey Iron castings are made.
(b) Describe the method of producing Magnesium based alloy castings in a foundry shop. [8+8]
4. (a) Distinguish clearly between pressurized and non-pressurised gating system.
(b) Critically discuss the size, shape, location and feeding distance of risers. [4+12]
5. (a) Explain the principle of **CO₂ molding**. What are its advantages and disadvantages.
(b) Explain the investment casting process. [10+6]
6. (a) With a neat sketch explain the principles of working of a hot chamber die casting machine.
(b) List the various casting defects developed in castings. Explain their causes and remedies. [8+8]
7. (a) Write an essay on Foundry mechanization.
(b) Briefly explain any one type of Non-destructive test method. [8+8]
8. Write short notes on the following:
 - (a) Plaster molds
 - (b) Horn gate
 - (c) Blind risers
 - (d) Sand reclamation [4×4]

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1. (a) Explain the constructional details of a hot blast cupola.
(b) Write a short note on cokeless cupola. [8+8]
2. What is unidirectional solidification?
 - (a) Explain the criteria to be followed to obtain directional solidification for the production of sand castings.
 - (b) Draw the cross sectional view of an induction furnace and explain the various steps in the working principle of induction furnace. [8+8]
3. (a) How grey cast Iron is melted? Explain the construction details of the furnace used and sequence of operations.
(b) What is coring? How is it eliminated? [10+6]
4. (a) Describe the melting practice of copper base alloy castings.
(b) Explain various treatments to be given to obtain sand castings. [8+8]
5. (a) What are the functions of a riser? Explain various types of risers.
(b) Explain the necessity of chaplets, chills and padding in a gating system. [10+6]
6. (a) With neat sketches explain the principles of Investment casting process. What are the applications of this process. Explain the merits and demerits of the above process.
(b) What are the three basic types of centrifugal casting processes? Explain any one in detail. [10+6]
7. (a) With a neat sketch explain the working of a Jolt molding machine.
(b) Explain various material handling Equipment used in foundry mechanization. [6+10]
8. Write short notes on the following:
 - (a) CO₂ process
 - (b) Shell molding process
 - (c) Sand reclamation
 - (d) Liquid penetrant test method. [4×4]

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1. (a) Explain the working principle of a hot blast cupola with the help of a neat sketch. Describe the construction details and operations of the hot blast cupola.
(b) Explain the various types of refractories. [10+6]
2. (a) Explain in detail the working principle of basic open hearth furnace with the help of a neat sketch. List out the advantages and disadvantages of open hearth furnace.
(b) With a neat sketch explain the working of Electric arc furnace. [10+6]
3. (a) What is grey cast Iron? Explain properly the production of grey Iron castings. What are the advantages of grey cast Iron compared to the other types of cast Iron castings.
(b) Describe the method of producing Aluminium based alloy castings in foundry shop. What are the problems arise during aluminium melting and how they may be minimised. [8+8]
4. (a) What is a gating system? Name the various parts of a gating system with a neat sketch. Explain the function of each of them.
(b) Distinguish between open and blind risers. [12+4]
5. Sketch and explain the
(a) Construction and working of **centrifuging**. Explain the merits and demerits of this process compared to other centrifugal casting processes.
(b) Explain with a neat sketch the mode of solidification in a metallic mold and discuss its effect on the quality of castings made. [10+6]
6. Explain the following:
(a) Investment casting process
(b) Plaster mould process. [8+8]
7. What are the main aims of :
(a) Non destructive testing. Explain any one type of NDT process for the inspection of quality of castings.

- (b) Explain different types of defects which occur in ingots. How are they prevented?

[8+8]

8. Write short notes of the following:

- (a) Malleabilizing
- (b) Padding
- (c) Sand reclamation
- (d) Die casting.

[4×4]

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1. Explain the following:
 - (a) Oxygen enriched blast in cupola
 - (b) Cokeless cupola. [8+8]
2. (a) What are the various types of refractories. Explain any two types of refractories with reference to composition; properties and applications.
(b) Distinguish between grey Iron castings and Malleable Iron castings. [12+4]
3. (a) What are the different types of Electric arc furnaces. Explain them.
(b) Describe the various methods of choosing in Electric arc furnace. [10+6]
4. (a) Explain various types of gates with a neat sketches.
(b) Discuss critically the different factors that are involved in the design of a riser. Suggest and explain the methods for increasing riser efficiency. [8+8]
5. (a) Differentiate between Permanent mold casting and Semi-Permanent mold casting. Describe in detail **permanent** mold casting process.
(b) Compare and contrast 'True' and Semi-Centrifugal casting process. [10+6]
6. (a) Explain with a neat sketch the shell molding process.
(b) Discuss the techniques of degassing in liquid metals. [8+8]
7. (a) Discuss various types of segregation in alloy castings.
(b) Explain various casting defects observed in a foundry. Explain any three with suggested remedies. [8+8]
8. Write short notes on the following:
 - (a) Strainer core in gating system
 - (b) Chvorinov's rule
 - (c) Shape factor
 - (d) Chills. [4×4]
