

III B.Tech. II Semester Regular Examinations, April/May -2005

FOUNDRY TECHNOLOGY
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What do you mean by pattern design. Explain the various activities in pattern desing.
(b) Describe the stages in the construction of a good pattern.
2. (a) What is a sand slinger? Explain the working of sand slinger with a neat sketch.
(b) What are the purposes of sand conditioning equipment. Name several machines for this purpose indicating the specific purpose of each.
3. (a) Describe the true centrifugal casting process with the help of a neat sketch and also explain to what workpiece configurations it is best suited.
(b) Explain the process of permanent mold casting. Discuss the advantages and limitations of this method.
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?
5. (a) Differentiate between dendrite, nucleus crystal and grain.
(b) Suggest and Explain methods to get uniform grain size in a casting having thick and thin sections.
6. (a) Explain the advantages and limitations of hot blast cupola and water cooled cupola.
(b) Explain with a neat sketch, the electric arc furnace and mention its relative merits and demerits.
7. What do you mean by baking. What are the various methods available for baking sands and cores. Is there any difference between baking of sands and cores. If so explain them. Explain any 2 methods of baking.
8. Mention various casting defects observed in a foundry. Explain any five of them suggesting suitable remedies.

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1. (a) Compare the advantages and limitations of wood as pattern material to metals and plastics.
(b) What is the purpose of colouring patterns? Explain the common pattern colour code.
2. (a) What is a sand slinger? Explain the working of sand slinger with a neat sketch.
(b) What are the purposes of sand conditioning equipment. Name several machines for this purpose indicating the specific purpose of each.
3. What are the three basic types of centrifugal casting process. Explain all of them in detail bringing out the major differences among the three methods.
4. (a) Calculate the Maximum feeding distance of the bar 100 mm thick when it is fed by a riser of 200 mm diameter being placed at the centre.
(b) Find the modulus of the following castings:
(i) Sphere of 100 mm dia (ii) Cube of 50 mm side.
(iii) Cylinder of height = 75 mm (iv) Cylinder of diameters = 50 mm.
5. Explain the formation of casting from liquid metal poured in a mold. Explain the conditions that favour the formation of fine equi-axed grains.
6. (a) With a neat sketch explain the reactions occurring in different zones of cupola.
(b) What is carbon equivalent? Explain the effect of carbon equivalent on the structure of cast irons.
7. Write an essay on the 'Full mold process'. Explain their advantages, limitations and application of the above process.
8. Explain the following casting defects
 - (a) Sand fusion
 - (b) Slag inclusions
 - (c) Blow holes
 - (d) Cold shuts.

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1. (a) Describe the major activities in metal casting industry through a flow-chart.
(b) Explain the major Research and development thrust areas of metal casting in India.
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.
(b) Why does foundry sand deteriorate with use and how is its quality restored.
3. (a) Distinguish fully between 'True' and semi-centrifugal casting Processes.
(b) Explain the principle of CO_2 molding process. Enlist the advantages and disadvantages.
4. Explain the need of padding, chills, insulating sleeves and exothermic compounds in the casting, process.
5. (a) Distinguish clearly between gross shrinkage and Micro shrinkage.
(b) How is the critical radius is evaluated from the thermodynamic background? Explain the effect of under cooling an critical radius can you expect the afore-said in the actual practice. Justify.
6. Explain the following:
 - (a) Oxygen Enriched Blast in cupola
 - (b) use of calcium carbide in cupola
 - (c) cokeless cupola.
7. What is full mold process. Explain the process fully. What are the advantages disadvantages and applications of the above process.
8. List some of the common types of casting defects which are normally detected only after cleaning. Explain the reasons for the above and explain the methods for their remedy.

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1. Compare the advantages, limitations and applications of the following pattern material.
 - (a) Wood
 - (b) Plastics
 - (c) Metals
 - (d) Wax
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.
 - (a) green strength
 - (b) Permeability
 - (c) Collapsibility
 - (d) Surface finish.
3.
 - (a) Discuss the various factors to be considered for die costing design.
 - (b) Name various types of die casting dies. Also explain the factors that affect the selection of die.
4.
 - (a) Explain with neat sketches pouring Basin and down sprue.
 - (b) Explain the parameters which cause the pouring time of a given casting to vary.
5.
 - (a) Explain the differences between equilibrium solidification and non-equilibrium solidification with the help of a suitable example.
 - (b) What are the important characteristics of liquid metals. Explain them in brief.
6.
 - (a) Describe with the help of a neat sketch the working of a hot-blast cupola.
 - (b) Distinguish clearly between malleable cast iron and spheroidal graphite cast iron with respect to microstructure; properties and applications.
7. Explain the recently developed modern casting processes.
 - (a) Thixo casting process.
 - (b) Rheo casting process.

8. What are the casting defects that are likely to form due to improper melting?
Explain the reasons for them. Suggest remedial measures with suitable examples.
