

**III B.Tech II Semester Regular Examinations, Apr/May 2008**  
**FOUNDRY AND WELDING**  
**(Production Engineering)**

**Time: 3 hours**

**Max Marks: 80**

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

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1. Compare the suitability of polymeric patterns which are reinforced with wood, wooden patterns, metallic patterns, polystyrene patterns and wax patterns in meeting the requirements of dimensional accuracy, cost of tooling, pattern life, and ease of manufacture. [16]
2. (a) Why cores are used in making castings? Why is it preferable not to use cores at all ?  
(b) How are cores joined? Cores are mudded and ignited after applying core washes? Why?  
(c) What is a core print? What considerations govern the dimensions of core print? [4+6+4]
3. (a) How do you exercise control over sulphur and phosphorus levels in a liquid gray cast iron made in cupola?  
(b) What is a scab? What are the reasons for its occurrence?  
(c) What are the methods available for joining two or more shell molds to produce a composite mold? [6+4+6]
4. (a) Explain how alloys solidify?  
(b) Explain how microshrinkage and microsegregation are developed in solidified parts?  
(c) What are the pros and cons of using several ingates instead of single ingate in feeding a mold cavity, when total ingate area is same in both cases? [4+6+6]
5. (a) Explain the submerged arc welding process with a neat sketch.  
(b) Differentiate between TIG welding and MIG welding processes. [8+8]
6. (a) Explain the following adhesive bonded joint tests
  - i. Cleavage test
  - ii. Ultrasonic test  
(b) Explain various types of adhesive bonded joints. [8+8]
7. With the help of a neat sketch explain the working of a skew injection molding process. What are the advantages and disadvantages of this, over other methods of processing of plastics. Give the important applications of this process. [16]

8. (a) What is powder metallurgy? What is its importance? Compare powder metallurgy with conventional shaping methods.
- (b) What are the major advantages and limitations of powder metallurgy. [9+7]

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1. (a) Explain on which surface dimensions the shrinkage allowance, draft allowance, machining allowance, and distortion allowance are provided for in pattern making.  
(b) What is the function of pattern coatings?  
(c) What are the advantages of expanded polystyrene patterns? [8+4+4]
2. (a) How does core shifting reveal itself in the casting?  
(b) If under-baked cores are used, what kind of defects they can introduce in the castings?  
(c) Explain how cores are baked at elevated temperatures?  
(d) Interrupted pour results what kind of defects in castings? What are other causes of that defect and how you reduce the resulting foundry scrap? [3+3+4+6]
3. (a) Discuss the causes of Shrinkage porosity in castings. How does shrinkage porosity manifests itself? How do you distinguish it from gas blow holes? What measures are required to eliminate shrinkage porosity?  
(b) What are the advantages and demerits of crucible melting of metals in a foundry? [10+6]
4. (a) When a liquid metal solidifies, who have contributions from liquid shrinkage, solidification shrinkages? How each of these shrinkage components is taken care of in dimensioning the part geometries?  
(b) Explain the considerations in the design of a gating system. [8+8]
5. (a) What advantages do resistance welding processes have over the other methods of welding.  
(b) Describe the features of weld nugget. What does its strength depended on? Explain.  
(c) Make a list of some products that can be fabricated by resistance welding process. [7+5+4]
6. (a) Discuss the advantages, disadvantages and applications of braze welding.  
(b) Explain the following: [8+8]
  - i. Wettability
  - ii. Contact angle

iii. Spreading.

7. (a) Describe the transfer molding process for the thermosetting plastics, with the help of a neat sketch.  
(b) Discuss the advantages and disadvantages of the transfer molding process. Also give its important applications. [9+7]
8. (a) What is powder metallurgy? What is its importance? Compare powder metallurgy with conventional shaping methods.  
(b) What are the major advantages and limitations of powder metallurgy. [9+7]

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1. (a) Define the term castability.  
(b) Draw schematic sketches of representative patterns of following types
  - i. follow board pattern,
  - ii. match plate pattern,
  - iii. Loose patterns,
  - iv. cope and drag patterns.[4+12]
2. Write short notes on :
  - (a) cold box process
  - (b) core shooters.[8+8]
3. (a) What is a runout? What factors of foundry practice are responsible for runouts? How do you reduce the risk of runouts?  
(b) Classify different functional zone in a cupola and show by a sketch. [6+10]
4. (a) Explain what is directional solidification?  
(b) What are considerations in filling a mold cavity?  
(c) Explain the gating design considerations aimed at reducing the incidence of sand inclusions.  
(d) Differentiate between micro and macroshrinkage in castings. How do you eliminate/reduce them by gating and riser design. [4+4+4+4]
5. (a) Sketch the neutral flame for oxy acetylene welding and explain the chemical reactions taking place in various zones of the flame. Also compare this with oxidising and carburising flames.  
(b) Explain how acetylene gas is stored in the cylinder with a sketch, showing the cross section of the cylinder. Discuss the safety devices incorporated on the cylinder. [10+6]
6. What are the various types weld joints used for plastics. Explain all of them with neat sketches. [16]
7. (a) Explain some of the reasons for the great increase in the use of plastics in engineering designs over the past few decades.  
(b) Distinguish fully between thermosetting and thermoplastic polymers. [8+8]

8. (a) Discuss two important theories of sintering which you consider as the most convincing and comprehensive.
- (b) Discuss the effect of bulk movement and plastic deformation of particles during compaction and densification of metal powders. [9+7]

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1. (a) What do you mean by compositional control of liquid metal? What does it imply?  
(b) Which of the following factors are favorably disposed towards greater dependence on castings by designers? Elaborate how?
  - i. Rapid transition from prototype to finished product,
  - ii. suiting shape and size to a given unction,
  - iii. good surface finish,
  - iv. complex parts as an integral unit,
  - v. Improved dependability,
  - vi. better fracture toughness and fatigue growth resistance. [4+12]
2. (a) What are the methods of coating the cores?  
(b) What are the methods of venting the cores?  
(c) What are the disadvantages of plaster mold casting? [6+6+4]
3. (a) Distinguish between ceramic slurry mold casting process and investment casting process.  
(b) What are required properties of waxes used in investment properties? [10+6]
4. (a) Explain how alloys solidify?  
(b) Explain how microshrinkage and microsegregation are developed in solidified parts?  
(c) What are the pros and cons of using several ingates instead of single ingate in feeding a mold cavity, when total ingate area is same in both cases? [4+6+6]
5. (a) Describe the summerged arc welding process with suitable sketch and give current range, electrode size, metals welded and metal deposition rates.  
(b) Explain the factors to be considered in the selection of a weld joint. Also explain various welding positions. [8+8]
6. What are the two main types of ultrasonic welding techniques used for joining of plastics. Explain their working principle. Discuss the advantages, limitations and applications of ultrasonic welding process. [16]
7. Explain the following processes with the help of neat sketches. [16]
  - (a) Inject molding process

- (b) Compression molding process.
8. (a) Describe the various methods used for the manufacture of metal powders. Which method do you think to be superior? Why? Explain.
- (b) Which method will you recommend for the manufacture of powders of the following metals.
- i. copper
  - ii. Iron
  - iii. Magnesium
  - iv. Nickel.
- [8+8]

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