

II B. Tech I Semester Regular/Supply Examinations, Oct/Nov - 2016
METALLURGY AND MATERIAL SCIENCE
 (Com. to ME, AME)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) What are the types of bonds? Explain their properties. (4M)
- b) What is a eutectic system? Give an example. (3M)
- c) Compare the properties of malleable and spheroidal cast iron? (4M)
- d) What is annealing? Explain its purpose. (3M)
- e) Write the properties of copper. Name a few applications. (4M)
- f) Write the properties of ceramics (4M)

PART -B

2. a) Explain the methods that are used for determining the grain size. (8M)
- b) Why alloying is done to metals? What are its limitations? (8M)
3. a) Name and explain experimental methods for construction of phase diagrams. (8M)
- b) Write about coring and miscibility gaps. (8M)
4. a) Write are the types of cast irons? Explain their properties and applications. (12M)
- b) Write the classification of plain carbon steels? (4M)
5. a) Write important features of iron –iron carbide phase diagram? (8M)
- b) What is tempering? Explain the stages in tempering. (8M)
6. a) Explain the steps involved in hardening of Cu-Al alloy. (8M)
- b) Write the properties of titanium and applications of titanium alloys. (8M)
7. a) What do you mean by cermet? How do you manufacture them? (6M)
- b) What are nanomaterials? Write its properties and applications. (10M)



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PART -A

1. a) What are the types of solid solutions? (4M)
- b) What are isomorphous alloy systems? (3M)
- c) What is gray cast iron? (4M)
- d) What are TTT diagrams? (4M)
- e) Write the properties of aluminum? (4M)
- f) Name any two cermets. Explain their composition. (3M)

PART -B

2. a) What is a substitutional solid solution? Write its properties. (6M)
- b) Explain Hume-Rothery rule? What is their significance? (10M)
3. a) What is a lever rule? Explain it with an example? (6M)
- b) Write about transformation in solid state (10M)
4. a) Write the classification of steels? Give the advantages of alloy steels over plain carbon steels? (8M)
- b) Write about Hadfield Manganese steel? Explain its properties. (8M)
5. a) Compare annealing and normalizing. When do you use each? (8M)
- b) What is surface hardening? Why is it required? Explain any one technique. (8M)
6. a) Write about dezincification? Write the methods to reduce dezincification? (8M)
- b) Compare alpha and beta alloys of titanium? (8M)
7. a) Write down the classification of ceramic materials? Give their uses? (8M)
- b) Compare large particle reinforced and dispersion strengthened composites. (8M)

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PART -A

1. a) Write about intermediate alloy phases (4M)
- b) Distinguish between eutectoid and peritectoid reactions. (4M)
- c) What is white cast iron? What are its applications? (3M)
- d) How do you find hardenability? (4M)
- e) Name any Aluminum alloys. Write their compositions (4M)
- f) What do you mean by FRP composites? Explain their properties. (3M)

PART -B

2. a) What is crystallization? Name and explain the steps in it? (8M)
- b) How does grain size affect the properties? Explain. (8M)
3. a) Explain Cu-Ni phase diagram. (10M)
- b) What is a phase rule? Explain. (6M)
4. a) Write about tool steels and die steels? Explain their applications (8M)
- b) Write about spheroidal cast iron. Discuss its properties. (8M)
5. a) What is annealing? Explain various types of annealing processes. (8M)
- b) Write about Jominey-End Quench test. Explain why is it required. (8M)
6. a) Write about the corrosion resistance of aluminum? (8M)
- b) Explain season cracking and methods to avoid it? (8M)
7. a) Write the classification of metal matrix composites. (6M)
- b) Explain the methods of manufacture of fiber reinforced composites? (10M)



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**PART -A**

1. a) What is an alloy? Give an example. (3M)
- b) What is a peritectic reaction? Give an example? (4M)
- c) Write the applications of spheroidal graphite cast irons? (3M)
- d) Write about hardening? (4M)
- e) Write the properties of titanium? (4M)
- f) What are glasses? write their properties (4M)

**PART -B**

2. a) Explain the necessity of alloying. (6M)
- b) What are Hume-Rothery rules? Explain. (10M)
3. a) Write about transformations in solid state. (6M)
- b) Draw Fe-Fe<sub>3</sub>C phase diagram. Label it and write down the important reactions. (10M)
4. a) Write down the classification of cast irons? Differentiate between white and grey cast irons. (8M)
- b) Classify steels? Give the properties and applications of plain carbon steels. (8M)
5. a) Write about age hardening treatment. (6M)
- b) Briefly describe various surface hardening methods. (10M)
6. a) Briefly explain the properties of copper and its classification and applications. (10M)
- b) Write about the corrosion resistance of aluminum alloys? (6M)
7. a) Name a few metal matrix composites. Differentiate between MMCs and PMCs? (8M)
- b) Write about C-C composites? How do you manufacture them? (8M)

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