Printed Pages : 4 **EME-301**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0428 Roll No. | | | | | | | | | | |

B. Tech.

(Semester-III) Theory Examination, 2011-12

MATERIALS SCIENCE IN ENGINEERING

Time : 3 Hours] *[Total Marks : 100*

Note: Attempt questions from each Section as per directions.

Section-A

Answer *all* questions. 2×10=20

1. Define the term 'Miller indices'.
2. What is NDT ? Explain.
3. What is difference between Hardness and Toughness ?
4. Explain about Gibbs Phase rule.
5. Define 'Critical Cooling Rate' in TTT diagram.
6. Mention any two copper alloys along with its properties.

7. Mention differences between hard and soft magnetic materials.

8. What is Messier effect ? Explain.

9. What is a Composite material ? Give any two examples.

10. What is fatigue phenomenon ? Explain.

Section-B

Answer any *three* questions. 10×3=30

1. Draw a neat sketch of BCC crystal structure and calculate its atomic packing factor and also find out the effective number of atoms.

2. Draw a Stress- Strain diagram for a low carbon steel specimen indicating the proportional limit, elastic limit, yield point, point of maximum loading and rupture and explain.

3. Distinguish between the following :
   (a) Annealing and Normalising
   (b) Flame and Induction Hardening.

4. What is Super Conductivity ? Discuss the properties of Super Conductors.

5. Describe briefly about mechanical properties of various types of plastics and also its applications.

Section-C

Answer *all* questions. 10×5=50

1. Explain in detail about Edge and Screw dislocations. Distinguish between them.

Or

Explain about determination of crystal structure by X-ray diffraction method.

2. Draw a typical 'Creep-test' curve, showing different stages of elongation for a long time high temperature creep-test. State how the information is helpful to the designer.

Or

Explain about Iron Carbon Equilibrium diagram with a neat sketch.

3. What are bronzes ? How are they classified ? Give the composition, microstructure, properties and applications of any three of them.

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Or

Draw a TTT diagram for a eutectoid steel and explain the effect of cooling rate on the transformation products and hardness obtained.

4. Distinguish between diamagnetic, paramagnetic and ferromagnetic materials. Explain their properties and applications.

Or

Explain about energy band concept of conductor, insulator and semiconductor.

5. What are the various types of corrosions ? Explain. Also explain the methods to their preventions.

Or

What are Ceramics ? Explain briefly the different types of ceramics with their properties and applications.

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