

**B.Tech. – VIEP – MECHANICAL ENGINEERING  
(BTMEVI)**

**Term-End Examination**

**December, 2017**

00932

**BIME-005 : MATERIAL SCIENCE**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Attempt any seven questions. All questions carry equal marks. Standard symbols and notations have usual meanings. Use of calculator is permitted.*

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1. Describe the atomic arrangement in an HCP unit cell. Name some common elements which possess this structure. Are these elements ductile ? Justify your answer. 10
  
2. Classify imperfections found in crystals. Discuss each type of imperfection with the help of suitable diagrams. 10
  
3. Make a comparative analysis of dye-penetrant and magnetic particle testing methods. 10

4. Are brittle materials stronger than ductile ones ?  
Justify your answer. Which procedure would you suggest for finding strength of brittle materials ?  
Describe it in brief. 10
5. (a) Enlist all steps, in their proper order, that are followed for preparing samples of microstructural examination. Discuss each step. 7
- (b) Describe the significance of etching. 3
6. (a) Define eutectoid composition of the Fe-C system. Discuss the phase changes that take place when this alloy cools down to room temperature from the above eutectoid temperature. 7
- (b) Briefly discuss Babbitts. 3
7. (a) Discuss the objectives of tempering. How is tempering of steels classified ? How would you temper cutting tools ? Discuss. 7
- (b) What is martensite ? Under which condition is it formed ? Discuss. 3
8. Describe in detail, the furnace which can be used to produce cast iron. 10

9. Write short notes on any *two* of the following :  $2 \times 5 = 10$

- (a) Superconductivity
  - (b) Magnetic Hysteresis
  - (c) Transistors
  - (d) Piezoelectricity
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