

Seat  
No.

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मठ - 017

**Material Science**  
**(1030)**

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt all questions.
5. From each question attempt **any two** sub-question out of a,b,c.
6. Black figures to the right indicate full marks.
7. Assume suitable data if necessary.
8. Use of non - programmable calculator is allowed.

1. a) Draw the crystal structures of the following. 4
  - i) Zinc
  - ii) Copper
  - iii)  $\alpha$ -Iron
  - iv) Magnesium.
- ii) Explain edge dislocation and screw dislocation. 6
- b) i) Show that atomic packing factor for FCC crystal structure is 0.74. 4
  - ii) What is cold working and Hot working ? In which respect the hot working is superior to cold working. 6
- c) i) Explain plastic elastomers and list the applications of the same. 4
  - ii) Differentiate between : 6
    - a) Ceramics and composites
    - b) Metal matrix composites and fiber reinforced composite.
2. a) What is working principle of brinells hardness test ? What are its advantages and limitations. 10
- b) Explain the impact test ? What are the different types of notches ? Differentiate between charpy and Izod impact test. 10

- c) Writes short note on : 10  
i) Magna flux inspection.  
ii) Dye - Penetrant test.
3. a) Draw a typical partial eutectic type equilibrium diagram and explain it briefly. 10  
b) Write short note on : 10  
i) Dispersion hardening.  
ii) Precipitation hardening.
- c) i) Explain the lever rule. 4  
ii) Apply Gibbs phase rule to pure metal and alloy cooling and explain it. 6
4. a) Describe the advantages and important applications of powder metallurgy. What is powder metallurgy ? 10  
b) List various temperature measuring instruments and explain resistance pyrometer in details. 10  
c) What are the various types of thermocouples. Give characteristics of thermocouples. Explain any one type of thermocouples in details. 10
5. a) Write short note on : 10  
i) Mechanism of dry corrosion.  
ii) Galvanic corrosion.
- b) What are the basic methods of corrosion prevention ? Explain cathodic protection with each sketch. 10
- c) State the various non metallic coating which are usually applied on the metal surfaces. Explain them in brief. 10

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