

**Mid Semester Examination**

**MT-213 Material Science and Technology**

Year: S.Y. B. Tech  
Academic Year: 2011-12  
Duration: 3 Hours.

Branch: Production Sandwich  
Date: 23<sup>th</sup> November 2011  
Out of 50 Marks

**Instructions to candidates:**

1. Neat Diagrams must be drawn wherever necessary.
2. Figures to the right indicate full marks.

Write you MIS number here, before you start.

**Question No. 1      Explain why?      10 marks**

- I. Tempering is necessary after hardening Heat Treatment of steels.
- II. Hardness of the **Test piece** used for Jominy End quench Test changes, along its length, after test.
- III. After Nitriding, fast cooling (/quenching) is **not** required, but after carburizing it is **necessary**, to get hard surface.
- IV. High carbon steel cannot be used for manufacturing of sheet metals.
- V. Weldability of High Carbon steel is poor than Low Carbon Steels.

**Question No. 2      Short Notes      10 Marks**

- A**      With respect to given points, write short notes on **Tool Steels**      **4**

(Points – Types, Alloying Elements, Heat treatment, Microstructure and Properties, Applications/ Use)

- B**      Write short notes on any two of the Following,
- i. High Strength Low Alloy Steels.      **3**
  - ii. Composite Materials.      **3**

**Question No. 3      Answer Following      12 Marks**

- C**      Give two typical applications for each of the following      **3**
- (i) Martensitic Stainless Steels    (ii) High Carbon Steel    (iii) Austenitic Stainless Steels.
- D**      Give approximate composition of the following specifications: (Any Three)      **3**
- i) Fe 430 K      ii) 15 Ni<sub>13</sub> Cr<sub>1</sub> Mo<sub>12</sub>
  - iii) T 75 W18 Cr4 V1      iv) AISI 1050

- E
- i) Enlist the Various Steps involved in Powder Metallurgy Technique of Manufacturing. 1
  - ii) Explain Sintering Operation in detail. 2
  - iii) Write any six advantages of PM Technique. 2
- F Enlist any Two Tool materials, those are not made of steels 1

Question No. 4 Differentiate between following with reference to the specified points

**18 Marks**

(Note: Don't Draw Microstructure). (Answer in Tabular format only)

**(i) Gray Cast Iron and White Cast Iron**

- |  |  |                                    |   |
|--|--|------------------------------------|---|
| i) <i>Microstructure,</i>                      | ii) <i>Difference in Hardness (with reason),</i> | iii) <i>Cooling Rate Required,</i> | 5 |
| iv) <i>Damping Capacity &amp; Weldability.</i> | v) <i>Reason for Good wear Resistance.</i>       |                                    |   |

**(ii) Alloy Steels and Plain Carbon Steel**

- |  |                               |                               |   |
|--|-------------------------------|-------------------------------|---|
| i) <i>Hardness at elevated Temperatures,</i> | ii) <i>Hardenability-CCR,</i> | iii) <i>Creep Resistance,</i> | 4 |
| iv) <i>Corrosion Resistance and</i>          | v) <i>Cost</i>                |                               |   |

**(iii) Carburizing and Nitriding Case Hardening Treatments**

- |   |                                  |                                 |   |
|---|----------------------------------|---------------------------------|---|
| i) <i>Temperature range,</i>  | ii) <i>Element that diffuse,</i> | iii) <i>Gas used as Medium,</i> | 4 |
| iv) <i>Composition of Steel used for treatment (with justification)</i> |                                  |                                 |   |

**(iv) Induction Hardening and Case Carburizing**

- |  |  |  |   |
|--|--|--|---|
| i) <i>Heat Source,</i>   | ii) <i>Microstructure at center and Surface.</i> |  | 3 |
| iii) <i>Carbon content of Specimen to be Heat Treated by these methods before treatment.</i> |  |  |   |

**(v) Thermosetting and Thermoplastic resins.**

- |                       |                        |                       |   |
|-----------------------|------------------------|-----------------------|---|
| i) <i>Definition,</i> | ii) <i>Properties,</i> | iii) <i>Examples.</i> | 2 |
|-----------------------|------------------------|-----------------------|---|

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