

**DIPLOMA - VI EP MECHANICAL  
ENGINEERING (DMEVI)**

**Term-End Examination**

**June, 2012**

**BIME-024 : ENGINEERING METALLURGY**

*Time : 2 Hours*

*Maximum Marks : 70*

*Note : Attempt any five questions. Question no. 1 is compulsory question and Four questions are to be attempted out of Question no 2 to 8.*

1. Choose the correct answer of the following questions. 2x7=14
- (a) 18 - 4 - 1 high speed steel contains :
- (i) Vanadium 4%, Chromium 18%, and tungsten 1%
  - (ii) Vanadium 1%, Chromium 4%, and tungsten 18%
  - (iii) Vanadium 18%, Chromium 1% and tungsten 4%
  - (iv) None of the above
- (b) Approximate %age of carbon in grey cast iron is :
- (i) 2.5 to 3.8%
  - (ii) 0.4 to 1%
  - (iii) 0.15 to 0.5
  - (iv) 0%

- (c) The imperfections may be minimized by :
- (i) thermal energy
  - (ii) making metal in fibre form
  - (iii) surface treatment
  - (iv) all of these
- (d) Ideal crystal have :
- (i) No imperfection
  - (ii) Only screw dislocations
  - (iii) Frenkel's defect
  - (iv) None of these
- (e) The allotropic form of  $\delta$  - iron has the crystal structure of the type of :
- (i) HCP
  - (ii) BCC
  - (iii) FCC
  - (iv) SC
- (f) Addition of magnesium to cast iron increases its :
- (i) hardness
  - (ii) corrosion resistance
  - (iii) ductility and strength in tension
  - (iv) creep strength
- (g) In low carbon steel, presence of small quantity of sulphur improves :
- (i) weldability
  - (ii) formability
  - (iii) machinability
  - (iv) Hardenability

2. (a) Describe various types of imperfections (defects and dislocations) in solids. 10  
(b) Comparison of hot working and cold working of metals 4
3. (a) Draw a neat sketch of iron - carbon equilibrium diagram and discuss it. 7  
(b) Classify various types of carbon steel and mention its properties and applications. 7
4. (a) What is wrought iron ? Discuss in brief its chemical composition, properties and applications. 7  
(b) Discuss various types of nickle alloys. 7
5. Discuss various types of case - hardening processes. 14
6. (a) What do you mean by powder metallurgy ? What are the main steps of powder metallurgy process ? 4  
(b) Describe briefly the methods by which powders suitable for powder metallurgy can be produced. Also enumerate the main characteristics of metal powder. 10
7. Name the various Non - Destructive Testing (NDT) methods and explain any one of them. 14

8. Attempt *any four* parts of the following :  $3.5 \times 4 = 14$
- (a) Differentiate between Annealing and Normalising
  - (b) Differentiate between Austenite and Martensite
  - (c) Write short notes on High Speed Steel (HSS).
  - (d) What are the effects of different alloying elements on alloy steels ?
  - (e) Give composition and applications of Grey cast iron and Nodular cast iron.
  - (f) Differentiate between quenching and tempering.
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