

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

Term-End Examination

December, 2013

BIME-024 : ENGINEERING METALLURGY

Time : 2 Hours

Maximum Marks : 70

Note : Attempt any five questions. Question no.1 is compulsory. Question any four questions are to be attempted out of question 2 to 7.

1. Choose the correct answer of the following questions : **7x2=14**
- (a) Which one of the following microconstituents have maximum hardness :
- (i) Austenite (ii) Pearlite
(iii) Cementite (iv) Sorbite
- (b) Purpose of normalizing is :
- (i) To improve strength
(ii) To increase hardness
(iii) To improve toughness
(iv) To improve ductility
- (c) Hardness of martensite in a steel is a function of :
- (i) Carbon content
(ii) Cooling rate
(iii) Nose location
(iv) None of these

- (d) Graphite clusters are obtained in microstructure of which cast iron ?
- (i) Grey cast iron
 - (ii) Nodular cast iron
 - (iii) White cast Iron
 - (iv) Malleable cast Iron.
- (e) Which tool is used for rapid machining of hard metals ?
- (i) Cemented Carbide
 - (ii) High speed steel
 - (iii) Stellites
 - (iv) All the above
- (f) A molten metal is poured into an ingot mould. The type of the grains produced at the walls of the mould are :
- (i) Equiaxed grains
 - (ii) Chilled grains
 - (iii) Columnar grains
 - (iv) None of the above
- (g) To cause slip in perfect lattice, maximum shear stress for a crystal structure is $G/16$. What is the type of crystal structure ?
- (i) Simple cubic
 - (ii) Diamond structure
 - (iii) FCC
 - (iv) HCP
2. (a) Discuss general considerations for selection of materials in manufacturing. 7
- (b) What are metallurgical advantages of hot working process over cold working process ? 7
3. (a) Differentiate between cast iron, wrought iron and mild steel. 7
- (b) What are the requirements of an alloy to be used as a bearing metal ? Explain. 7

4. (a) Draw a neat sketch of TTT diagram and discuss it. 7
(b) Describe briefly the following process of surface Hardening. 7
(i) Nitriding
(ii) Induction Hardening
5. State briefly, the process of making a powder metallurgy product having improved properties and discuss the advantages of powder metallurgy. 14
6. (a) Which NDT method is suitable for testing of welded joints ? Explain. 7
(b) Explain briefly any two refractory metals with composition and properties. 7
7. Write short notes on *any two* of the following : 2x7=14
(a) Solid solution hardening and precipitation hardening.
(b) Creep strength and creep rupture strength
(c) Eutectic reactions
(d) Low-alloy-high strength steels.
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