

3E1412

Roll No. : _____

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B. Tech. (Sem. III) (Main & Back) Examination, January - 2013
Production & Industrial Engg.
3PI2 Material Science & Engg. (Common for ME/AE)

Time : 3 Hours]

[Total Marks : 80

[Min. Passing Marks : 24

*Attempt any five questions. Selecting one question from each unit.
All questions carry equal marks. Schematic diagrams must
be shown wherever necessary. Any data you feel missing
suitably be assumed and stated clearly. Units of quantities
used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL2. NIL**UNIT - I**

- 1 (a) What is meant by Crystal imperfections ? State the effect of their presence in materials. 8
- (b) What do you understand by the term 'Crystal lattice' and how many types of this are found in metals ? 8

OR

- I (a) How are crystal planes identified by means of miller indices ? 6
- (b) Draw the following planes and directions in an FCC structure :
- (i) (010)
 - (ii) (111)
 - (iii) (011)
 - (iv) (001)

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1

10
[Contd...

UNIT - II

- 2 What is slip ? On what crystallographic planes and in what directions it is likely to occur in BCC, FCC and HCP metals ?

16

OR

- 2 (a) Explain the yield point phenomenon in materials in terms of dislocations.

8

- (b) Explain deformation of metals. How does it take place ? State its effect.

8

UNIT - III

- 3 Draw the phase diagram for a binary system showing complete solubility in liquid and solid state.

16

OR

- 3 Describe the process of austenite decomposition of alloyed steels with TTT diagrams.

16

UNIT - IV

- 4 Explain briefly the following heat treatment operations :

- (i) Annealing
- (ii) Normalising
- (iii) Tempering
- (iv) Hardening

4×4=16

OR

- 4 (a) Explain the important processes of heat treatment of steel with illustrative examples.

8

- (b) Discuss the effect of heat treatment on the mechanical properties of steel.

8



UNIT - V

- 5 Why is alloying done ? What are the effect of Si, Mn, Mo, Co and Ti as alloying element on properties of steel.

16

OR

- 5 Write short notes on :
- (a) BIS standards
 - (b) Fiber reinforced plastic composites
 - (c) Classification of steels

5+6+5=16

