3E1412

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B. Tech. (Sem. III) (Main/Back) Examination, January - 2012
Production & Industrial Engg.
3PI2 Material Science & Engg. (Common for ME/AE)

Time : **3** Hours] [Total Marks : **80**
[Min. Passing Marks : **24**

Instructions to Candidates :

*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. Nil 2. Nil

UNIT – I

1 (a) What do you understand by crystallographic ? Notation of atomic planes ? Explain with the help of examples. 8

(b) Determine the density of BCC iron (Atomic mass = 55.847 g/mol). which has a lattice parameter of 0.2866 nm. 8

OR

1 (a) Explain with the neat sketches the various types of crystal imperfections. 10

(b) What is space lattice ? Draw the following plane and direction in the FCC structure (101), (112). 6

UNIT – II

2 (a) Explain the mechanism for dislocation in plastic deformation with neat sketches.

10

(b) What is the change in property that occurs in recovery and recrystallisation ?

6

OR

2 (a) What are the various mechanism of plastic deformation ?

8

(b) Write short note on mechanism of creep.

8

UNIT – III

3 Draw iron carbon equilibrium diagram and level the various phase, fields and temperatures. Discuss in brief different reactions that take place in the system.

16

OR

3 (a) Explain TTt curve. Explain critical cooling rate.

8

(b) What is martensitic transformation ? Explain the characteristic of Martensite transformation.

8

UNIT – IV

4 (a) Explain flame hardening and carburizing.

8

(b) Write short note on Heat treatment furnace.

8

OR

4 (a) Explain Rockwell hardness testing method. Write its advantages and limitations.

8

(b) Explain tempering of steel and its effects.

8

UNIT – V

5 (a) Why is alloying done ? What are the effect of chromium and nickel as alloying element on properties of steel ?

8

(b) What are bearing materials ? What are their composition ? Explain its applications.

8

OR

5 (a) Explain B's standard for classification of low and high alloy steels.

8

(b) What is a composite ? What are the properties of composite materials depend upon ?

8