Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | | |

Odd Semester Examination-2016

B.Tech.(Semester-III)

MATERIAL SCIENCE

[Time : 3 Hours] **[Maximum Marks :100]**

Note : Attempt **All** questions. All questions carry **equal** marks. Assume missing data suitably.

1. Attempt **any four** parts : [5×4=20]

(a) What do you understand by 'Atomic Packing factor'? Obtain its expression for Face centred cube and body centred cube.

(b) What is the importance of Miller indices? How does it help in the study of crystallography?

(c) Discuss different types of point imperfections in brief.

(d) Calculate the atomic radius of iron whose density is 7.86 gm/cm^3 and the atomic weight is 55.85.

(e) What are the main differences between atomic structure and crystal structure?

(f) Calculate the linear atomic density in an aluminium unit cell along direction [110]. The lattice constant is 0.4049 nm.

2. Attempt **any two** parts : [10×2=20]

(a) Draw iron carbon equilibrium diagram and discuss its main features in detail.

(b) (i) Discuss the main differences between brass and bronze.

(ii) Explain the main differences between engineering stress-strain curve and true stress-strain curve.

(c) Write down different non-destructive techniques [NDT] and explain any one of them in detail.

3. Attempt **any two** parts : [10×2=20]

(a) (i) What are the differences between Eutectoid and Eutectic, solidus and liquids?

(ii) Describe the special features of martensitic transformation as compared to other transformations in steel.

(b) Draw a TTT diagram for a 0.6% carbon steel and show by neat sketches the microstructures you would expect for different rates of cooling.

(c) (i) Discuss the various features of quenching and annealing process.

(ii) Discuss the main features of Nickel superalloys and cryogenic steel.

4. Attempt **any two** parts : [10×2=20]

(a) (i) Explain the mechanism of origin of permanent magnetic dipole.

(ii) Describe all possible applications of magnetic materials.

(b) Explain composites and their classification. How they are different from metals and plastics ?

(c) (i) Write short note on smart materials.

(ii) Explain Messier effect in detail.

5. Write short notes on **any four** : [5×4=20]

(a) Creep

(b) Hardness

(c) Ferro Hysteresis

(d) Nano-materials

(e) Unit cell

(f) Corrosion and its control

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