

# CBCS Scheme

USN

15NT42

## Fourth Semester B.E. Degree Examination, June/July 2017 Material Science and Engineering

Time: 3 hrs.

Max. Marks: 80

**Note:** Answer FIVE full questions, choosing one full question from each module.

### Module-1

- 1 a. Discuss the classification of materials based on functionality. (08 Marks)  
b. Explain different types of Atomic bonding, with examples. (08 Marks)

OR

- 2 a. Describe the electronic structure of the atom. (08 Marks)  
b. Explain the following : (08 Marks)  
i) Lattice ii) Unit cells iii) Basis iv) Crystal structure.

### Module-2

- 3 a. Discuss the influence of high density planes on crystal behaviour. (08 Marks)  
b. Explain the following : i) Crystallographic point groups ii) Space groups. (08 Marks)

OR

- 4 a. Explain Bravais Lattices in two and three dimensional spaces. (10 Marks)  
b. What is Wigner - Seitz cell? Explain its construction. (06 Marks)

### Module-3

- 5 a. Explain Effusion and Graham's law. (06 Marks)  
b. What is Photon diffusion? Explain different kinds of passive transport. (10 Marks)

OR

- 6 a. Describe the mechanism of diffusion in solids. (06 Marks)  
b. Derive an expression for unsteady state diffusion. (06 Marks)  
c. Discuss applications of Diffusion. (04 Marks)

### Module-4

- 7 a. Discuss the possible Mesophases in Lyotropic liquid crystals. (08 Marks)  
b. Describe Liquid Crystalline Behaviour in any two homologous series. (08 Marks)

OR

- 8 a. Explain how Liquid Crystals are identified. (06 Marks)  
b. Discuss the role of Chiral Liquid Crystals in thermography. (10 Marks)

### Module-5

- 9 a. What are Ceramics? Discuss types of ceramics. (06 Marks)  
b. Discuss Electrical properties of Ceramics. (04 Marks)  
c. Explain Electro - rheological fluids with applications and limitations. (06 Marks)

OR

- 10 a. Mention applications of Ceramics. (04 Marks)  
b. Explain Piezoelectric materials mechanisms. (08 Marks)  
c. What are Shape memory Alloys? Explain. (04 Marks)

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