CBCS Scheme

USN | | | | | | | | | | |

15NT42

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
Material Science and Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain binding energy and inter atomic spacing with necessary diagrams. **(12 Marks)**
b. Define lattice parameter, unit cells, coordination number and packing factor. **(04 Marks)**

OR

2 a. Discuss different types of atomic bonding with examples for each. **(10 Marks)**
b. Define amorphous materials. Write principle and technological applications. **(06 Marks)**

Module-2

3 a. Explain 7 crystal systems with neat sketches and parameters. **(07 Marks)**
b. Distinguish between crystalline and amorphous solids. **(04 Marks)**
c. Discuss Wigner – Seitz cell and construction. **(05 Marks)**

OR

4 a. Explain the following :
i) Crystallographic point groups ii) Symmetry operations iii) Space groups **(12 Marks)**
b. Write a note on Miller indices. **(04 Marks)**

Module-3

5 a. Describe the following
i) Atomic diffusion ii) Eddy diffusion iii) Effusion and Graham's law **(10 Marks)**
b. Describe the mechanisms of diffusion in solids. **(06 Marks)**

OR

6 a. Explain photon diffusion and four main kinds of passive transport. **(10 Marks)**
b. Describe the factors affecting diffusion. **(06 Marks)**

Module-4

7 Explain in detail molecular ordering in Nematic and smectic liquid crystals. **(16 Marks)**

OR

8 a. Discuss thermotropic liquid crystals and lyotropic liquid crystals. **(06 Marks)**
b. Discuss types of liquid crystal displays and their applications. **(06 Marks)**
c. What are the applications of chiral liquid crystals in thermography. **(04 Marks)**

Module-5

9 a. Discuss the mechanical, electrical and optical properties of ceramics. **(12 Marks)**
b. Discuss bonding and general characteristics of ceramics. **(04 Marks)**

OR

10 a. Explain in brief shape memory alloys and applications. **(10 Marks)**
b. Explain electro-rheological fluids, ER effect, applications and limitations. **(06 Marks)**

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