

CBCS SCHEME

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15NT42

Fourth Semester B.E. Degree Examination, June/July 2018 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 diagram. (12 Marks)
b. Define with a neat sketch, Amorphous materials. Write principles and technological applications. (04 Marks)

OR

- 2 a. Describe neatly about the electronic structure of an atom with example. (10 Marks)
b. Discuss about the Material Design and selection and also the structure of materials. (06 Marks)

Module-2

- 3 a. Briefly explain the 7 types of crystals systems with neat sketches and their parameters. (10 Marks)
b. Explain Diamond crystal structure and determine the packing factor for diamond-cubic-silicon. (06 Marks)

OR

- 4 a. Explain the following :
(i) Crystallographic point groups (ii) Space groups. (08 Marks)
b. Give a brief introduction to unit cell and miller indices in a crystal. (08 Marks)

Module-3

- 5 a. Explain photon diffusion and four main kinds of passive transport. (10 Marks)
b. Explain the mechanism for diffusion in solids. (06 Marks)

OR

- 6 a. Describe about the factors affecting diffusion and mention the applications of diffusion. (08 Marks)
b. Briefly explain the diffusion phenomenon and material processing. (08 Marks)

Module-4

- 7 a. Briefly explain the classification of liquid crystals. (06 Marks)
b. Discuss about liquid crystalline behavior in homologous series. (10 Marks)

OR

- 8 a. Discuss about possible mesophases in Lyotropic liquid crystals. (08 Marks)
b. Write briefly about molecular ordering in
(i) Cholesteric liquid crystals
(ii) Columnar liquid crystals (08 Marks)

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Module-5

- 9 a. Describe the types and application of ceramics. (10 Marks)
b. Explain about electro-rheological (ER) fluids, ER effects, applications and limitations. (06 Marks)

OR

- 10 a. Write briefly about piezoelectric materials mechanism and applications. (10 Marks)
b. Explain in brief about Shape memory alloys and applications. (06 Marks)

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