

B Met Engg. Examination 2017

(4th Year 2nd Semester old)

MATERIAL ENGINEERING

Time : Three hours

Full Marks : 100

Use a separate Answer-Script for each part

PART - I (70 Marks)

Answer Question 1 and any three questions from the rest

1. Discuss briefly the concept of bond formation. Using this concept explain the thermal expansion of solids. 6+4

2. a) Using the concept of LCAO, find the solution for the n-atom molecule. 10
b) Using the simplifying assumptions of Huckel, discuss the bond formation in H₂ molecule. 10

3. a) Define polarization. Show that polarization is numerically equal to bound charge density. 2-6
b) Find an expression for the Lorentz internal field for dielectric. 12

4. a) Discuss the mechanisms of polarizations. 8
b) Find an expression for Debye equations for dipolar polarization in alternating field. 12

5. Write short notes (any four) 4*5
 - a) Oxide magnets
 - b) Molar polarization
 - c) Chemistry of polymerization
 - d) Molecular weight of polymer
 - e) HOMO-LUMO gap
 - f) Synthesis of Si₃N₄

[Turn over

PART - II (30 Marks)

Answer any two questions from the following. (Answer all parts of a question sequentially in a common place)

1. Discuss the effects of alloying on the following properties of Cu.

a) electrical conductivity b) machinability c) formability d) corrosion resistance e) mechanical strength. 15

2. Give reasons for the following. (Any three)

a) Multiple tempering is required for tool steels.

b) Sb is used for Al-Si alloys.

c) Use of silver in MCBs.

d) FCC metals and alloys are used for cryogenic applications. 15

3. Write technical notes on the following. (Any three)

a) Materials used for heating element.

b) Materials used for aerospace applications.