Registration no: | | | | | | | | | | |

Total Number of Pages: 01 **B.Tech.**
BSMS1213

3rd Semester Back Examination 2017-18
MATERIAL SCIENCE AND ENGINEERING
BRANCH(S): ECE, EEE, EIE, ELECTRICAL, ETC, IEE
Time: 3 Hours
Max Marks: 70
Q.CODE: B725

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Distinguish between soft and hard superconductor.
b) Define pyroelectric materials?
c) Why the refractive index of core is more than the cladding in an optical fibre?
d) Define degree of polymerization.
e) What happens to the volume of a magnetic domain, where electric field is applied along the direction of alignment of magnetic dipoles?
f) Why ceramics are usually brittle in nature?
g) Mention two important features of quantum free electron theory.
h) What is corrosion?
i) A steel wire of original diameter 12.8 mm is subjected to a tensile load up to fracture. Its diameter at fracture is 10.7 mm. Find ductility of steel wire.
j) What is the difference between dielectric strength and breakdown voltage?

Q2 **a)** What is hardness? How is hardness of a material measured? **(6)**
b) Write the difference between Creep and Fatigue. **(4)**

Q3 **a)** What are the postulates of Drude – Lorentz theory of metals? **(5)**
b) Prove that all the energy levels of a material below the Fermi level at 0 K are filled up by electrons. **(5)**

Q4 **a)** Explain about the BCS theory of superconductivity. **(6)**
b) The magnetic susceptibility of a metal at room temperature is 0.82×10^{-8}. Calculate its magnetization under the action of magnetic induction of 0.25 T. **(4)**

Q5 **a)** What is Laser? Explain the principles of operation of He-Ne Laser. **(6)**
b) Distinguish between spontaneous emission, induced absorption and induced emission. **(4)**

Q6 **a)** Explain with the block diagram about FOCL. **(7)**
b) The dielectric constant of quartz is 1.55. Calculate the refractive index of the material. **(3)**

Q7 **a)** Write the various polymerization mechanisms with examples. What is the minimum functionality required for a monomer to form a cross linked polymer. **(6)**
b) The number average molecular mass of a polymerized sample is 6000.Calculate the degree of polymerization, if the molecular mass of the monomer sample is 30. **(4)**

Q8 **a)** Discuss briefly the different types of fibre -reinforced composites. **(5)**
b) What are ceramics? Discuss the mechanical properties of ceramics. **(5)**