SATHYABAMA UNIVERSITY
(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E / B.Tech - (Common to ALL Branches)
Title of the paper: Applied Physics - II
Semester: II   Max. Marks: 80
Sub.Code: ET203A/ 3ET203A/ 4ET203A/ 5ET203A   Time: 3 Hours
Date: 09-05-2007   Session: FN

PART – A   (10 x 2 = 20)
Answer ALL the Questions
1.   What are the merits of classical free electron theory?
2.   What are the properties of superconductors?
3.   Explain p-type and n-type semiconductor?
4.   Which type of semiconductor is used for LED?
5.   Differentiate soft and hard magnets?
6.   Mention some important applications of ferrites?
7.   Which type of pumping is used in ruby laser?
8.   What is the principle behind light propagation through optical fibre?
9.   Copper crystallizes into FCC structure. Its atomic radius is 1.278 x 10^{-10}m. Calculate the interplanar spacing for (212) planes in copper crystal.
10. Define dielectric loss?

PART – B   (5 x 12 = 60)
Answer All the Questions
11. (a) Obtain the expression for the electrical conductivity of a metal on the basis of classical free electron theory?   (8)
     (b) The thermal conductivity of a metal at 300k is 123.92 W/m/K. Find the electrical conductivity and Lorentz number when the metal possess the relaxation time of 10^{-14} seconds of at 300 k. Density of electron is 6×10^{28}/m^3.   (4)

(or)

12. (a) Describe BCS theory? (6)
    (b) Explain AC and DC Josephson effect. (6)

13. Analyse qualitatively the band theory of solids and how to differentiate conductors, semiconductors and insulators based on band theory. (12)

(or)

14. (a) Find the carrier concentration in n type semiconductor? (8)
    (b) What are the applications of semiconductor? (4)

15. (a) Explain in details about the classification of magnetic materials. (8)
    (b) The magnetic material is subjected to a magnetic field of strength 500A/m. If the magnetic susceptibility of the material is 1.2, calculate the magnetic flux density inside the material.$\mu= 4\pi \times 10^{-7}$ H/m. (4)

(or)

16. (a) Briefly discuss the domain theory of ferromagnetism.
    (b) Explain the applications of magnetic materials

17. Explain the principle, construction and working of CO_2 Laser.

(or)

18. Explain Attenuation, distortion and dispersion of light waves in optical fibre.

19. Find the atomic packing factor for FCC, BCC and HCP structures.

(or)

20. (a) Derive an expression for the internal field in a dielectric solids. (8)
    (b) The dielectric constant of a helium gas at NTP is 1.0000694. Calculate the electronic polarizability of He atoms if the gas contains 2.7 x 10^{25} atoms/m^3. (4)