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Total number of printed pages – 2

B. Tech  
BSCP 1206

**Third Semester Back Examination – 2014**

**PHYSICS – II**

**BRANCH(S) : BIOTECH, MM, MME**

**QUESTION CODE : L 311**

**Full Marks – 70**

**Time : 3 Hours**

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



1. Answer the following questions : 2×10
  - (a) What is Meissner effect ?
  - (b) What is Fermi energy ? Give its importance.
  - (c) The magnetic flux density in a cyclotron is 1.5 T. This field is used to accelerate protons. Find the cyclotron frequency.
  - (d) Define the term reciprocal lattice.
  - (e) Mention the merits of semiconductor laser.
  - (f) What are nano particles ?
  - (g) What are color centers ?
  - (h) Mention any four applications of radio isotopes.
  - (i) Which type of emission takes place in case of LED ?
  - (j) What is the role of non-uniform and time varying magnetic field in betatron ?
2.
  - (a) With a neat diagram write down the principle and working of a Cockcroft Walton accelerator. 5
  - (b) What are the advantages and disadvantages of drift tube linear accelerators ? Write an expression for the length of the nth tube in terms of the length of its first tube. 5

P.T.O.

3. (a) Derive Bragg's law . 5  
(b) A crystal plane cuts the crystallographic axes at 2,3, 5 units respectively. Find its Miller indices. 5
4. (a) Write a short note on carbon nano tube (CNT). Give some applications of both SWNT and MWNT. 5  
(b) What do you mean by compound semiconductor ? Give few examples. 5
5. (a) What is Cooper pair and how is it formed ? 5  
(b) What do you mean by hard and soft superconductors ? 5
6. (a) Explain why population inversion is a necessary condition for causing stimulated emission . 5  
(b) Describe the basic construction of an LED. 5
7. (a) Mention with proper diagram, the position of Fermi level in intrinsic and extrinsic (both donor and acceptor) semiconductors. 4  
(b) Explain the working mechanism of a He- Ne Laser. What are the limitation of a He- Ne Laser. 4  
(c) Calculate the transition temperature and critical fields at 0K, for a certain specimen, the critical fields are  $2.8 \times 10^5$  A/m,  $5.4 \times 10^5$  A/m for 14K and 13 K respectively. 2
8. Write short notes on any **two** of the following : 5×2  
(a) Step - index fiber and graded - index fiber  
(b) Type – I and Type – II superconductors  
(c) FOCL  
(d) Quantum dots.

