

3rd Semester B.Tech Examination, Nov. 2004

PHYSICS II

Full Marks : 70

Time : 3 hours

Answer six questions including Q. No. 1

The distribution of marks has been indicated in the right-hand margin

- I. Answer the following : 2 × 10
- (a) What is the function of a cyclotron ?
 - (b) Why visible light is unsuitable for diffraction by crystalline solids ?
 - (c) Define forbidden gap.
 - (d) Between insulators and semiconductors, which has greater forbidden gap ?
 - (e) What is the full form of LASER ?
 - (f) What is meant by coherence length ?
 - (g) Name the three components of an optical fibre.

(Turn Over)

- (h) What is meant by compound semiconductor? 6
- (i) What is the difference between a semiconductor and a good conductor? 4
- (j) Write about one application of fibre optics. 4
2. (a) Explain the action of a Cockcroft-Walton generator with the help of a circuit diagram. 6
- (b) Describe the construction of a linear accelerator. 4
3. (a) Give the principle and working of a Betatron. 6
- (b) Write four applications of radio isotopes. 4
4. (a) Explain the assignment of Miller indices for a plane. 5
- (b) Derive Bragg's law. 5
5. (a) What is meant by reciprocal lattice? 5
- (b) In a cubic structure, calculate the spacing between (111) planes when the lattice parameter is 1.732 \AA . 3
- (c) If the intercepts are $3a$, $4b$ and $3c$, find the Miller indices of that plane. 2

6. (a) Distinguish between Conductor, Semiconductor and Insulator on the basis of band theory. 5
- (b) Give an idea about Kronig-Penney model. 5
7. (a) Give a few properties of superconductors. 4
- (b) What is Meissner effect? 3
- (c) Write a few applications of superconductors. 3
8. (a) Describe the construction and working of Gas Laser. 6
- (b) What are the basic characteristics of optical fibres? 4