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Code No: PH1501

GEC-R14

I B. Tech II Semester Supplementary Examinations, December 2017

## ENGINEERING PHYSICS

( Common to Electronics and Communication Engineering, Computer Science and Engineering and Information Technology)

Time: 3 Hours

Max. Marks: 60

**Note:** All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **PART-B**. All Questions carry equal Marks.

### PART-A

6 × 2 = 12M

1. Define Resolving power.
2. What are the conditions under which total internal reflection takes place?
3. Define unit cell. How many effective numbers of atoms a unit cell of FCC lattice contain?
4. What is the reason for persistent current in superconductors?
5. Write any two differences between direct and indirect band gap semiconductor?
6. An electron is bound in one - dimensional infinite well of width  $1 \times 10^{-10}$  m. Find the energy value in the ground state.

### PART-B

4 × 12 = 48M

1. a) Derive an expression for maxima and minima intensity due to interference of reflected light from surface of a thin film. (8M)  
b) The refractive indices of mica for ordinary and extraordinary rays are 1.586 and 1.592 with a wavelength of  $5460 \text{ \AA}$ . Find the thickness of mica sheet to act as a quarter wave plate. (4M)
2. a) Derive the relation between the probabilities of spontaneous and stimulated emissions in terms of Einstein's coefficients. (6M)  
b) Derive an expression for Numerical aperture of an optical fibre. (6M)
3. a) Describe the seven crystal systems with neat diagrams. (6M)  
b) What are Miller indices? How are they determined? (6M)
4. a) Define Meissner effect. Classify Type -I and Type -II superconductors on the basis of Meissner effect. (8M)  
b) The dielectric constant of He gas at NTP is 1.0000684. Calculate the electronic polarizability of He atoms if the gas contain  $2.7 \times 10^{25}$  atoms per  $\text{m}^3$ . (4M)

5. a) What do you understand by drift and diffusion currents in case of semiconductors? Deduce Einstein's relations related to these currents. (8M)
- b) State and explain Hall effect. (4M)
6. a) Show that the energies of a particle in a potential box are quantized. (6M)
- b) What are the drawbacks of classical free electron theory? Write assumptions of quantum free electron theory. (6M)

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