Code No:18PH1102

**Geethanjali College of Engineering and Technology (Autonomous), Hyderabad**
**B.Tech I Year I Semester Examinations, Dec. 2018**

# Course: APPLIED PHYSICS
### Branch: CSE /ECE/EEE
# Model Paper

Time: 3 hours
Max. Marks: 70

### Part–A (10 x 2 = 20)

1) Why a particle in one dimensional box not allowed taking zero point energy?

2) Explain characteristics of wave function.

3) Define the effective mass of an electron.

4) What is a Brillouin zone

5) Distinguish between direct and indirect band gap semiconductors.

6) Differentiate p-type and n-type semiconductors

7) How laser beam is different from ordinary light?

8) What is the significance of numerical aperture in an optical fiber?

9) List any four applications of piezoelectric materials?

10) Differentiate soft and hard magnetic materials?

### PART B (10 x 5=50)

1 a  i)  What are the matter waves? Describe the experiment that supports the existence of matter waves   6M

   ii)  Light of wavelength 2000 $A^0$ falls on an aluminum surface with work function 4.2 eV. Calculate threshold wavelength and stopping potential   4 M

**OR**

b  i)  How Bohr's condition of stationary orbits of an atom can be obtained from the concept of matter wave   5M

   ii)  What is the Physical significance of wave function?   5M

2 a  Explain the Kronig-Penny model of solids and show that it leads to energy band structure of solids   10 M

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<div align="center">OR</div>

b  i)  What are the Brillouin zones in solids explain with help of E-k curve    **6M**

    ii)  Explain how solids are classified on the basis of energy band gap    **4M**

3 a    What is Fermi level and Fermi energy? How does Fermi level vary with temperatur    **10 M**

<div align="center">OR</div>

b  (i)  What is Hall Effect? Obtain an expression for Hall co-efficient of an extrinsic semiconductor. Give two of its applications    **8 M**

    (ii)  A n-type germanium sample has a donor density of $10^{21}/m^3$. It is arranged in a Hall experiment having magnetic field of 0.5 Tesla and current density of 500 $A/m^2$. Find the Hall voltage if the sample is 3 mm wide    **2 M**

4 a  i)  Explain spontaneous and stimulated emission of radiation    **3 M**

    ii)  Why the active media should have preferably broad absorption band?    **3 M**

    iii)  Describe the construction and working of Nd:YAG laser    **4 M**

<div align="center">OR</div>

b  i)  Explain the phenomenon of total internal reflection of light. How is it used in fiber optic communications?    **4 M**

    ii)  Derive an expression for acceptance angle and numerical aperture for an optical fiber.    **6 M**

5 a  i)  Distinguish between electronic, ionic and orientation polarization and discuss the effect of temperature on each of them.    **6 M**

    ii)  Discuss the two applications each of piezoelectric and ferroelectric materials    **4 M**

<div align="center">OR</div>

b  i)  How do you distinguish between diamagnetic, paramagnetic and ferromagnetic materials    **6 M**

    ii)  Explain ferromagnetic hysteresis on the basis of domains    **4 M**