Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec - 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14PH2019** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CONDENSED MATTER PHYSICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Define Fermi energy. | CO1 | 2 |
| b. | Illustrate the first and second Brillouin zones for a two dimensional square lattice. | CO1 | 4 |
| c. | Discuss the problem of an electron moving in a periodic potential. Explain the occurrence of energy gap in a semiconductor. | CO1 | 14 |
| (OR) | | | | |
| 2. | a. | State Weidmann Franz law. | CO1 | 2 |
| b. | Explain Fermi Dirac distribution function. Plot this function for various temperatures including 0 K. | CO1 | 6 |
|  | c. | Discuss the process of thermal conduction in insulators. Do electrons contribute to the thermal conduction in insulating solids? | CO1 | 12 |
| 3. | a. | Define polarizability. | CO2 | 2 |
|  | b. | List the dielectric break down mechanisms. | CO2 | 3 |
|  | c. | Discuss the effect of temperature and frequency of applied electric field on dielectric constant. | CO2 | 15 |
| (OR) | | | | |
| 4. | a. | Define electric susceptibility. | CO2 | 2 |
|  | b. | Write short notes on ferroelectric materials. | CO2 | 3 |
|  | c. | Explain in detail, the different types of polarization mechanisms in dielectrics. | CO2 | 15 |
| 5. | a. | Extend the effect of temperature in magnetic materials. | CO2 | 2 |
|  | b. | Write short notes on antiferromagnetism. | CO2 | 3 |
|  | c. | Discuss in detail, the Langevin’s theory of paramagnetism. | CO2 | 15 |
| (OR) | | | | |
| 6. | a. | Define Neel temperature. | CO2 | 2 |
|  | b. | Explain the concept of domains in magnetic materials. | CO2 | 3 |
|  | c. | Discuss in detail the properties of para, ferro and antiferro magnetic materials | CO2 | 15 |
| 7. | a. | Differentiate stoichiometric and non-stoichiometric crystal defects. | CO2 | 2 |
|  | b. | Write short notes on electroluminescence. | CO2 | 3 |
|  | c. | Discuss in detail, the different types of point defects in crystals. | CO2 | 15 |
| (OR) | | | | |
| 8. | a. | Differentiate Schottky and Frenkel defect. | CO2 | 2 |
|  | b. | Write short notes on cathodoluminescence. | CO2 | 3 |
|  | c. | Explain the mechanism of luminescence. Discuss the different types of luminescence. | CO2 | 15 |
|  | **Compulsory :** | |  |  |
| 9 | a. | Define Meissner effect in super conductors. | CO3 | 2 |
|  | b. | Discuss the effect of magnetic field on superconductors. Mention the applications of superconductors. | CO3 | 8 |
|  | c. | Explain in detail BCS theory of superconductivity. | CO3 | 10 |

ALL THE BEST