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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Mention the drawbacks of Somerfield’s free electron theory of metals. | 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. | Write short notes on Umklapp process. | CO1 | 2 |
| b. | Write short notes on phonon-phonon interaction. | CO1 | 4 |
|  | c. | Describe the motion of an electron in a periodic potential and show from (E-K) graph, that materials can be classified into conductors, insulators and semiconductors. | CO1 | 14 |
| 3. | a. | Define dielectric constant. | CO2 | 2 |
|  | b. | Explain the effect of the frequency of applied electric field on dielectric constant. | CO2 | 3 |
|  | c. | Summarize the different types of polarization mechanisms in dielectrics. | CO2 | 15 |
| (OR) | | | | |
| 4. | a. | Define electric susceptibility. | CO2 | 2 |
|  | b. | Write short notes on ferroelectric materials. | CO2 | 3 |
|  | c. | Derive an expression for Lorentz internal field in dielectric and hence deduce Clausius-Mossotti relation. | CO2 | 15 |
| 5. | a. | Define Curie temperature. | CO2 | 2 |
|  | b. | Relate antiferromagnetism and ferrimagnetism. | CO2 | 3 |
|  | c. | Discuss in detail, the Langvenin’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. | Classify 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. | Express 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. | Define colour centers. Explain in detail about F-centers and V-centers. | CO2 | 15 |
|  | | **Compulsory :** |  |  |
| 9 | a. | Distinguish Type I and Type II superconductors. Give examples. | CO3 | 10 |
|  | b. | Explain in detail BCS theory of superconductivity. | CO3 | 10 |

ALL THE BEST