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 – Nov/Dec – 2017**

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| **Code :** | **15PH3014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SOLID STATE 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. | Write a short note on infrared absorption in solids. | CO1 | 4 |
| b. | Briefly explain classical free electron theory. Explain nearly free electron theory in detail with its energy curve diagram. | CO1 | 16 |
| (OR) | | | | |
| 2. |  | Explain the behavior of electron in a periodic crystal field and derive the equation based on Kronig-Penney model. | CO1 | 20 |
|  |  |  |  |
| 3. | a. | What are Brillouin Zone? Explain in brief. | CO1 | 4 |
|  | b. | Explain band theory of solids in detail with necessary diagram. | CO1 | 16 |
| (OR) | | | | |
| 4. |  | Derive the Bloch theorem based on band theory of solids. | CO1 | 20 |
|  |  |  |  |  |
| 5. | a. | Explain ferroelectricity and ferromagnetic domains in detail. | CO1 | 8 |
|  | b. | Find the expression relating the macroscopic dielectric constant with microscopic polarizabilities by driving the Classius-Mosotti relation. | CO1 | 12 |
| (OR) | | | | |
| 6. | a. | Explain anti-ferromagnetism and Neel temperature in detail. | CO1 | 8 |
|  | b. | Derive the equation for the temperature dependence of dielectric constant in a ferroelectric crystal with necessary graph. | CO1 | 12 |
|  |  |  |  |  |
| 7. | a. | Explain photo conductivity in detail. Briefly describe trap capture and recombination centres in photo conductivity. | CO1 | 10 |
|  | b. | Explain Electro-luminescence in detail with an example and adequate graph. | CO1 | 10 |
| (OR) | | | | |
| 8. |  | Explain the microscopic origin of superconductors based on BCS theory of superconductivity in detail with adequate diagram. | CO1 | 20 |
|  |  |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. | a. | Briefly explain London equations in superconductors. | CO1 | 6 |
|  | b. | Explain Meissner effect in detail. Explain different types of superconductors in details and discuss its applications. | CO1 | 14 |

ALL THE BEST