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**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**

Ph.D. (First Semester-Winter) Examinations, June - 2025

**23WPPEPH1011–Advanced Experimental Techniques for Materials
(Physics)**



Time: 3 hrs

Maximum: 70 Marks

The figures in the right hand margin indicate marks.

Answer ANY FIVE Questions.

(14 x 5 = 70 Marks) Marks

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| 1.a. Explain hooping mechanism in composite materials. | 8 |
| b. Discuss energy distribution in solids. | 6 |
| 2. What are grain boundaries? Discuss with necessary figures. How they affect electrical conductivity of the material? | 14 |
| 3.a. What are Piezoelectricity, Ferro electricity, and Pyro-electricity?
Give examples and their applications | 8 |
| b. Mention different types of bonding in solids. | 6 |
| 4. Explain different types of polarization mechanism with required figures and examples. | 14 |
| 5.a. Discuss different type of emission spectroscopy. | 7 |
| b. Write short notes on dielectric strength and insulation breakdown. | 7 |
| 6.a. Define Infrared Spectroscopy with diagram. | 7 |
| b. Compare between Phosphorescence and Luminescence with examples. | 7 |
| 7. Define XRD? Discuss Rietveld analysis for powder diffraction and Particle size determination using Scherrer formula. | 14 |
| 8.a. What is the principle of SEM? Discuss its working and application | 7 |
| b. What is AFM? Discuss its working and application | 7 |

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