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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **Ph.D. Course Work End Term Examinations –JAN-FEB 2025** |
| **Date:** 30 – 01- 2025 **Time:**09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** Ph.D. | |
| **Course Code** : PHY 805 | **Course Name :** Material Characterization Techniques | |
| **Semester**: | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **10** | **20** | **20** | **30** | **20** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 10 marks. 6Q x 10M=60Marks** | | | | |
| **1** | Explain the concepts of red and blue shifts in UV spectroscopy. What is meant by transition probability, and how does it relate to the intensity of the absorption bands in UV spectra? | **10 Marks** | **L2** | **CO1** |
| **2** | Explain the different modes of stretching and bending vibrations in infrared spectroscopy. | **10 Marks** | **L3** | **CO2** |
| **3** | Explain the principle and working of IR spectroscopy? | **10 Marks** | **L2** | **CO2** |
| **4** | Discuss in detail types of crystal systems and Bravais lattices. | **10 Marks** | **L2** | **CO4** |
| **5** | Describe the factors that affect group frequencies in IR spectroscopy. How do conjugation, inductive effects, resonance, and steric effects influence the position of absorption bands? | **10 Marks** | **L3** | **CO4** |
| **6** | Explain the principle of X-ray diffractometer. Discuss the applications of XRD. | **10 Marks** | **L2** | **CO4** |

**Part B**

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| **Answer the Questions. Each question carries 20 marks 2Q x 20 = 40 Marks** | | | | | |
| **7.** |  | Describe the principle, construction and working of Transmission Electron Microscopy (TEM). Discuss its role in material characterization. | **20 Marks** | **L3** | **CO3** |
|  | | | | | |
| **8.** |  | Describe the principle, construction and working of X-ray photoelectron spectroscopy (XPS). Discuss its role in material characterization. | **20 Marks** | **L3** | **CO5** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***