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**B. Tech. Engineering Physics 4th Year, 7th Semester
End-Semester Exam; November 2023**

Subject: Materials Synthesis and Characterization

Subject Code: PH-411

Max Marks = 50

Time = 3.00 hrs.

Attempt all the questions

Q. No.	Question statement	Marks
1.	Sketch unit cells of (i) FCC Aluminium, (ii) BCC Iron, (iii) Carbon in diamond form, (iv) NaCl solid and (v) Piezoelectric barium titanate.	5
2.	Using X-ray diffraction technique explain how to differentiate between a non-crystalline, poly-crystalline and single structure of a solid.	5
3.	Show (112) plane and [112] direction and (221) plane and [221] directions in cubic unit cells.	5
4.	Explain working principle of one technique (STM or AFM) for probing surface structure of a material.	5
5.	Explain different working modes of transmission electron microscope. Explain what information about the solid one can obtain in these modes of operation.	5
6.	Differentiate between the UV-Visible and FTIR spectroscopy techniques.	5
7.	What are various types of electron diffraction patterns one can obtain in electron microscope. What information about the structure of solid can be obtained from these diffraction patterns.	5
8.	Explain one technique for preparing thin films of metals by evaporation.	5
9.	Discuss one method of fabrication of multilayers of materials.	5
10.	Explain working principle of X-Ray photoelectron spectroscopy (or Auger electron spectroscopy). What information one can obtain from these techniques.	5

*** Good Luck ***.