Ref. No.: Ex/Met/PC/H/T/425/2024

B.E. METALLURGICAL ENGINEERING

FOURTH YEAR SECOND SEMESTER EXAM 2024

SUBJECT: ADVANCED CHARACTERISATION TECHNIQUES (HONS.)

Time: 3 hours **Full Marks: 100**

Answer any four (4) questions.

1	Differentiate: Atomic absorption spectroscopy, ultra violet visible spectroscopy and infrared spectroscopy. What is the requirement of temperature in spectroscopy?	18+7
2	Can spectroscopy be used for imaging? What is the effect of the atomic number of the elements in spectroscopy? By what means is it possible to determine the chemical composition of steel?	8+8+9
3	Derive Weiss zone law. What is the use of Weiss zone law? Draw [100] standard stereographic projection of a cubic crystal.	8+5+12
4	What is diffraction contrast? What is the unit used in selected area diffraction pattern in transmission electron microscope? What is reciprocal lattice vector? What is the use of reciprocal lattice vector in characterization of selected area diffraction pattern in transmission electron microscopy?	6+2+7+10
5	Between transmission electron microscope and scanning electron microscope, which is having higher resolution? Why? What are the use of x ray and diffraction in scanning electron microscopy? What is the application of electron channeling contrast imaging?	2+6+12+5
6	What are the uses of electron microscopy in determining the mechanisms of chemical reaction and the efficiency of the chemical reactions? What are the applications of focused ion beam scanning electron microscopy?	18+7