

**M.Sc. II Semester Degree Examination, October - 2023****INDUSTRIAL CHEMISTRY****Instrumental Methods of Analysis (Analytical Chemistry-II)****(NEP)**

Time : 3 Hours

Maximum Marks : 70

Instructions :

- (i) Answer **any five** questions including Q.No. 1.
(ii) Q.No. 1 is **Compulsory**.

1. (a) With a neat schematic, explain the principle and working of HPLC. **5+5+4=14**
(b) Discuss the applications of ion exchange chromatography in the preparative and recovery process with suitable examples for each.
(c) Illustrate the principle and applications of gas chromatography in the separation of organic volatile compounds.
2. (a) Describe the various chemical interferences observed in AAS and also explain how they can be overcome? **5+5+4=14**
(b) What is a plasma? Briefly explain the different excitation sources employed in ICP with their advantages.
(c) Enumerate the methodology involved in flame emission spectroscopy.
3. (a) Explain the principle and applications of pulse polarography. **5+5+4=14**
(b) Sketch and explain the different types of amperometric titrations.
(c) Draw the cyclic voltammogram for $K_3[Fe(CN)_6]$ and explain its characteristics.
4. (a) Discuss the principle of electrophoresis and classify the electrophoretic techniques. **5+5+4=14**
(b) Briefly explain the mechanism and methodology involved in the field flow fractionation technique.
(c) What are supercritical fluids? Give examples and list their properties.
5. (a) With a neat schematic, explain the principle and working Debye Scherrer method. **5+5+4=14**
(b) Illustrate the applications of photoelectron spectroscopy in the determination of oxidation state and chemical structure with suitable examples.
(c) Explain the working and applications of SEM.



6. (a) With suitable chemical reactions, explain the mechanism of separation and procedure for the preparation of cation exchange resins. **5+5+4=14**
- (b) Discuss the different types of burners employed in flame photometry.
- (c) Give the principle of conductometry. Sketch the conductometric titration curves for :
- (i) strong acid vs strong base and (ii) strong acid vs weak base.
7. (a) What is osmotic pressure ? Discuss the principle and applications of electro-osmosis. **5+5+4=14**
- (b) Describe the principle and applications of X-ray fluorescence.
- (c) What are Miller-Indices ? Explain their importance and rules for the calculation of the Miller indices of a plane.
8. (a) Discuss the procedure for the production of X-ray using X-ray tube. Also explain the working of scintillation counter. **5+5+4=14**
- (b) Account on the principle and procedure for the separation of nickel from Cu-Ni alloy using electrogravimetry.
- (c) Differentiate between X-ray diffraction and electron diffraction.

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