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# DD-758

## M. Sc. (Fourth Semester) EXAMINATION, 2020

CHEMISTRY

Paper No. CH-19

(Instrumental Methods of Analysis)

*Time : Three Hours*

*Maximum Marks : 80*

**Note :** All questions are compulsory. All questions carry equal marks. Attempt *one* question from each Unit.

### Unit-I

1. (a) Explain ion exchange equilibrium and inorganic applications of ion chromatography. 10
- (b) Describe theory and applications of size exclusion chromatography. 7
- (c) What type of organic compounds can generally be separated using anion and cation exchange resins ? 3

*Or*

- (a) Explain the applications of capillary electrochromatography. 7
- (b) Write instrumentation involved in supercritical fluid chromatographic separation technique. 7

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- (c) What are supercritical fluids ? How the technique supercritical fluid chromatography serves better than other separation techniques ? 6

**Unit—II**

2. (a) Compare wavelength dispersive and energy dispersive X-ray fluorescent methods. 10
- (b) Discuss the characteristics of X-rays emission with reference to  $K_{\alpha}$ ,  $K_{\beta}$  and  $K_{\gamma}$  lines. 6
- (c) Explain the advantages and disadvantages of X-ray fluorescent method. 4

*Or*

- (a) Discuss theory, instrumentation and applications of proton induced X-ray spectrophotometry. 10
- (b) Describe analytical application of X-ray fluorescent method in qualitative analysis. 6
- (c) Explain, what are the main radiation sources in X-ray fluorescence analysis. 4

**Unit—III**

3. (a) Describe theory, instrumentation and applications of atomic emission spectroscopy. 10
- (b) Explain the various types of interferences in atomic spectroscopy. 6
- (c) Explain instrumentation and working of flame photometer. 4

*Or*

- (a) Write principle, instrumentation and applications of ICP-AES. 10
- (b) Explain atomic fluorescence spectroscopy. 6

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- (c) Explain the terms selectivity and sensitivity with reference to atomic spectroscopy. 4

**Unit—IV**

4. (a) Why HG-AAS technique is used for the analysis of metalloids like Pb, As etc. ? Explain principle and instrumentation of HG- and cold vapour - AAS. 10
- (b) Why hollow cathode lamps are used as light sources in AAS ? Explain its construction and working. 6
- (c) What is the function of photomultiplier tube in AAS ? Explain its working. 4

*Or*

- (a) What are hyphanated techniques ? Discuss the principles and instrumentation of GC-MS or HPLC-MS or HPLC-ICP-MS. 10
- (b) Discuss, how atomic absorption spectroscopy is carried out using graphite furnace. 6
- (c) Explain sample preparation methods used in AAS. 4