



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 132853

Roll No.

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B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15
ANALYTICAL INSTRUMENTATION

Time : 3 Hours]

[Total Marks : 100

Note : All questions are compulsory.

1 Attempt any two parts of the following : **10×2=20**

- (a) State how UV absorption spectroscopy can be used for quantitative analysis of different samples? Describe the working of the dual beam type UV spectrophotometer with a neat sketch.
- (b) What are the different sources of error involved in spectrophotometric measurements? List various components involved in infrared spectroscopic measurement.
- (c) Define Beer Lambert Law and state deviation from Beer Lambert Law. And Compare absorption filter with interference filter on the basis of their suitability.

2 Attempt any two parts of the following : **10×2=20**

- (a) Draw and describe the operation of a non dispersive dual channel absorption type IR spectrometer.
- (b) Why IR spectroscopy is called vibrational spectroscopy? Show that molecular electronics excitation, vibratioal excitation and rotational excitation take place in UV-Visible, NIR, FIR regimes of electromagnetic wave spectrum respectively.
- (c) Explain the principle of operation and constructional details of Flame Photometry.

3 Attempt any two parts of the following : **10×2=20**

- (a) Find the expression for the resolution of a chromatography column separating a gas mixture of two components A and B.
- (b) Draw and describe the operation of a Flame Ionization Detector (FID).
- (c) Draw a typical polarograph and mention some applications. Also describe the atomization process with block diagram.

4 Attempt any two parts of the following : $10 \times 2 = 20$

- (a) Mention various components of a mass spectrometer in correct sequence and explain each component in detail.
- (b) Derive the expression of 'r', radius of curvature of the trajectory for Magnetic deflection mass spectrometer. Also explain the working of Nier 60° sector mass spectrometer.
- (c) What types of columns are integrated in Gas chromatographs for analysis of the sample material?

5 Attempt any two parts of the following : $10 \times 2 = 20$

- (a) Why is RF source necessary for NMR spectroscopy? Describe NMR spectroscopy with schematic diagram.
- (b) What is the principle used in Electronic Spin Resource? Mention two application of ESR Spectroscopy in details.
- (e) What are the advantages of a Fourier transform NMR measurement over the continuous wave measurement? Write short notes on G60A NMR Spectrometer.