

**Ph.D. IN CHEMISTRY
(PHDCHEM)**

Term-End Examination

00331 December, 2017

**RCH-003 : ANALYTICAL TECHNIQUES IN
CHEMISTRY – II**

Time : 3 hours

Maximum Marks : 100

Note : Answer all the questions.

1. What is a Chromatogram ? Draw a labelled diagram of a typical GC chromatogram and explain the terms given in it. 10
2. Name the types of columns used in gas chromatography and give the usual mobile phase velocity in each of them. Explain any five parameters for improving the column efficiency in gas chromatography. 10
3. Name the carrier gases generally used in Gas Chromatography (GC). Giving reasons, arrange the following analytes in the increasing order of their elution time in GC when the stationary phase is non-polar : 10
 - (a) Isopropanol
 - (b) Benzene
 - (c) Ethanol

4. Differentiate between Normal Phase and Reverse Phase HPLC with respect to their stationary and mobile phases. 10
 5. Explain the principle of Mössbauer spectroscopy, giving the equations involved. 10
 6. Draw the EPR spectrum of Vanadyl acetylacetonate ($\text{VO}(\text{acac})_2$) based on the hyperfine interactions. Justify the illustration. 10
 7. How does the X-ray crystallographic technique work ? What are Miller indices ? Explain with the help of an example. 10
 8. Describe the principle of working of TEM and give its advantages. 10
 9. Differentiate between SEM and TEM methods, with suitable examples. 10
 10. Write the applications of XRD. 10
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