

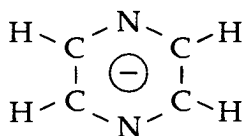
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**M.Phil/Ph.D. IN CHEMISTRY
(MPHILCHEM/PHDCHEM)****Term-End Examination****December, 2018****RCH-003 : ANALYTICAL TECHNIQUES IN
CHEMISTRY - II***Time : 3 hours**Maximum Marks : 100**Note : Answer all the questions given below.*

1. What is the principle involved in the separation of different components of a mixture by gas-liquid chromatography ? List the essential requirements of the liquid phase used in it. 10
2. What is the effect of temperature on the retention time in GLC ? Explain. 10
Draw a schematic chromatogram indicating the relative retention time for the following :
water, ethanol, tetrahydrofuran, propane and dimethylformamide.
3. What is meant by isocratic and gradient elution in HPLC ? Which out of the two is more advantageous and why ? 10
4. Compare GC and HPLC with respect to the 10
 - (a) mobile phase
 - (b) stationary phase, and
 - (c) applicability

5. Draw the ESR spectra of the following with justification giving the number and nature of signals present in them. 10

(a) pyrazine radical anion



(b) VO (ac ac)₂ (Vanadium, $I=7/2$)

6. What are the strengths and weaknesses of ⁵⁷Fe Mössbauer spectroscopy ? 10
7. What are hyperfine interactions in ESR ? Explain with the help of examples. 10
8. With the help of suitable examples, elaborate on the significance of g^{\perp} and g^{\parallel} pertaining to ESR spectroscopy. 15
9. Give the full forms of the following terms pertaining to the analytical techniques in chemistry and give their working principle : 15
- (a) SIMS
- (b) STM
- (c) EXAFS
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