



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI - 600 034

DEGREE EXAMINATION - FOOD CHEMISTRY AND FOOD PROCESSING

FIRST SEMESTER - NOVEMBER 2014

FP 1808 - ANALYTICAL AND INSTRUMENTATION TECHNIQUES

Date : 06/11/2014

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

Part A

Answer all the questions:

10 x 2 = 20

1. How would you express the concentration of solution by molarity?
2. Define the term molar absorption co-efficient.
3. Mention any two applications of pH meter.
4. Of the following which are IR active and IR inactive? Give reason.
a. a) H_2 , O_2 , N_2 b) HCl , CN , CO
5. What is finger print region? Mention its uses?
6. What is coupling constant?
7. Predict the number of 1H NMR signals for following compounds?
a. a) CH_3-OH b) $CH_3CH_2-NH_2$
8. State and explain nitrogen rule.
9. What is molecular ion peak in mass spectrum?
10. Write two applications of paper chromatography.

Part B

Answer any eight questions:

8 x 5 = 40

11. Sketch the block diagram of spectrofluorimeter and explain the functions of various parts.
12. a) What are the various types of electronic transitions taking place in UV spectroscopy?
b) Most of the absorption bands in the UV-Visible spectra are very broad. Give reason.
13. Describe the principle and applications of Atomic absorption spectroscopy.
14. a) What are the sources of IR radiation in IR spectrometer?
b) How IR spectroscopy is used to distinguish between inter molecular and intra molecular hydrogen bond?
15. How will you distinguish between the following pairs of compounds using IR spectral technique?
a. CH_3COOH and CH_3OH b. CH_3CH_2OH and CH_3OCH_3
16. How will you account for the appearance of prominent peaks at m/z 31, 42 and 70 in the mass spectrum of n-pentanol?
17. Discuss shortly the Mc Lafferty rearrangements.
18. Explain the principle and instrumentation of NMR spectroscopy.
19. Write short note on the following.
a. vander Waals deshielding b. Anisotropic effects
20. What is the basic principle involved in the separation of compounds in chromatographic technique? Give in detail.
21. Write short note on thin layer chromatography.
22. Give in detail the applications of HPLC.

Part C

Answer any four questions.

4 x 10 = 40

23. An organic compound of molecular formula C_3H_7NO exhibits the following spectral data.

a. I.R. 3428, 2941-2857, 1681, and 1452

b. 1H NMR (ppm) : 1.87 (1H, s); 7.30 (3H, s); 8.1 (3H, s);

Deduce the structure of the compound.

24. Explain the principle and instrumentation of GLC in detail. Give its applications.

25. Derive Beer-Lambert's law and write all the limitations observed in the quantitative analysis.

26. a) Discuss the principle and instrumentation involved of UV-Visible spectral technique.

b) Give any three applications of UV-Visible spectroscopy.

27. a) How to calculate the number of vibrational modes for a different types of compounds?

b) Write the expected I.R peaks for the following. i) p-nitro phenol ii) p-nitro benzoic acid

28. a) What is quantum yield?

b) Describe how the fluorescent molecules are useful in biochemical studies?
