

Marks scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
June, 2018

Level : B.Sc./B.Pharm./B.Tech.
Year : III

Course : INAN 301
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date JUN 14 2018

SECTION "A"

[20Q. × 1 = 20 marks]

Encircle the most appropriate answer from the given choices.

- Which of the following statements is correct?
[a] Actuators and transducers are both examples of sensors.
[b] Sensors and transducers are both examples of actuators.
[c] Sensors and actuators are both examples of transducers.
[d] Actuator is an example of transducer.
- What is the unit of absorbance which can be derived from Beer Lambert's law?
[a] $L \text{ mol}^{-1} \text{ cm}^{-1}$ [b] $L \text{ gm}^{-1} \text{ cm}^{-1}$ [c] cm [d] No unit
- Narrow line spectra are emitted by
[a] hot solids [b] excited polyatomic molecules
[c] molecules in the ground molecular state [d] excited atoms
- How many ^{13}C signals would 1,4-dimethylbenzene give?
[a] 2 [b] 3 [c] 4 [d] 5
- The mass spectrum of alcohols often fail to exhibit detectable M peaks but instead show relatively large _____ peaks.
[a] M-17 [b] M+2 [c] M+1 [d] M-18
- Absorbed wavelengths in atomic absorption spectrum appear as
[a] dark background [b] dark lines
[c] light background [d] light lines
- The alkenes and aromatic compounds can be suitably detected using:
[a] Spectrophotometric detector [b] Potentiometric detector
[c] Conductivity detector [d] Refractive index detector
- If the informations are encoded in an instrument in a two level scheme, it is considered as
[a] Non electrical domain [b] Digital domain
[c] Analog domain [d] Time domain
- In which of the following mass spectrometric techniques is the sample introduced as a solution which is nebulized under an applied electrical potential?
[a] fast atom bombardment (FAB)
[b] electron ionization (EI)
[c] electrospray ionization (ESI)
[d] matrix-assisted laser desorption ionization (MALDI)

10. Which one of the following techniques can be used for the detection in a liquid chromatography?
- [a] Ultraviolet absorbance or refractive index measurement
 - [b] Increase in temperature
 - [c] Ionization in flame
 - [d] Thermal conductivity

Fill in the blanks by most appropriate VALUE or WORD.

11. In order for a vibration mode to be observable in the IR, the vibration must change the _____ of the molecule.
12. In NMR, _____ is commonly used to provide a reference against which other peaks are measured.
13. In mass spectrometry, the most intense peak is assigned an intensity of 100%, and is referred to as the _____.
14. An IR wavelength of 4.8 μm is equivalent to a wavenumber of _____.
15. In size exclusion chromatography the analyte mixture is separated on the basis of _____.
16. GC separation where temperature remains same throughout the analysis is called _____.
17. The ratio of the analyte concentrations in both stationary and mobile phases at equilibrium is called _____.
18. Grating is a device used in the spectrophotometer to function as _____.
19. The removal of dissolved gases in HPLC solvent by passing inert gases like He and N_2 , is called _____.
20. In measure of dynamic range LOQ stands for _____.

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Level : B.Sc./B.Pharm./B.Tech..
Year : III
Time : 2 hrs. 30 mins.

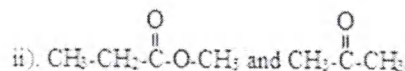
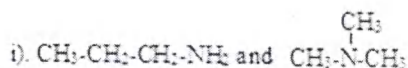
Course : INAN 301
Semester: I
F. M. : 55

SECTION "B"

[5Q. × 3 = 15 marks]

Attempt *ANY FIVE* questions.

1. Write short notes on: i) Precision ii) Sensitivity [3]
2. Write the features of thermal conductivity detector with a labeled diagram. [2+1]
3. Write the different types of flame on the basis of fuel and oxidant in AAS. Briefly explain the flame structure. [1+2]
4. Define the following terms: [1.5+1.5]
a) Bathochromic shift b) Fermi resonance
5. How many PMR peaks and multiplicity do you expect in the following compounds?
i) CH₃-CO-CH₃ ii) (CH₃)₃C-CH₂Cl iii) CH₃ClC=CH₂ [1+1+1]
6. How do you distinguish between the following pair of compounds through IR spectral studies? [1.5+1.5]



7. List the differences between paper and electro chromatography. [3]

SECTION "C"

[5Q. × 5 = 25 marks]

Attempt *ANY FIVE* questions.

8. What are the possible defects of normal calibration curve procedure? How the standard addition method minimizes these defects? [2+3]
9. a) Explain why a polar solvent usually shifts the π - π^* transition to longer wavelength and n - π^* transition to shorter wavelength.
b) Calculate the energy of a 700 nm photon of a visible radiation in KJ/mol unit.
($h = 6.63 \times 10^{-34}$ Js, Avogadro's No. = 6.02×10^{23}). [3+2]
10. What is a protective agent and in which instrumental method would you use one? How does it work? [2+3]
11. Justify the following: [2.5+2.5]
a) Acetylene proton signal is at up field whereas ethylene resonate at down field in PMR.
b) Increasing the magnetic field strength will increase the sensitivity of NMR instrument.

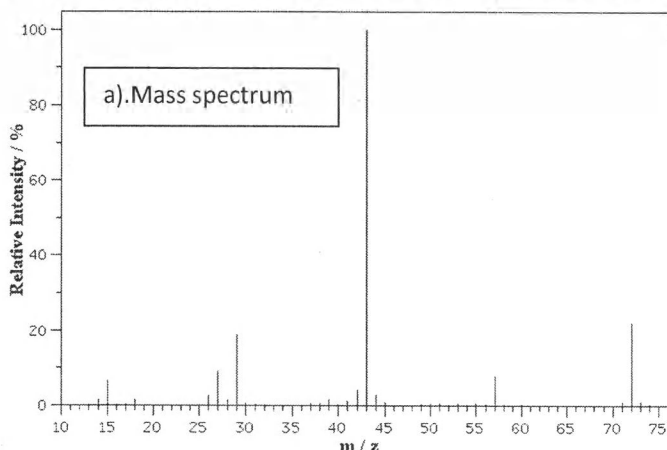
12. a) Why does the minimum in a plot of plate height versus flow rate occur at lower flow rates with liquid chromatography than with gas chromatography? Explain it.
 b) Describe time of flight (TOF) mass analyzer system. [2.5+2.5]
13. a) List the variables that lead to zone broadening in chromatography.
 b) How are the performance characteristics like:
 i) Capacity factor ii) Plate height, are determined in TLC? [3+2]
14. Differentiate between isocratic and gradient elution. Write about injectors used in GC. [5]

SECTION "D"

[2Q. × 7.5= 15 marks]

Attempt *ANY TWO* questions:

15. a) Write Van Deemter equation. Explain all the factors affecting the efficiency of the column.
 b) Explain refractive index detector for HPLC. [1+4+2.5]
16. a) What are the devices that have been utilized for obtaining (selecting) monochromatic light from a light source? [3+4.5]
 b) Explain in brief:
 i) Reversed phase chromatography ii) Hydrogen deficiency index iii) Suppressor column
17. From the combined IR, mass, ¹³C-NMR and ¹H-NMR spectra given below for an unknown compound, elucidate the correct structure for the compound with detailed description of each spectrum analysis. Also show the mass fragmentation pattern. [5.5+2]



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