

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022
(Sixth Semester)

Branch – CHEMISTRY

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 x 1 = 10)

- The significant figures of 0.00567 and 2.34 are
 - 3,1
 - 5,1
 - 3,3
 - 6,3
- The number of weight losses observed in the TG thermogram of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ when heated to 900°C is
 - two
 - one
 - three
 - four
- The number of modes of vibration for water molecule is
 - six
 - five
 - four
 - three
- The region of frequency (in IR) for C=C stretching is
 - $3700\text{-}2500\text{ cm}^{-1}$
 - $2500\text{-}2000\text{ cm}^{-1}$
 - $2000\text{-}1600\text{ cm}^{-1}$
 - $1600\text{-}1450\text{ cm}^{-1}$
- On the addition of a few drops of dilute aqueous NaOH solution, the UV absorption spectrum of pure $\text{C}_6\text{H}_5\text{OH}$ in $\text{C}_2\text{H}_5\text{OH}$ will show which one of the following characteristics?
 - λ value remains unchanged
 - λ value suffers a hypsochromic shift
 - the intensity and λ value remain unaffected
 - λ value suffers bathochromic shift
- For which of the following groups $\pi \rightarrow \pi^*$ transition does not occur in UV-Visible spectroscopy?
 - Acetaldehyde
 - Nitromethane
 - Azomethane
 - Acetone
- How many signals would you expect for toluene in NMR?
 - 9
 - 1
 - 2
 - 3
- Pick out the incorrect statement about DPPH
 - Its g value is 2.0039
 - used as standard substance in ESR study
 - Gives three peaks with relative intensities 1:3:1 in the ESR spectrum
 - It generates free radical
- Diffusion current is
 - directly proportional to concentration
 - indirectly proportional to concentration
 - equal to concentration
 - a limiting current
- In polarography method of analysis, the current is measured as
 - migration current
 - eddy current
 - limiting current
 - diffusion current

Cont...

SECTION - B (25 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

- 11 a How is accuracy determined by qualitative analysis?
OR
b Explain the thermometric titration of HCl and NaOH.
- 12 a How is force constant determined?
OR
b State and explain the mutual exclusion rule.
- 13 a Bring out the applications of UV spectroscopy in quantitative and qualitative analysis.
OR
b State and explain the laws of colorimetric analysis.
- 14 a Outline the various factors influencing the chemical shift in NMR spectroscopy.
OR
b Sketch and describe the block diagram of instrumentation of ESR spectroscopy.
- 15 a Explain the following, i) Residual current ii) Diffusion current.
OR
b Describe briefly about half wave potential.

SECTION - C (40 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

- 16 a Discuss the methods of least squares and correlation coefficient with examples.
OR
b Discuss the principle, instrumentation and application of TGA.
- 17 a Distinguish between the IR and Raman spectroscopy.
OR
b Discuss the techniques and instrumentation of Raman spectroscopy.
- 18 a Outline the principle and instrumentation of UV spectroscopy.
OR
b Discuss the methods of colour measurements by colorimetric titration and Duboscq colorimeter.
- 19 a Discuss about the structural determination and kinetic studies using NMR spectroscopy.
OR
b Highlight of the following in ESR spectroscopy,
i) g factor ii) hyperfine splitting
- 20 a Discuss the principle and instrumentation of polarography.
OR
b Outline the following,
i) Organic polarography ii) Pulse polarography.

Z-Z-Z

END