

# SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES COIMBATORE



## QUESTION BANK

### BP 701T: INSTRUMENTAL METHODS OF ANALYSIS

#### UNIT 1: UV VISIBLE SPECTROPHOTOMETRY & FLUORIMETRY

| S.NO | QUESTION TYPE | QUESTIONS                                                      | MAPPING TO TNMGRMU, GPAT, NIPER, VARIOUS PHARMA COMPANY WITH YEAR                                                                | BLOOM'S TAXONOMY |
|------|---------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1    | 2-Marks       | Define Bathochromic shift and Hypsochromic shift.              | TNMGRMU (Dec 2021, May 2022, Dec 2023, Oct 2024), GPAT (2021, 2022, 2023, 2024), NIPER (2021, 2022, 2023, 2024), Sun Pharma 2020 | Remembering      |
| 2    | 2-Marks       | State Beer's Law and Lambert's Law.                            | TNMGRMU (Mar 2023, May 2024), GPAT (2023, 2024), NIPER (2023, 2024), Cipla 2022                                                  | Remembering      |
| 3    | 2-Marks       | What are chromophores? Give two examples.                      | TNMGRMU (Dec 2021, Dec 2023), GPAT (2021, 2023), NIPER (2021, 2023), Dr. Reddy's 2022.                                           | Remembering      |
| 4    | 2-Marks       | What are auxochromes? Give two examples.                       | TNMGRMU (May 2022, Aug 2023), GPAT (2022, 2023), NIPER (2022, 2023), Lupin 2024.                                                 | Remembering      |
| 5    | 2-Marks       | Define quenching and list two factors affecting it.            | TNMGRMU (May 2022, Dec 2023, May 2024), GPAT (2022, 2023, 2024), NIPER (2022, 2023, 2024), Maiva 2024.                           | Remembering      |
| 6    | 2-Marks       | What is an isosbestic point?                                   | TNMGRMU (Dec 2021), GPAT (2021), NIPER (2021)                                                                                    | Remembering      |
| 7    | 2-Marks       | Write two applications of fluorimetry.                         | TNMGRMU (May 2024), GPAT (2024), NIPER (2024)                                                                                    | Remembering      |
| 8    | 2-Marks       | Define luminescence and give one example.                      | TNMGRMU (Dec 2021), GPAT (2021), NIPER (2021), Mylan 2021.                                                                       | Remembering      |
| 9    | 2-Marks       | Mention two radiation sources used in UV-Visible spectroscopy. | TNMGRMU (Oct 2022), GPAT (2022), NIPER (2022), Freedom pharma 2019.                                                              | Remembering      |

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|    |         |                                                                                                                                                                                                 |                                                                                                     |               |
|----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------|
| 10 | 2-Marks | What is the advantage of a photomultiplier tube in UV spectroscopy?                                                                                                                             | TNMGRMU (Oct 2022), GPAT (2022), NIPER (2022), Aurobindo 2023.                                      | Remembering   |
| 11 | 2-Marks | Why does iodide quench fluorescein 50 times more than chloride? Name the effect.                                                                                                                | GPAT-2024, Cipla 2023.                                                                              | Analyzing     |
| 12 | 2-Marks | Xenon flash lamp vs Deuterium lamp: Which gives higher photon shot noise in fluorimetry? Justify in 1 line.                                                                                     | NIPER-2024, Aurobindo 2022                                                                          | Evaluating    |
| 13 | 2-Marks | For 0.1 ppb $\text{Hg}^{2+}$ detection, fluorescence probe is 1000 times better than UV. Justify in numbers.                                                                                    | GPAT-2024, Sun Pharma 2021.                                                                         | Evaluating    |
| 14 | 2-Marks | Sketch Jablonski diagram showing ISC and delayed fluorescence.                                                                                                                                  | NIPER-2021, Dr. Reddy's 2021.                                                                       | Creating      |
| 15 | 5-Marks | A 0.01% w/v solution of Sunset Yellow shows $A = 0.92$ at 482 nm (1 cm). Calculate its specific absorbance $A(1\%, 1 \text{ cm})$ and predict shelf-life if Beer's law fails beyond $A = 2.0$ . | NIPER-2025, Abott 2024.                                                                             | Analyzing     |
| 16 | 5-Marks | Explain the different types of electronic transitions involved in UV-Visible spectroscopy.                                                                                                      | TNMGRMU (May 2022, Mar 2023), GPAT (2022, 2023), NIPER (2022, 2023), Glenmark 2023.                 | Understanding |
| 17 | 5-Marks | Discuss the factors affecting fluorescence intensity and their impact on fluorimetric analysis.                                                                                                 | TNMGRMU (Dec 2021, Mar 2023, May 2024, Oct 2024), GPAT (2021, 2023, 2024), NIPER (2021, 2023, 2024) | Analyzing     |
| 18 | 5-Marks | Explain the Jablonski diagram and its significance in understanding fluorescence.                                                                                                               | TNMGRMU (May 2022), GPAT (2022), NIPER (2022), Lupin 2023                                           | Understanding |
| 19 | 5-Marks | Write a note on the applications of UV-Visible spectroscopy in pharmaceutical analysis.                                                                                                         | TNMGRMU (Oct 2022), Sun pharma 2023.                                                                | Applying      |

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|----|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------|
| 20 | 5-Marks  | Describe the principle of simultaneous equation method for multi-component analysis in UV spectroscopy.                                                                                                                                                                                                                                                                                                        | TNMGRMU (Aug 2023, Oct 2024), GPAT (2023, 2024), NIPER (2023, 2024)                       | Understanding |
| 21 | 5-Marks  | Explain the role of chromophores and auxochromes in UV-Visible spectroscopy.                                                                                                                                                                                                                                                                                                                                   | TNMGRMU (Mar 2023), Mylan 2021.                                                           | Understanding |
| 22 | 5-Marks  | Write a note on the instrumentation of a single beam UV-Visible spectrophotometer.                                                                                                                                                                                                                                                                                                                             | TNMGRMU (Oct 2024), Maiva 2022.                                                           | Understanding |
| 23 | 10-Marks | With a neat labeled diagram, explain the principle and instrumentation of a double beam UV-Visible spectrophotometer.                                                                                                                                                                                                                                                                                          | TNMGRMU (Dec 2021, Dec 2023, Oct 2024), GPAT (2021, 2023, 2024), NIPER (2021, 2023, 2024) | Understanding |
| 24 | 10-Marks | Derive the Beer-Lambert's law mathematically and discuss the reasons for deviations from the law.                                                                                                                                                                                                                                                                                                              | TNMGRMU (May 2022, Oct 2022), GPAT (2022), NIPER (2022)                                   | Applying      |
| 25 | 10-Marks | Explain the theory and instrumentation of a fluorimeter, including the role of singlet, doublet, and triplet states in fluorescence.                                                                                                                                                                                                                                                                           | TNMGRMU (Mar 2023), GPAT (2023), NIPER (2023)                                             | Understanding |
| 26 | 10-Marks | Discuss the electronic transitions in UV-Visible spectroscopy and their applications in spectrophotometric titrations and multi-component analysis.                                                                                                                                                                                                                                                            | TNMGRMU (Oct 2022), Lupin 2022.                                                           | Analyzing     |
| 27 | 10-Marks | Describe the solvent effects on UV-Visible absorption spectra and their significance in analytical applications.                                                                                                                                                                                                                                                                                               | TNMGRMU (Dec 2021), Dr. Reddys's 2023.                                                    | Understanding |
| 28 | 10-Marks | <p>Tablet contains Paracetamol (<math>\lambda_{\text{max}}</math> 243 nm) + Caffeine (273 nm).</p> <p>Design simultaneous equation method using 250 nm &amp; 270 nm.</p> <p><math>\epsilon</math> values: Para-250=12800, Para-270=4200; Caff-250=3800, Caff-270=10200. Write equations, solve for a sample where <math>A_{250}=0.68</math>, <math>A_{270}=0.56</math> in 1-cm cell (50 mL from 1 tablet).</p> | NIPER-2023, Sun pharma 2023.                                                              | Creating      |