

Reg. No: _____

Q/K/TY


VIT
 Vellore Institute of Technology

Final Assessment Test – November 2025

Course: TBIT301L - Analytical Techniques

Class NBR(s): 1018

Time: Three Hours

Slot: A1+TA1

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Elaborate knowledge on good laboratory practices.
CO2	Summarize preparations of standard solutions.
CO3	Develop operating skills of analytical instruments.
CO4	Perceive knowledge on extraction and purification of biomolecules from biological samples.
CO5	Predict, measure and identify biomolecules.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

- | | | | |
|----|---|-----|-----|
| 1. | Identify the use of various personnel protective equipment's by researchers. State whether standard operating procedures followed in laboratories are different from GLPs. | CO1 | BL1 |
| 2. | Derive the Handerson-Hasselbalch equation for acids and bases and mention its uses. | CO2 | BL2 |
| 3. | a) Calculate the citric acid and sodium citrate required for the preparation of 0.1 M citrate buffer, pH 5.0 (500 ml). (Mol. Wt. of Citric acid 192.1 & Sodium citrate 294.0) [5] | CO2 | BL3 |
| | b) Demonstrate how buffers are effectively resisting a change in pH either addition of a weak acid or a weak base. [5] | | |
| 4. | Illustrate the working principle and components of SEM and their functions. List out the biological applications of SEM. | CO3 | BL2 |
| 5. | Explain the principle and components of fluorescence microscopy. How it differs from conventional microscopy. List the advantages of florescent microscopy. | CO3 | BL2 |
| 6. | How a particular protein fraction would be separated in a sample containing a mixture of proteins having different shape and size. What chromatography technique you would use? Elaborate the principle and methodology used to achieve the separation. | CO4 | BL3 |
| 7. | Illustrate the separation of mixture of macromolecules through TLC and list the advantageous of TLC over other chromatographic techniques. | CO4 | BL3 |

8. Review the principle, methodology and applications of isoelectric focussing in separation of proteins based on isoelectric points and mention their uses. CO4 BL4

9.a) Define Beer Lamberts law. Review the principle of colorimetry and explain why spectrophotometric estimations are accurate than colorimetric estimations. CO5 BL5

OR

9.b) Demonstrate how FTIR is used for the measurement of the rotations and vibrations of atoms in identifying varying functional groups of present in biomolecules. Mention the importance of fingerprint region in FTIR spectra. CO5 BL5

10.a) You are asked to fractionate ribosomes from the given tissue homogenate. Draw a flow pathway to demonstrate the fractionation of various subcellular fractions by using different centrifugation techniques. CO5 BL2

OR

10.b) Review the types of scintillation counting. List the advantages of liquid scintillation counting methods over GM counter based methods in the measurement of radioactivity. CO5 BL2

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