Roll No. ☐☐☐☐☐☐☐☐☐☐

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER ARREAR EXAMINATIONS, Nov / Dec 2024

B.E. Materials Science and Engineering

ML5401 & Experimental Techniques and Methods
(Regulation 2019)

Time: 3hrs   Max.Marks: 100

CO 1	Explain the fundamentals of spectroscopic methods.
CO 2	Apply the principles of UV-visible, IR, Raman and Atomic spectroscopic techniques for material characterization.
CO 3	Evaluate the thermal and surface properties of materials using analytical techniques.
CO 4	Describe the qualitative and quantitative methods of evaluating the samples by separation techniques.
CO 5	Interpret the results of spectroscopic and analytical methods.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analyzing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	How the EMR interacts with the matter?	2	1	L3
2	List out the absorption and emission techniques?	2	1	L1
3	Draw the general electronic transitions and energy level diagram?	2	2	L1
4	State the photometric titration applications?	2	2	L1
5	Mention the vibration modes of two molecules?	2	3	L2
6	How the hollow cathode lamp detector works?	2	3	L2
7	What is the principle of TLC?	2	4	L1
8	When is a solvent considered to be a good in chromatographic methods?	2	4	L3
9	What are the applications of TEM?	2	5	L1
10	What are the advantages and disadvantages of AFM?	2	5	L1

PART- B (5 x 13 = 65 Marks)

Q. No	Questions	Marks	CO	BL
11 (a)	Write a note on atomic and molecular spectroscopy?	13	1	L2
OR				
11 (b)	Explain the principle of visible absorption spectroscopy with a neat diagram?	13	1	L2
12 (a)	Explain the Wood Ward fieser rule for absorption maxima?.	13	2	L2
OR				
12 (b)	Discuss UV-Visible spectrometer with a neat sketch?	13	2	L2
13 (a)	Describe the theory and principle of IR spectroscopy?	13	3	L2
OR				
13 (b)	Explain the working of ICP-AES with a neat sketch. What are its major uses and limitations?	13	3	L2
14 (a)	Explain the principles of solvent extraction and ion exchange techniques?	13	4	L2
OR				
14 (b)	Discuss the working of GC and HPLC?	13	4	L2
15 (a)	Explain the working principle of TGA and DSC?	13	5	L2
OR				
15 (b)	Explain the construction, working principle and applications of SEM?	13	5	L2

PART- C (1 x 15 = 15 Marks)
(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	Derive Beer Lamberts' law and mention the limitations?.	15	1	L3