

B.E./B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2019

Material Science and Engineering

Semester 4

ML 8401 ANALYTICAL INSTRUMENTATION TECHNIQUES

(Regulation 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks: 100

PART-A (10 x 2 = 20 Marks)

1. What are the limitations of Beer Lambert's law?
2. Distinguish between phosphorescence and chemiluminescence.
3. What is a hyperchromic shift?
4. With an example define auxochrome and chromophore.
5. How does a detector work?
6. Mention the number of vibrational modes in water and benzene molecules.
7. What is the principle of TLC.
8. What factors affect the R_f value?
9. Sketch a DSC curve and label.
10. What is the purpose of thermal analysis?



Part – B (5 x 16 = 80 Marks)

11. (i) Derive Beer Lambert's law and illustrate its usefulness. 8
(ii) Explain the principle of visible absorption spectroscopy with a neat diagram. 8
 12. (a) (i) Write a note on vibrational and rotational transitions. 8
(ii) How conjugation influences the λ_{\max} value. Illustrate with examples. 8
- OR
- (b) (i) What is a photometric titration? Explain its uses with suitable examples. 8
(ii) What is the principle of UV visible spectrophotometer? Explain its working with a neat sketch. 8

13. (a) (i) What is the principle of IR spectroscopy? What is the difference between FTIR and dispersive IR spectroscopy? 8
8
(ii) Distinguish between IR and Raman spectroscopy.

OR

- (b)(i) Explain the construction and working of flame photometry with a block diagram. 8
(ii) What is the principle of flame emission spectroscopy? Explain its working principle with an example. 8
14. (a) (i) Explain the working mechanisms of TCD and ECD detectors. 8
(ii) Explain the use of column chromatography in separation of organic compounds. 8

OR

- (b) (i) Write a note on GC. 8
(ii) Explain the working of HPLC. 8
15. (a) (i) Write a note on TEM specimen preparation. 8
(ii) Bring out the differences between (1) thermionic and field emission guns (2) optical and electron microscopy. 8

OR

- (b) (i) Distinguish between (1) SEM and TEM (2) secondary and back scattered electrons. 8
(ii) Write a note on modes of AFM. 8

