

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
EIGHTH SEMESTER B. TECH DEGREE EXAMINATION, MAY 2019

Course Code: AE402

Course Name: ANALYTICAL INSTRUMENTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) State and derive Beer-Lambert's law from basic principles. Discuss the limitations of it. (5)
- b) What is the use of filters and monochromators in spectroscopy? With diagrams explain principle of filtering using filters and monochromators. (10)
- 2 a) Draw the electromagnetic spectrum and specify wavelengths of different radiations. (5)
- b) Differentiate single beam and double beam spectrophotometer with neat diagrams. (7)
- c) What are the different types of detectors used in flame photometry? (3)
- 3 a) With a block diagram explain the operation of a Single beam photometer. (5)
- b) Explain the various components in the emission system of flame photometer in detail with neat diagram. (10)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) How a single-beam filter fluorimeter and Double beam filter fluorimeter works? Explain in detail with neat sketches. (10)
- b) Describe the principle of ion-beam spectroscopy with a neat sketch. (5)
- 5 a) Illustrate the working of an Inductively coupled plasma- mass spectrometer. (8)
- b) Explain the working of an X-ray absorptiometer. (7)
- 6 a) Explain the following with neat sketches: (10)
 - i. Inlet sample system in a Mass spectrometer.
 - ii. Functions of Klystron tube and Microwave cavity in ESR spectrometer.
- b) Explain about X-Ray spectrum and indicate it in the electromagnetic spectrum diagram. (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Explain the basic principle of chromatographic process. List the various types. (7)
- b) Define retention time, Dead time, Phase ratio, linear velocity and efficiency in chromatography. (5)
- c) With neat diagrams explain any two detectors used in Gas chromatography. (8)
- 8 a) How liquid chromatography works? What are the various types of LC and discuss in detail. (10)
- b) Prepare brief notes on (10)
- i. pH meter.
 - ii. Flue gas analysers.
- 9 a) With necessary theoretical backing, explain how Paramagnetism is employed in the sensing of Oxygen. (10)
- b) Explain the following: (10)
- i. CO analyser.
 - ii. DO meter.
