

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022 - 23 Examination

Semester: 7**Date: 13/10/2022****Subject Code: 203111405****Time: 10:30am to 1:00pm****Subject Name: Analytical Techniques & Instrumentation****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark)**(15)**

1. Mass spectrometers are used to determine which of the following?
 - a) Composition in sample
 - b) Concentration of elements in sample
 - c) Relative mass of atoms
 - d) Properties of sample
2. Which is an element of analytical instrument?
 - a) Transducer
 - b) Temperature sensor
 - c) Pressure gauge
 - d) Anode, cathode
3. What is the type of solution having pH value 7?
 - a) Acidic
 - b) Basic
 - c) Neutral
 - d) Alkaline
4. What is measured by the pulse oximetry test?
 - a) Oxygen perfusion
 - b) Particle pressure of oxygen dissolved in the blood
 - c) End tidal carbon dioxide
 - d) Oxygen saturation of haemoglobin
5. Which one of the following techniques can be used for the detection in a liquid chromatograph?
 - a) Ultraviolet absorbance or refractive index measurement.
 - b) Increase in temperature
 - c) Ionization in flame
 - d) Thermal conductivity

6. According to Beer's law for a colored solution, The absorbance is directly proportional to the concentration. -----True or False?
7. A precise analytical measurement will always have a small relative standard deviation. ----- True or False?
8. Atomic absorption spectroscopy used for the analysis of metals. -----True or False?
9. What is an analytical instrumentation?
10. What wavelength does a colorimeter use?
11. What is the formula for pH calculation?
12. What is Autoclave?
13. Define the term : wavelength
14. Can chromatography be used to separate the high pressure species?
15. Is Gamma spectroscopy is based on the use of semiconductor device?

Q.2 Answer the following questions. (Attempt any three) **(15)**

- A) What is electrophoresis? Write a detailed note on electrophoresis.
- B) Draw neat diagram of pH electrode. Explain how to measure pH using pH electrode along with its construction in detail.
- C) Give the difference between colorimeter and spectrometer.
- D) Describe the principle of oxygen measurement with the Clark electrode with neat diagram.

Q.3 A) Explain the analytical instrumentation system with neat block diagram. **(07)**

B) Explain the principle, construction and applications of hot-air oven. **(08)**

OR

B) Describe the construction of auto analyzer in detail with neat block diagram. **(08)**

Q.4 A) Explain working and components of flame photometer giving neat diagram. **(07)**

OR

A) What is the purpose of blood cell counting? Discuss coulter counter method for blood cell counting. **(07)**

B) Describe working and application of a mass spectrometer with neat diagram. **(08)**