

SARDAR PATEL UNIVERSITY  
Vallabh Vidyanagar – 388 120

(CBCS) M. Sc. INSTRUMENTATION & CONTROL EXAMINATION, SEMESTER - II  
PS02CINC21 - ANALYTICAL INSTRUMENTATION  
Tuesday, 10<sup>th</sup> APRIL, 2018, 10:00 am to 1:00 pm

Total Marks: 70

Note: Figures to the right indicate maximum marks.

Q1. **Multiple Choice Questions-**

- (1) The heart of FTIR spectrometer is two beam interferometer known as: [1]  
(a) Mull type (b) Michelson type (c) Scintillation type (d) Raman type
- (2) Consumption of sample in Integral burner atomizer is .....than discharge type. [1]  
(a) less (b) more (c) equal (d) all
- (3) The study of absorption of radio frequency radiation by nuclei in magnetic field is: [1]  
(a) Electron Spin Resonance (c) Proton Magnetic Resonance  
(b) Neutron Spin Resonance (d) Nuclear Magnetic Resonance
- (4) The pH value is dependent on [1]  
(a) current, (b) resistance (c) temperature (d) viscosity
- (5) The radioactive high energy photons which have low penetration and large ionizing power: [1]  
(a)  $\beta$  rays (b)  $\alpha$  rays (c)  $\gamma$  rays (d)  $\lambda$  rays
- (6) The process in which total scattered light intensity occurs at frequencies that are different [1]  
from the incident frequency is:  
(a) Rayleigh Scattering (b) Snell's law (c) Raman Scattering (d) Fiber optics
- (7) If the rate of change of weight is to be measured, the method is ..... [1]  
(a) Thermo gravimetric (b) Differential Thermal Analysis  
(c) Derivative Thermo gravimetric (d) Calorimetric
- (8) Nephelometry is the method based on .....process. [1]  
(a) Magnetic (b) optical (c) electrical (d) none

Q2. **Short answer type questions — attempt any 7**

- (1) What are the important properties of Radiation sources? [2]
- (2) Write the principle of Pyroelectric detector. [2]
- (3) State Beer's law and write the necessary equation. [2]
- (4) Enlist the requirements for Pneumatic Nebulizer. [2]
- (5) Write Nernst equation for pH measurement and interpret all terms. [2]
- (6) Compare NMR and ESR. [2]
- (7) Write an equation for velocity of migration in Electrophoresis technique with interpretation. [2]
- (8) List Applications of Thermo Gravimetric Analysis. [2]
- (9) What do you understand by Gradient Elution in HPLC? [2]

- Q3. (a) Discuss radiation sources for UV-VIS range. [6]  
(b) Draw a block diagram of Double Beam Photometer and explain it. [6]  
OR  
(c) Write the basic principle of Flame photometry and explain its each block. [6]
- Q4. (a) Write a note on Atomic Absorption Spectroscopy (AAS) with concept of Resonance. [6]  
(b) Explain Raman Spectrometer and list its application. [6]  
OR  
(c) Describe working of Photo-acoustic spectrometer with neat diagram. [6]
- Q5. (a) List different types of Mass Spectrometry. Explain Magnetic Deflection Mass Spectrometry. [6]  
(b) Write a note on Electron Spin Resonance spectrometer. [6]  
OR  
(c) Draw a block diagram and explain Instrumentation for Electron Spectroscopy. [6]
- Q6. (a) Write a note on Paramagnetic Oxygen Analyzer. [6]  
(b) Describe operation of Differential Thermal Analyzer (DTA). [6]  
OR  
(c) Explain the components of Gas Chromatography with neat block diagram. [6]

\*\*\*\*\*X\*\*\*\*\*