

B.E. / B.TECH. DEGREE EXAMINATIONS, December 2020

Fourth Semester

**BT16401 – Analytical Methods and Instrumentation**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. Deuterium and tungsten lamps are used as a light source in one of the following techniques.
  - (a) Nuclear magnetic resonance spectrophotometers
  - (b) X-rays diffractometers
  - (c) Gas chromatograph
  - (d) Uv/Visible spectrophotometers
2. One part per million is the same as
  - (a) 1  $\mu\text{g/g}$
  - (b) 1 mg/kg
  - (c) 1 ng/mg
  - (d) All of the above are correct
3. Grating is a device used in the spectrophotometer to function as
  - (a) a light source
  - (b) a monochromator
  - (c) a detector
  - (d) a nebulizer
4. Considering high performance liquid chromatography, which one of the following statements is FALSE?
  - (a) HPLC is suitable for the separation and determination of the nonvolatile (high boiling point) components.
  - (b) The stationary phase could be a liquid or a solid.
  - (c) Columns longer than 50 meters have been used here to increase the efficiency of separation.
  - (d) High pressure is used here to decrease the retention time and improve the separation of components.
5. Why signal to noise ratio is an important factor in spectral analysis.
6. How is Chemical shift calculated in NMR?
7. Why is helium used as the carrier gases used in GC?
8. List out the application of atomic force microscopy in biotechnology.

**PART B - (4 X16 = 64 marks)**

9. (a) What is the significance of Signal to Noise ratio? Explain the different types of noises and different software and hardware methods for instrumental noise reduction. (16)

**(OR)**

- (b) What are the essential components of absorption spectrophotometers? How PIN number in ATM Card/ Credit Card could be traced? Correlate the role of transducers in that. (16)

10. (a) Distinguish dispersive and non-dispersive IR. Explain the important components of Infrared spectroscopy with diagram. (16)

**(OR)**

- (b) Describe the biological applications of Raman spectroscopy with its principle. (16)

11. (a) Elaborate the ionization techniques followed in mass spectroscopy for determination protein structures. (16)

**(OR)**

- (b) Explain with a neat diagram the principle and working of STM for finding the morphology of nanoparticles. (16)

12. (a) Discuss the principle, column packing and applications of IEC in water purification system. (16)

**(OR)**

- (b) Discuss principle, instrumentation, gradient analysis and applications of HPLC. (16)