KUMARAGURU
college of technology
character is life

Register Number: ……..

B.TECH DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Fourth Semester

BIOTECHNOLOGY

BTY107: Instrumental Methods of Analysis

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A semiconductor device used to amplify and switch electronic signals and electrical power
   a) Transistor b) Capacitor
   c) Resistor d) Amplifier
2. A system that performs mathematical operations on a sampled, discrete-time signal to reduce or enhance certain aspects of that signal.
   a) Digital filter b) Analog filter
   c) Signal controller d) Signal sampler
3. Electromagnetic radiation in the infrared region on interaction with materials causes
   a) Ionization b) Nuclear transition
   c) Electronic transition d) Molecular vibration
4. Protein absorb maximally at
   a) 230 and 280nm b) 260 and 330nm
   c) 520 and 660nm d) 660nm
5. The pH meter works on the basis of
   a) Potentiometry b) Coulometry
   c) Amperometry d) Polarography
6. A method of thermal analysis in which changes in physical and chemical properties of materials are measured as a function of increasing temperature
   a) Thermogravimetry b) Differential scanning calorimetry
   c) Dielectric thermal analysis d) Isothermal microcalorimetry

7. Which of the following detectors is not commonly used for GC?

a) Fluorescence b) Flame ionization

c) Thermal conductivity d) Mass spectrometry

8. The principle of capillary electrophoresis

a) electroendoosmosis b) Ionization

c) absorption d) iontophoresis

9. The method of radiation measurement and detection based on ionization of gases

a) Geiger Muller counter b) Solid Scintillation

c) Liquid Scintillation d) Autoradiography

10. The commonly used matrix substance in MALDI TOF MS is

a) 2,5 dihydroxy benzoic acid b) PMMA

c) UHMWPE d) pHEMA

PART B (10 x 2 = 20 Marks)

11. List the basic electronic components and their functions.
12. What is calibration?
13. State Beer-Lambert's law.
14. Outline the applications of fluorescence spectroscopy.
15. Differentiate between potentiometry and voltametry.
16. What are ISFETs?
17. Relate the resolving power of a chromatographic column to the flow and kinetic parameters which may cause peak broadening.
18. Illustrate the principle of size exclusion chromatography.
19. Compare GM counting and scintillation counting in radiation detection.
20. What is electrospray ionization?

PART C (5 x 14 = 70 Marks)

21. a) (i) Define Validation in analytical instrumentation. (4)

(ii) Explain the parameters for the calibration of HPLC. (10)

(OR)

b) (i) What are the sources of noise in instrumental analysis? (4)

(ii) Illustrate with an example for signal-to-noise ratio enhancement. (10)

22. a) Explain the instrumentation and applications of UV-visible spectrophotometer.

(OR)

b) Explain in detail, the principle, instrumentation and applications of atomic absorption spectroscopy.

23. a) (i) What are the two basic types of thermogravimetric instruments? (4)

(ii) Explain the operating principle, sources of error and practical concerns in thermogravimetric analysis. (10)

(OR)

b) (i) Sketch basic block diagram of a biosensor. (4)

(ii) How Na^+/K^+ ions in the body fluids are determined using an ion selective electrodes? (10)

24. a) (i) Explain in detail, the principle of an ion exchange chromatography. (4)

(ii) Write the selection criteria for an ion exchange resins and add notes on the preparation of medium, procedure and applications of IEC. (10)

(OR)

b) (i) Differentiate between conventional chromatography and HPLC. (4)

(ii) Explain in detail about the HPLC instrumentation. (10)

25. a) How the structures of protein in the solution are determined? Explain the theory, principle and instrumentation involved.

(OR)

b) State Bragg's law. Explain the determination of crystal structures using X-ray diffraction.

****