Register Number: ……

B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2012

Fourth Semester

BIOTECHNOLOGY

BTY107: Instrumental Methods of Analysis

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

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. Which is the correct wavelength in ultraviolet region?

   (a) 180-400nm (b) 400-650nm (c) 1-180nm (d) 650-900nm

2. Convert the wave number of 2500 cm minus 1 to wavelength in A°.

   (a) $5*10^4$ A° (b) $4*10^4$ A° (c) $4*10^{-4}$ A° (d) $5*10^{-4}$ A°

3. The number of secondary electron produced at each dynode is 2, what is the total gain for a 9-stage multiplier phototube?

   (a) 400 (b) 200 (c) 700 (d) 500

4. Which of the following transitions needs greater energy?

   (a) n –sigma (b) π-π* (c) sigma-sigma* (d) sigma-sigma

5. Which parameters can be measured in therogravemetric methods?

   (a) Time (b) Temperature (c) Mass (d) Density

6. What type of carrier gas used for gas chromatography?

   (a) Methane (b) Sulpar (c) Hydrogen (d) Nitric oxide

7. What is the factor mainly affected by separation methods?

   (a) Concentration (b) Time (c) Velocity (d) Density

8. Which would be the best to separate a protein that binds strongly to its substrate?

   (a) Gel filtration (b) Affinity chromatography (c) Cation exchange (d) Anion exchange

9. What resolving power of mass spectrometer is required to separate the CH_2N-C_2H_4 double at mass 200?

   (a) 10000 (b) 20000 (c) 15000 (d) 12500

10. How many peaks would you expect in the low resolution NMR spectrum of vinyl chloride?

    (a) 5 (b) 4 (c) 3 (d) 6

PART B (10 x 2 = 20 Marks)

11. Find out the refraction index of solution through which light is passing at a velocity of $2.0*10^{-8}ms^{-1}$.

12. For infrared radiation of 5.00 micrometer, what is the wave number in cm^{-1}?
13. Define Ohm's law.
14. State the major differences between beer's law and lamberts law.
15. What reference material is used in DSC?
16. What are the advantages of potentiometric titration over indicator methods?
17. What are the methods employed to develop chromatogram?
18. List out the major differences between stationary phase and mobile phase.
19. Give four important advantages in NMR spectroscopy.
20. How will you determine cis-trans isomerism by X-ray diffraction?

PART C (5 x 14 = 70 Marks)

21. a) (i) How to classify the instrumental methods of analysis? (6)

(ii) Calculate the range in wavelength in nanometers that corresponds to every transition of 1.5 to 8.0 Ev, given data $h=6.62*10^{-27}$ erg.sec, $c=3*10^{-10}$cm/sec. (8)

(OR)

b) How are the physical properties used for chemical analysis and radiotracer techniques?

22. a) (i) Explain about the mechanism of electromagnetic spectrum. (6)

(ii) Describe the various components of UV-spectrometer. (8)

(OR)

b) Explain working principle of Atomic Absorption Spectroscopy and how will you determine metallic elements in food industry?

23. a) Explain the working principle of thermo-gravimetric instrumentation and what are the application of thermometric titration?

(OR)

b) Explain with the help of a diagram the principle involved in potentimetric titration and list out their advantage.

24. a) (i) Illustrate a gas chromatography instrument, describe the principal components. (8)

(ii) Describe three methods for the development of chromatogram. (6)

(OR)

b) Explain ion-exchange chromatography and list out their important application.

25. a) Explain the working principle of NMR spectroscopy and list out their application.

(OR)

b) (i) Write brief notes on the various types of spectroscopy. (6)

(ii) Discuss the application of diffraction methods to complexes. (8)

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