Reg. No. :

Question Paper Code: 54056

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Electronics and Instrumentation Engineering

15UEI406 - ANALYTICAL INSTRUMENTATION

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The potential of the measuring pH electrode may be written by means of the

    (a) Bernoulli's equation   (b) pH equation
    (c) Nernst equation   (d) Reference equation

2. The relationship between ammonia, ammonium ion and hydroxide is

    (a) $[NH_4^+] [OH^+] / [NH_3]$ = constant   (b) $[NH_4^+] [OH^-] / [NH_3]$ = constant
    (c) $[NH_4^-] [OH^-] / [NH_3]$ = constant   (d) $[NH_4^-] [OH^+] / [NH_3]$ = constant

3. Bee-Lambert law defines the relationship between _____ and _____.

    (a) Absorbance and concentration   (b) Concentration and absorbance
    (c) Transmittance and concentration   (d) Absorbance and transmittance

4.   The total fluorescence intensity is equal to

    (a) $F = \eta (P_0 - P)$ (b) $F = \eta (P - P_0)$ (c) $F = (P_0 - P)$ (d) $F = (P - P_0)$

5. In gas chromatography, the gas flow is in the range of

    (a) 10 – 200 ml/min   (b) 10 – 300 ml/min
    (c) 10 – 400 ml/min   (d) 10 – 500 ml/min

6. One Pascal is equal to

      (a) One Newton per square meter (N / m^2)
      (b) Two Newton per square meter $(2\ N / m^2)$
      (c) Three Newton per square meter $(3\ N / m^2)$
      (d) Four Newton per square meter $(4\ N / m^2)$

7. The spectral region for maximum radiation absorption for O_2 gas for its wavelength is

      (a) < 900 Å (ultraviolet)   (b) 1450 Å (ultraviolet)
      (c) 2.73, 4.25 and 14.93 μ   (d) 2.6, 20 and 52 μ (infrared)

8. The change in electrical conductivity takes place due to the formation of sulphuric acid by oxidation of the

      (a) Water   (b) Hydrogen peroxide
      (c) Sulphur trioxide   (d) Sulphur dioxide

9. In Mass spectrometer, atoms can be deflected by _____ fields to provide the atom is first turned into an ion.

      (a) Magnetic   (b) Electro magnetic
      (c) Non magnetic   (d) Electrolytic

10. If the number of neutrons and the number of protons are both even, then the nucleus has _____ spin.

      (a) one   (b) two   (c) three   (d) zero/no

PART - B (5 x 2 = 10 Marks)

11. State the application and disadvantage of bio-sensor.

12. What is meant by flame emission spectrometry?

13. Mention the different techniques of chromatography.

14. Define thermal conductivity of a gas.

15. What is the principle of Electron spin resonance?

PART - C (5 x 16 = 80 Marks)

16. (a) With a neat diagram, explain the construction and working of dissolved oxygen analyzer.   (16)

Or

    (b) With a neat diagram, explain the working of sodium analyzer.   (16)

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17. (a) Discuss about the working of Atomic Absorption Spectrophotometer (AAS).   (16)

Or

(b) Explain the construction and working of FTIR spectrophotometers.   (16)

18. (a) With a neat diagram, explain the construction and working of High Pressure Liquid Chromatography (HPLC) with advantages and disadvantages.   (16)

Or

(b) Describe the operation of flame ionization detector in detail.   (16)

19. (a) Explain the construction and working of NO_2 gas analyzer with a neat diagram.   (16)

Or

(b) Explain the construction and working of Infra-Red gas analyzers.   (16)

20. (a) With a neat sketch, explain the construction and working of Transmission Electron Microscope (TEM).   (16)

Or

(b) With a neat diagram, explain the working of electron spin resonance spectrometer.   (16)

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