KUMARAGURU
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Register Number: ……..

B.E or **B.TECH DEGREE EXAMINATIONS: NOV/DEC 2014**

(Regulation 2009)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

EIE110**:** Analytical Instruments

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Name the detector which is used to measure the intensity of infrared radiation.
   a) Thermocouple b) Photovoltaic cell
   c) Golay cell d) Photo conductivity cell
2. The elements present in the sample of flame photometer is mainly detected using _____
   a) Colour intensity of the flame b) Vapour intensity of the flame
   c) Odour of the flame d) Solubility of the sample
3. Gas chromatography is mainly used to separate _____
   a) Neutral substances b) Thermally stable components
   c) Complicated complex mixture d) Acids
4. The Electron capture detector is mainly used to detect _____
   a) Brominated fungicides b) Phenolic compounds
   c) Chlorinated pesticides d) Radiating materials
5. Mention toxic effect of carbon dioxide is _____
   a) Loss of appetite b) Leads to acid rain
   c) Causes green house effect d) Accumulation of fluids in lungs
6. The chemiluminescence reaction with ozonator is specific for_____
   a) NO_2 b) CO
   c) SO_2 d) NO

7. P^H=

a) $-\log_{10}[H+]$ b) $-\log_{10}\left[\frac{1}{H+}\right]$

c) $-\log_{10}[OH^-]$ d) $\text{Log}_{10}\left[\frac{1}{OH-}\right]$

8. _____is a good example for solid state sensor.

a) Biocatalytic electrode b) Fluoride electrode

c) Gas sensing electrode d) Reference electrode

9. The resolution range of double focusing spectrometers are _____

a) 10^5 range b) 10^{15} range

c) 10^4 range d) 10^{14} range

10. Scintillations are chemicals used to convert radiant energy into _____energy.

a) Light b) Electrical

c) Heat d) Thermal

PART B (10 x 2 = 20 Marks)

11. Define transmittance.
12. Name the sources used in Infrared Spectrophotometer.
13. Define retention time.
14. List any four advantages of HPLC over gas chromatography.
15. Formulate the equation for chemiluminescence method in NO measurement.
16. Classify the air pollutants according to state of matter.
17. Mention the features of bio-sensor.
18. Draw the diagram of calomel electrode.
19. Give some of the X-ray detectors.
20. Write the formula to calculate the mass spectra in magnetic spectra analyzer spectrometer.

PART C (5 x 14 = 70 Marks)

21. a) Elaborate on the working of the Flame Emission Photometer with diagram and list its applications.

(OR)

b) Derive Beer Lambert's law. Discuss the reasons for deviations of Beer's law.

22. a) Illustrate the operation of any two detectors used in Gas Chromatography.

(OR)

b) Point out the various stages of High Pressure Liquid Chromatography and explain with diagram.

23. a) Discuss in detail the operation of the Hay's magnetostrictive analyzer used for oxygen analysis and the principle of thermal conductivity.

(OR)

b) (i) List out the methods to estimate the amount of hydrocarbons present in air with neat Instrumentation setups. (7)

(ii) Explicate the working of smoke and dust meter with suitable diagram. (7)

24. a) How is pH measured using selective ion electrodes and hydrogen electrode? Explain with suitable diagram.

(OR)

b) (i) With a schematic diagram, explain the working principle of dissolved oxygen analyzer. (7)

(ii) Describe the working principle of Silica analyzer. (7)

25. a) Discuss the working principle of NMR spectrophotometer and mention its application.

(OR)

b) Elucidate the working of GM counter and proportional counter.

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