



B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U14EIT605:Analytical Instruments

COURSE OUTCOMES

- CO1: Understand the interaction of electromagnetic radiations with matter and apply analytical techniques to accurately determine the elements present in the given sample
- CO2: Select an Instrument for a particular analysis with idea of its merits, demerits and limitations
- CO3: Identify specific techniques employed for monitoring different pollutants in air and water
- CO4: Apply chromatography in real time industrial environment
- CO5: Apply various techniques for medical imaging and analysis

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO1 [K2]

List I	List II
A Calorimetry	i.Human visual response to light
B. Spectrophotometry	ii. separation of a mixture
C. Chromatography	iii. heat of chemical reactions
D. Photometry	iv. chemical substance absorbing light

- | | A | B | C | D |
|----|-----|----|-----|----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | iii | i |
| d) | iii | i | ii | iv |

2. The **Beer-Lambert law** (or **Beer's law**) is the linear relationship between _____ of _____ of an absorbing species. CO1 [K1]

- | | |
|-----------------------------------|---------------------------------|
| a) Concentration and illumination | b) absorbance and concentration |
| c) Reflectance and concentration | d) Scattering and reflectance. |

8. A **pH Meter** is a scientific instrument that measures the _____ CO2 [K1]
a) Sodium b) hydrogen-ion concentration
c) Dissolved oxygen d) conductivity
9. Assertion (A): A diffractometer is a measuring instrument for analyzing the structure of a material from the scattering pattern produced. CO2 [K3]
Reason (R): when a beam of radiation or particles (such as X-rays or neutrons) interacts with it.
a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true
10. A _____ is one capable of multiple rounds of mass spectrometry, usually separated by some form of molecule fragmentation CO5 [K2]
a) Fourier transform ion cyclotron b) tandem mass spectrometer
c) Linear quadrupole ion trap d) Time-of-flight

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Name two different types of IR spectrometers. CO1 [K₁]
12. Generalize the light sources used for atomic absorption spectrophotometers. CO2 [K₃]
13. Define chromatography CO4 [K₁]
14. Assess the limitations of bulk property detector. CO3 [K₅]
15. Recall the advantages of Hydrogen Sulfide analyzer. CO3 [K₁]
16. Define Thermal Conductivity of a gas. CO4 [K₁]
17. Cite examples for the general classification of pH cell. CO2 [K₂]
18. Determine the two measurements made in silicon analyzer. CO2 [K₂]
19. Recognize the two types of semiconductor detectors. CO5 [K₁]
20. Record the applications of NMR principle CO5 [K₁]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

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|--|-----|-------------------|
| 21. Compare the operation of single beam and double beam instruments used in UV spectrophotometer. | CO1 | [K4] |
| 22. Elaborate on the working principle of any two detectors used in liquid chromatography. | CO4 | [K ₃] |
| 23. Discuss in detail about the principle of magnetic susceptibility in O ₂ analyzer. | CO4 | [K3] |
| 24. Write in detail about the measurement techniques involved in Nitrogen Oxide analyzer. | CO3 | [K4] |
| 25. Describe the following: | CO3 | [K2] |
| a. Sodium Analyzer | | (7) |
| b. Measurement of Dissolved Oxygen Analyzer. | | (7) |
| 26. Illustrate the function of Industrial Sodium analyzer with neat sketch. | CO4 | [K3] |
| 27. Summarize the working principle of GM counter and proportional counter in detail. | CO5 | [K5] |
