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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0398 Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2007-08

ANALYTICAL INSTRUMENTATION

Time : 3 Hours] *[Total Marks : 100*

Note : (1) Attempt **all** questions.
(2) All questions carry **equal** marks.
(3) Be precise in your answers.

1 Attempt any **four** parts of the following : **5×4=20**

(a) How many types of internal energies are possessed by molecules? How it changes when radiation falls on it?

(b) What is explained through Beer Lambert Law?

(c) Explain the working principle of Absorption filter and Interference filter.

(d) Why Selenium is preferred in Barrier layer cell (BLC)? Explain the working of BLC in brief.

(e) How many types of Photoemmisive cells do you know? Give a practical application of any one of them and explain its working.

(f) Explain the working of a single beam filter Photometer.

2 Attempt any **four** parts of the following : **5x4=20**

(a) Which parameters are essentially measured by a Calorimeters? How does a true calorimeters differs from inferential calorimeters?

(b) Draw a block diagram of a microprocessor controlled spectrophotometer. What is the role of microprocessor in such type of spectrophotometer?

(c) Discuss the role of photoconductive detectors and thermal detectors in an Infrared Spectrophotometers.

(d) Draw a block diagram representation of a typical Fourier transform spectrometer.

(e) In a NMR spectrometer obtain the frequency of the resonance absorption, ν, for the following specifications:

$\mu = 2.797$ nuclear magnetrons

$H_0 = 23000$ Gauss

Nuclear Magnetons = $\beta = 5.049 \times 10^{-24}$ ergs - gauss^{-1}

Planck's Constant = 6.625×10^{-27} erg.s

(f) Discuss the role of a Radio-frequency transmitter in a nuclear magnetic resonance spectrometer.

3 Attempt any **two** parts of the following : **2×10=20**

(a) What is the basic principle of Flame Photometry? List the essential parts of a flame photometer.

(b) Discuss the working of an Atomic Absorption Spectrophotometers (AAS). With the help of AAS how one can measure the content of Mercury in water?

(c) Discuss the working of Pneumatic Nebulisers and Ultrasonic Nebulisers. Which of the two can produce finer aerosol?

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4 Attempt any **two** parts of the following : **2×10=20**

(a) Draw the schematic diagram of a time-of-flight mass spectrometer. Explain its working.

(b) List the factors responsible for the selection of a detector in a Gas Chromatography. Also mention these detectors with one practical application each.

(c) How qualitative and quantitative analysis can be done in a gas and liquid chromatography? Discuss the role of Planimeter in identifying and quantifying raw chromatographic information.

5 Write short notes on any **two** of the following : **2×10=20**

(a) Geiger Muller Counter

(b) X-ray Fluorescent Spectrometer.

(c) Gamma Spectrometry.

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