Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

FIFTH SEMESTER B.TECH (INSTRUMENTATION AND CONTROL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ANALYTICAL INSTRUMENTATION (ICE-321)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. Derive Beer-Lambert law and explain instrumental deviations of Beer- lambert law. **(5)**

1B. Explain any two types of radiation sources which are used in Ultraviolet spectrophotometer. **(3)**

1C. A particular sample of solution of colored substance knows to follow Beer's law shows 80% transmittance when measured in a cuvette of 1.0 cm optical path length. **(2)**

i) Calculate the percent transmittance for solution of twice concentration in the same cuvette.

ii) What must be the path length in a cuvette to same transmittance (80%) for a solution of twice the original concentration?

2A. Explain the reason to use two light sources in spectrophotometers. With neat diagram explain single beam Ultraviolet and Visible Spectrophotometers. **(3)**

2B. Explain working of photo diode array and list the advantages of photo diode array **(3)**

2C. Explain the working of infrared spectrophotometer which uses the principle of multiple internal reflections. **(4)**

3A. Explain the working of differential flame ionization detector. List the advantages of flame ionization detector. **(4)**

3B. Explain any two types of mass spectrometers. **(4)**

3C. What is the pH of a solution of 0.15 M HCl, 0.62 M KOH, and 0.15 M H2SO4? **(2)**

4A. Explain the technique used for the measurement of average spacing between rows of atoms. **(4)**

4B With neat diagram, explain electron spin resonance spectrometer. **(4)**

4C. Explain the reasons to use amplifiers in proportional counters **(2)**

5A.	Explain the method of detection of β particle using any one of the liquid scintillator.	**(3)**
5B.	With neat diagram, Explain liquid chromatography which is used for non-volatile liquids.	**(4)**
5C.	With a neat block diagram, explain the principle of gas chromatography.	**(3)**
6A.	Explain ion selective electrode which is used to measure silicon in a solution.	**(4)**
6B.	With a neat diagram, explain the working of oxygen analyzer which is used in medical field.	**(3)**
6C.	Explain the measurement of Carbon monoxide in a gas using infrared radiations.	**(3)**

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