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 chemical deviations of Beer- lambert law. **(5)**

1B. Explain different types of monochromators which are used in spectrophotometers. **(3)**

1C. A reflective diffraction grating contained 1750 grooves/mm. the angle of incidence of a band of polychromatic radiation was 48.2^o. Determine the wavelengths that are diffracted at an angle of -11.2^o. **(2)**

2A. Draw optical diagram for double beam UV and Visible spectrophotometry. Explain photomultiplier tube. **(4)**

2B. The molar absorptivity of the iron (II)-2,2',2"-terpyridyl complex is 1.11*10^4 at 522 nm. Calculate the concentration of the complex in a solution which has a percent transmittance of 36.5 at 522 nm in a cell with a path length of 1.00 cm. **(2)**

2C. With neat diagrams, explain the infrared spectrophotometer which uses encoding and decoding of different wavelength radiations. **(4)**

3A. Write the disadvantages of flame atomizer which uses nebulizer and with a neat diagram explain how those disadvantages of flame atomizer are resolved. **(4)**

3B. With neat diagram, explain flame emission spectrophotometer. **(3)**

3C. Explain principle of mass spectrometer and explain time of flight mass spectrometer. **(3)**

4A. Explain the procedure for generation of X- rays. **(3)**

4B. Explain the rules for finding the net spin of a nucleus and with neat diagram explain continuous wave NMR Spectroscopy. **(4)**

4C. Explain the detection of α particle using any one of the crystal scintillator. **(3)**

5A. Write the disadvantage of single piston reciprocating pump and explain how to overcome the disadvantage of single piston reciprocating pump. **(5)**

5B. Explain the principle of biosensors and explain the working of an optical biosensor. **(5)**

6A. Name the method of oxygen measurement based on curie's law and explain its working. **(4)**

6B. With neat diagram, explain measurement of ozone based on conductivity principle. **(3)**

6C. With a neat diagram explain chopper amplifier type P^H meter. **(3)**