

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

SEVENTH SEMESTER B.TECH. (INSTRUMENTATION & CONTROL ENGG.) **END SEMESTER EXAMINATIONS, NOV-2017**

SUBJECT: ANALYTICAL AND OPTICAL INSTRUMENTATION [ICE 4101]

Time: 3 Hours

MAX. MARKS: 50

3

2

5

3

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitably assumed.
- **1A.** Derive Beer-Lambert law and explain chemical deviations of Beer- lambert 5 law.
- Explain working of the photo diode array and list the advantages of photo 1B. 3 diode array.
- 1C. A reflective diffraction grating contained 1750 grooves/mm. the angle of 2 incidence of a band of polychromatic radiation is 48.2°. Determine the wavelengths that are diffracted at an angle of -11.2°.
- 2A. What is vibration spectroscopy? Explain the spectroscopy technique which 5 interprets all the infrared frequencies simultaneously.
- **2B.** Explain the technique for determining dimensions of crystal structure.
- 2C. Name the gas which is highly paramagnetic in nature and draw a schematic 2 for its measurement.
- 3A. What is chromatography? Explain gradient elution liquid chromatography with 4 UV-visible spectrometer as a detector.
- **3B.** Define the term Nuclear Magnetic Resonance (NMR) and write a procedure 3 of recording a NMR signal.
- 3C. Explain magnetic deflection type mass spectrometer with necessary 3 equations. 5
- **4A.** Derive the necessary condition for light amplification in a Laser.
- **4B.** Describe the interferometer used for measurement of angular velocity. 3
- **4C.** Differentiate homo-junction and Hetro -junction semiconductor laser.
- **5A.** What is Doppler effect? Explain the working of Laser Doppler velocimetry.
- 5B. Explain different types of holograms based on their recording.
- 5C. Draw the schematic of optical time domain Reflectometer. 2