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Roll No

MNT - 202**M.E./M.Tech., II Semester**

Examination, December 2015

Transduction and Measurements*Time : Three Hours**Maximum Marks : 70*

- Note :** i) This question paper contains total eight questions.
 ii) Attempt any five questions.
 iii) All questions carry equal marks.

- What are Pin photodiodes and Avalanche photodiode? Explain them under following headings:
 - Photodiode Structure
 - Working Principle
 - Energy band diagram
 Also explain the difference between Pin-photodiode and Avalanche photodiode.
- Explain the principle and working of Carbon Nano Tube Flow Sensor with the help of schematics. Discuss an example of it.
- What is meant by cryogenics? Discuss the application of cryogenic systems and advantages of using a cryostat.

- What is a "resonator" or "cavity" in a semiconducting laser, discuss about cavity losses? Explain how the probability of stimulated absorption and emission depends on the populations of the upper and lower states.
- What is Rayleigh scattering? Explain how this phenomenon can be exploited for Nanoparticles sample characterization.
- Describe the general features of a standard 'Clean Room' used for research purpose. Discuss the air flow principle and steps required to achieve a clean room.
- Explain the Working principal, Structure and Instrumentation of Physical Property Measurement System (PPMS) (for any one physical property of a sample).
- Write short notes on any two of the following:
 - Photodiodes
 - Quantum Dot lasers
 - Kelvin probe measurement technique
 - Process of Liquefaction of Helium
