Reg.No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University, Manipal – 576 104

VII SEM. B.Tech. (MECHANICAL/ I & P ENGG.) END SEMESTER EXAMINATIONS NOV/DEC 2015

SUBJECT: NANOTECHNOLOGY (MME 451)

REVISED CREDIT SYSTEM

Time: 3 Hours. MAX.MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.

1A	What are secondary electrons and backscattered electrons? What are their applications in Scanning Electron Microscopy?	**(3)**
1B	What is an elastic hinge guide system? Draw the sketches of linear, torsional and combined motions.	**(5)**
1C	What is photolithography? Explain how its resolution can be reduced?	**(2)**
2A	Explain the mechanism of material removal in atomic bit processing in no defect or subatomic range, using Modified Morse plot of interatomic spacing Versus free potential energy.	**(3)**
2B	With sketches explain the constant height mode and constant current mode of operation of a Scanning Tunneling Microscopy (STM).	**(4)**
2C	With necessary sketches explain the fabrication process of holographic gratings.	**(3)**
3A	With necessary diagram explain directional ion beam processing.	**(5)**
3B	With neat and labelled sketches explain the various configurations of hydrostatic slides used for nano-positioning.	**(5)**
4A	With necessary sketch briefly explain the Molecular beam surface processing or Molecular beam epitaxy.	**(2)**

4B	Why Nano-grinding is preferred over nano- turning in machining of hard and brittle materials? With a neat sketch explain Electrolytic in-process dressing of Metal bonded diamond wheels.	**(4)**
4C	With necessary sketches explain Nano-Glassy servo system.	**(4)**
5A	Explain how Nanotechnology can be used for sustainable development in developing countries?	**(5)**
5B	With block diagram explain the servo control system for tool positioning of nanometer system.	**(5)**
6A	With necessary sketches explain the working principle of High Precision Optical Surface Sensor (HIPOSS).	**(3)**
6B	With necessary sketches explain the manufacturing process of ultra-precision balls for roller bearings.	**(4)**
6C	With a neat and labelled sketch explain the working of Laser interferometer which uses Heterodyne method with a two-wavelength Zeeman laser.	**(3)**