Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

VI SEM B.TECH. (BME) DEGREE MAKE-UP EXAMINATIONS, JUNE 2018
SUBJECT: INTRODUCTION TO BIOMEDICAL NANOTECHNOLOGY (BME 4012)
Revised Credit System
Friday, 22nd June 2018: 2 to 5 PM

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer ALL questions.**
2. **Draw labeled diagram wherever necessary**

1.	(a)	Explain electrostatic stabilization mechanism" of nanoparticles.	5
	(b)	Explain the mechanisms for reduction of overall surface energy in nanomaterials.	5
	(c)	Explain the effect of shape and size of metallic nanoparticles in optical absorption.	10
2.	(a)	Describe hydrothermal, sonochemical, and sol-gel routes for nanomaterial synthesis.	10
	(b)	Explain different electron-matter interactions and their significance in Transmission Electron Microscopy (TEM).	10
3.	(a)	Explain UV/Visible absorption spectroscopy and photoluminescence spectroscopy.	10
	(b)	Explain the principle behind and operation modes of Scanning Tunneling microscopy (STM).	10
4.	(a)	Explain Surface-Enhanced Raman Scattering (SERS) for bio-sensing and give a design example.	10
	(b)	Design a pH controlled Fluorescence Resonance Energy Transfer (FRET) activated drug delivery system. □ FRET is controlled by pH (normal & tumor tissue) □ Drug delivery is activated by FRET controlled luminescence	10
5.	(a)	Explain the concept pertaining to photodynamic therapy based on nanomaterials	10
	(b)	Explain in detail, the effect of nanomaterials in biological systems.	10