Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SECOND SEMESTER M.TECH (E & C) DEGREE END SEMESTER EXAMINATION
MAY / JUNE 2016
SUBJECT: NANOELECTRONICS (ECE - 566)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Explain the operation of SEM with a neat diagram.

1B. Derive the relationship between the atomic radius and the lattice parameter in SC, BCC, and FCC structures when one atom located at each lattice point.

1C. Explain how the surface of PDMS can be made hydrophobic and hydrophilic?

(5+3+2)

2A. Derive the Bragg's law.

2B. Calculate the probability of an electron tunneling through a potential barrier. Consider an electron with an energy of 2 eV impinging on a potential barrier with V_0= 20 eV and a width of 3 Å.

2C. Explain the M-H curve of a ferrimagnet.

(5+3+2)

3A. Consider the final structure the shown in **Figure 3A**. Explain the fabrication step to obtain the structure using E-beam lithography.

3B. Explain the operation of Datta-Das spin transistor.

3C. Within a cubic unit cell, sketch the following directions (i) [-1 1 0] (ii) [-1 -2 1].

(5+3+2)

4A. In a x-ray diffraction experiment of α-iron taken using a diffractometer and monochromatic x-radiation having a wavelength of 0.1542 nm; each diffraction peak on the pattern has been indexed at 45^o, 65.1^o and 82.8^o.
i) Compute the interplanar spacing for each set of planes indexed;
ii) Determine the lattice parameter of Fe for each of the peaks.

4B. Explain the fabrication of Quantum Wells.

4C. Explain the basic principle of Biosensor.

(5+3+2)

5A. Explain the processes involve in CVD. Also explain the CVD growth of graphene.

5B. Explain the fabrication of Silicon Nanowires using VLS technique.

5C. Determine the density of BCC iron, which has a lattice parameter of 0.2866 nm. Given Atomic mass= 55.847 g/mol.

(5+3+2)

6A. With ne diagram, explain the concept of micro contact printing of Proteins with neat diagrams.

6B. Explain the basic principle of UV-NIL process.

(5+5)

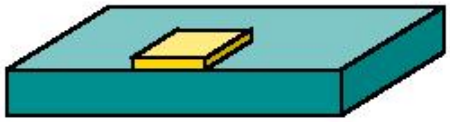

Figure 3A.