Enrollment No: _____ Exam Seat No: _____

C.U. SHAH UNIVERSITY

Winter Examination-2018

Subject Name: Nano-Science and Thin Film Physics

Subject Code: 5SC03NST1 Branch: M.Sc. (Physics)

Semester: 3 Date:04/12/2018 Time: 02:30 To 05:30 Marks: 70

Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 Attempt the Following questions **(07)**

a. Name the different quantum nanostructures.
b. Abbreviate: SNOM
c. How does Quantum Confinement affect the properties of Nanoparticles?
d. Which are the different modes of AFM operation?
e. Name the three factors that affect any microscopic technique.
f. Which is better, Electron beam Lithography or X-ray Lithography?
g. Give two properties of Evanescent waves.

Q-2 Attempt all questions **(14)**

a. Enumerate on the different methods used to synthesize CNTs. **(07)**
b. Discuss how TEM produces topographical images of samples? **(07)**

OR

Q-2 Attempt all questions **(14)**

a. Explain the working of STM in detail. **(07)**
b. How are nano clusters obtained by various reduction methods? **(07)**

Q-3 Attempt all questions **(14)**

a. Explain how AFM method is useful in surface studies? **(07)**
b. Explain Raman Spectroscopy as a thin film characterization technique. **(07)**

OR

Q-3
a. How one can measure thickness of a thin film using Stylus Profilometry? **(06)**
b. Explain the different stages governing the growth of thin films **(08)**

SECTION – II

Q-4 **Attempt the Following questions** **(07)**

a. Define Sputtering.
b. How are Auger electrons helpful in characterizing thin films?
c. Name the different epitaxial methods used for thin film preparation.
d. What are MEMS?
e. State the main difference between RHEED and LEED.
f. Why is thickness measurement so important for thin films?
g. Give two differences between PVD and CVD techniques

Q-5 **Attempt all questions** **(14)**

a. Discuss PVD technique for making thin films. **(07)**
b. Give an account on Photo and Electron beam lithography **(07)**

OR

Q-5
a. Elaborate on CVD technique and its types. **(08)**
b. Write a note on: DC sputtering. **(06)**

Q-6 **Attempt all questions** **(14)**

a. Explain LEED technique in detail. **(07)**
b. MBE is one of the best methods used in thin film preparations. Justify **(07)**

OR

Q-6 **Attempt all Questions**

a. Give major differences between LPE and VPE methods **(07)**
b. 'RBS can be used to characterize thin films'. Justify the statement **(07)**