Enrollment No:	Exam Seat No:	
	C.U. SHAH UNIVERSITY	
	<b>Summer Examination-2019</b>	

**Subject Name: Nano-Science and Thin Film Physics** 

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

Semester: 3 Date: 18/03/2019 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.	Give two applications of SNOM				
	b.	How does Contact mode in AFM operation work?				
	c.	Define evanescent waves and give some of its properties				
	d.	Which has better resolution: Electron beam Lithography or X-ray Lithography?				
	e.	How Size Effect affects the properties of Nanoparticles?				
	f.	Define Contrast in Microscopic Techniques.				
	g.	Name the different quantum structures				
Q-2		Attempt all questions	(14)			
	a.	Discuss two methods to synthesize CNTs	07			
	b.	Discuss the principle and working of TEM	07			
		OR				
Q-2		Attempt all questions	(14)			
	a.	Explain the working of STM in detail.	07			
	b.	Explain how is SNOM method is useful in surface studies?	07			
Q-3		Attempt all questions	<b>(14)</b>			
	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.	Enumerate on Lithography techniques.	06			



**b.** Explain the different stages governing the growth of thin films

**08** 

## SECTION – II

Q-4		Attempt the Following questions	(07)
	a.	Give the full form of RHEED.	
	b.	What are NEMS?	
	c.	Name the different epitaxial methods used for thin film preparation.	
	d.	Write the principle of Auger Electron Spectroscopy.	
	e.	Define the process of Sputtering used in thin film preparation.	
	f.	Why thickness measurement is 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.	Enumerate on the working of MBE	07
0.5		OR	0.0
Q-5	a.	Explain in detail the different epitaxial methods used for Thin film preparation.	08
	b.	Write a note on: DC sputtering.	06
<b>Q-6</b>		Attempt all questions	(14)
	a.	Explain LEED technique in detail.	07
	b.	Elaborate on CVD technique and its types.	07
		OR	
<b>Q-6</b>		Attempt all Questions	
	a.	Discuss RBS technique used in thin film characterization.	07
	b.	'AES can be used to characterize thin films'. Justify the statement	07

