Enrollment No:	Exam Seat No:

C. U. SHAH UNIVERSITY

Winter Examination-2021

Subject Name: Nanoscience and Nanotechnology

Subject Code: 4SC05NSN1 Branch: B.Sc. (Physics)

Semester: 5 Date: 15/12/2021 Time: 11:00 To 02:00 Marks: 70

Instructions:

- (1) Use of Programmable calculator & 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.

Q-1		Attempt the following questions:	(14)
	a)	Reflect your view on the term"Nanomaterials".	01
	b)	Convert 1 nm in the units of cm.	01
	c)	How many hydrogen atoms can possibly be placed in 1 nm?	01
	d)	What changes do you expect in the electrical properties of materials, while reducing their size to nano range?	01
	e)	Classify nanomaterials based on their dimension.	01
	f)	How does surface/volume ratio play a significant role in tuning the properties of nanomaterials?	01
	g)	Mention an example for nanostructures.	01
	h)	Calculate the volume of a sphere having a radius of 20 mm.	01
	i)	Name the two approaches widely used for the synthesis of nanomaterials.	01
	j)	Mention the full form of SWCNT.	01
	k)	Why are secondary electrons considered for the surface morphology analysis in a scanning electron microscopy?	01
	1)	What does CVD stand for?	01
	m)	Mention the principle on which TEM works?	01
		What do you understand by quantum confinement effect?	01
Atter	npt any	four questions from Q-2 to Q-8	
Q-2		Attempt all questions	(14)
	a)	Write a note on the magnetic properties of nanomaterials.	07
	b)	Enumerate on any one of the PVD technique for the synthesis of nanomaterials.	07
Q-3		Attempt all questions	(14)
_	a)	Highlight a few challenges existing in the field of nanotechnology.	07
	b)	Briefly explain the reported mechanical properties of materials in the nano scale.	07



Q-4		Attempt all questions	(14)
	a)	Write a concise note on carbon nanotubes.	07
	b)	Describe how the Ball Milling technique is being widely used for nano material synthesis.	07
Q-5		Attempt all questions	(14)
	a)	Discuss in detail, the properties of carbon nanotubes. How do SWCNTs differ from MWCNTs?	07
	b)	Write a note on Sol-gel method for the synthesis of nanoparticles.	07
Q-6		Attempt all questions	(14)
	a)	Briefly explain the observed thermal properties of nanomaterials.	06
	b)	Describe the principle, working and significance of SEM.	08
Q-7		Attempt all questions	(14)
	a)	Briefly discuss X-Ray diffraction (XRD) technique with necessary diagrams. On which law of physics does the XRD work?	07
	b)	Discuss Atomic Force Microscopy (AFM) in detail with necessary diagrams. Mention the modes in which the AFM is used.	07
Q-8		Attempt all questions	(14)
	a)	Discuss few applications of Nanotechnology.	09
	b)	Draw a diagram of TEM instrument. How do SEM and TEM differ?	05

