Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2143902 **Date: 03/06/2017**

Subject Name: Physics of Nanomaterials

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define semiconductor.	
	2	What is the value of band gap for wide band gap semiconductor.	
	3	Give the example of wide band gap semiconductor.	
	4	Define photonic crystal.	
	5	Define chiral vector.	
	6	Define quantum confinement	
	7	Define lattice	
	8	What is reciprocal lattice?	
	9	Define direct band gap.	
	10	Define homo junction	
	11	What is hetero junction?	
	12	Define effective mass of electron.	
	13	Define quantum well	
	14	Define exciton.	
Q.2	**(a)**	Explain quantum confinement effect.	**03**
	(b)	Describe one dimensional quantum confinement system with require diagram.	**04**
	(c)	Explain the carbon nano tube with their application.	**07**
		OR	
	(c)	Define lattice. Explain lattice point and lattice space.	**07**
Q.3	**(a)**	Write not on energy band gap diagram for semiconductor	**03**
	(b)	What is band gap? Explain direct – indirect band gap.	**04**
	(c)	Explain hetero junction.	**07**
		OR	
Q.3	**(a)**	Describe conductor in sense of energy band gap.	**03**
	(b)	Explain indirect band gap with neat diagram	**04**
	(c)	Explain modification in energy band gap by temperature alloys and composition.	**07**
Q.4	**(a)**	What is Type-I hetero structure? Explain it.	**03**
	(b)	Describe photonic crystal.	**04**
	(c)	Explain Nano structure materials.	**07**
		OR	
Q.4	**(a)**	What is Type-II hetero structure? Explain it.	**03**
	(b)	What is Nano cluster? Explain it.	**04**
	(c)	Classify the quantum confined system.	**07**
Q.5	**(a)**	Describe magic number.	**03**
	(b)	Explain excitons in bulk.	**04**
	(c)	Describe spherical cluster approximation.	**07**
		OR	

Q.5	**(a)**	Describe rare gas cluster.	**03**
	(b)	What is unit cell? Explain unit cell for quantum well and quantum dot.	**04**
	(c)	Describe the electronic structure in quantum well.	**07**

****