P P SAVANI UNIVERSITY

First Semester of B. Tech. Examination

January 2023

SESH1210 Applied Physics

10.01.2023, Tuesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	MCQ/Short Question/Fill in the Blanks.	**[10]**	**CO**	**BTL**
(i)	Dual nature of matter was predicted by		**1**	**1,2**
	(a)Schrodinger (b) Louis de-Broglie (c) G.P. Thomson (d)Werner Heisenberg			
(ii)	The function representing matter waves must be		**1**	**1,2**
	(a) complex (b) real (c) zero (d) infinity			
(iii)	Which of the following can act as both a particle and as a wave?		**1**	**2,3**
	(a) photon (b) electron (c)neutron (d)all of these			
(iv)	Which of the following is not a characteristic of a musical sound?		**2**	**2,3**
	(a) Pitch (b) Wavelength (c) Quality (d) loudness			
(v)	The minimum value of threshold intensity is ..... Wm^{-2}		**2**	**1,4**
	(a) 1 (b) 10^{-21} (c) 0 (d) 10^{-12}			
(vi)	Which of the following is a piezoelectric material?		**2**	**1,3**
	(a) Iron (b) Nickel (c) Quartz (d) None of above			
(vii)	Nanoscience is the study of objects whose size is		**2**	**1,2**
	(a)1-10 nm (b) 1-100 mm (c) 1-1000 nm (d) 1-100 nm			
(viii)	Chemical solution deposition is also known as		**2**	**1,3**
	(a) PVD (b) Sol-gel (c) CVD (d) Lithography			
(ix)	Type–II superconductors are also called ..... superconductors.		**3**	**2,3**
	(a) hard (b) medium (c) magnetic (d) soft			
(x)	In low temperature superconductors ..... is used as coolant.		**3**	**1,4**
	(a) liquid nitrogen (b) liquid helium (c) water (d) Dynalene HC-30			
Q - 2 (a)	Find the kinetic energy of an electron with de-Broglie wavelength of 0.2 nm. (Given $h = 6.62 \times 10^{-34}$ JS, $m_e = 9.1 \times 10^{-31}$ Kg)	**[04]**	**1**	**5,6**
Q - 2 (b)	Explain increase in surface area to volume ratio for nanomaterials.	**[04]**	**2**	**1,3**
Q - 2 (c)	Summarize: (I) Superconductivity (II) Critical Temperature with diagrams.	**[04]**	**3**	**1,2**
	OR			
Q - 2 (a)	Explain Heisenberg uncertainty principle.	**[04]**	**1**	**2,3**
Q - 2 (b)	Explain physical vapour deposition technique (PVD).	**[04]**	**2**	**1,2**
Q - 2 (c)	Write a short note on Josephson effect.	**[04]**	**3**	**2,4**
Q - 3	Answer the following (Any one)	**[08]**		
(i)	What is piezo electric effect? Explain construction and working		**2**	**1,3**

	Piezoelectric generators.			
(ii)	Explain any 4 factors affecting acoustics of buildings and their remedies.		2	2,3
	SECTION – II			
Q - 1	MCQ/Short Question/Fill in the Blanks.	[10]		
(i)	Which types of lasers use gas as a medium?		4	1,2
	(a) Semiconductor Lasers (b) Gas Lasers (c) Solid State Lasers (d) Dye Lasers			
(ii)	Energy source is the medium where population inversion takes place. (True or False)		4	1,3
(iii)	Nd:YAG is which type of lasers ?		4	1,3
	(a) Semiconductor Lasers (b) Gas Lasers (c) Solid State Lasers (d) Dye Lasers			
(iv)	The numerical aperture is defined as the .....of acceptance angle.		4	1,2
	(a) Sin (b) Cos (c) Sec (d) Cot			
(v)	Cladding is the central layer surrounded by Core. (True or False)		4	1,2
(vi)	The transmission loss is very high in Optical fiber. (True or False)		4	2,3
(vii)	In conductors large number of .....are available for conduction.		5	1,2
	(a) protons (b) neutrons (c) electrons (d) atoms			
(viii)	The N-type semiconductors are doped with pentavalent impurities. (True or False)		5	1,3
(ix)	In ..... semiconductors, the number of electrons are equal to the number of holes.		5	2,3
	(a) intrinsic (b) extrinsic (c) p-type (d) n-type			
(x)	P-N junction diode includes two layers of semiconductors. (True or False)		5	1,2
Q - 2 (a)	What do you mean by spontaneous emission and stimulated emission? Explain it with a proper diagram.	[07]	4	1,2
Q - 2 (b)	Describe the application of an Optical fibre in communication system.	[07]	4	2,3
Q - 2 (c)	Classify metal, semiconductor and insulator using band theory.	[06]	5	3,4
	OR			
Q - 2 (a)	Explain Construction and Working of Nd:YAG Laser with proper diagrams.	[07]	4	2,3
Q - 2 (b)	Explain Working Principle of an Optical fibre.	[07]	4	2,4
Q - 2 (c)	What are transistor ? Explain all the regions of it.	[06]	5	4,5

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create