P P SAVANI UNIVERSITY

First Semester of B. Tech. Examination

January 2022

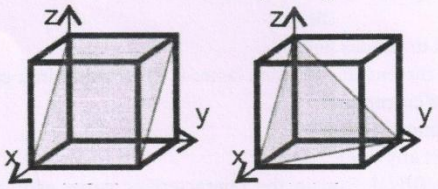
SESH1210 Applied Physics

25.01.2022, Tuesday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

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

SECTION – I

Q - 1	**Answer the Following.**	**[05]**
(i)	Give any two differences between matter waves and electromagnetic waves.	
(ii)	What are the Properties of sound absorbing material?	
(iii)	Give the Miller indices for the planes given below: 	
(iv)	What do you mean by One dimensional nanomaterial?	
(v)	Give the full form of (I)SEM (II)TEM.	
Q - 2 (a)	Derive the expression for energy levels of a particle enclosed in 1-D potential box of width "L" and infinite length.	**[05]**
Q - 2 (b)	(I)List any four Characteristics of Sound.	**[04]**
	(II) Define Ultrasonic Wave.	**[01]**
	OR	
Q - 2 (a)	Derive time independent Schrödinger's equation.	**[05]**
Q - 2 (b)	(I) What is the wavelength of Ultrasonic wave of frequency 330 kHz at 0^0C?	**[04]**
	(II) What is sound Insulation?	**[01]**
Q - 3 (a)	(I)Explain Bragg's law for X-ray diffraction with an appropriate diagram.	**[04]**
	(II)Define: Unit cell	**[01]**
Q - 3 (b)	Explain the terms given below for nanomaterial: (I) Increase in surface area to volume ratio (II) Quantum confinement	**[05]**
	OR	
Q - 3 (a)	(I)State any four Properties of X-Rays.	**[04]**
	(II)What is the difference between Crystalline material and Amorphous material?	**[01]**
Q - 3 (b)	Write applications of nano materials.	**[05]**
Q - 4	**Answer the Following (Attempt any one).**	**[05]**
(i)	Find the kinetic energy and group velocity of an electron with de-Broglie wavelength of 0.2 nm.	
(ii)	Explain: PVD (Physical vapour deposition technique) for the synthesis nano materials.	

SECTION – II

Q - 1	**Answer the Following.**	**[05]**
(i)	Write the full form of LASER.	
(ii)	State Ohm's law.	

(iii)	Explain the term: intrinsic semiconductor & extrinsic semiconductor	
(iv)	Define: Power factor	
(v)	In AC circuit the apparent power is always more than actual power. True / False?	
Q - 2 (a)	Using appropriate diagrams explain absorption, spontaneous emission and stimulated emission.	[05]
Q - 2 (b)	Write a short note on FET or Explain Construction, working and Output Characteristics of FET.	[05]
	OR	
Q - 2 (a)	Discuss the advantages of Optical fiber communication system over coaxial communication system.	[05]
Q - 2 (b)	What do you mean by Peak value, Average value and RMS Value of AC current or voltage? Explain with a proper diagram.	[05]
Q - 3 (a)	Obtain the formula of power factor for R-L-C series circuit and also discuss the cases When $X_L > X_C$, $X_C > X_L$ and $X_L = X_C$. Where X_L = Inductive reactance and X_C = Capacitive reactance	[05]
Q - 3 (b)	1. A 240 V, 50 Hz AC supply is applied a coil of 0.08 H inductance and 4 Ω resistance connected in series with a capacitor of 8 μF. Calculate the Impedance and Circuit current.	[03]
	2.What is the difference between ordinary light and Laser beam?	[02]
	OR	
Q - 3 (a)	Discuss the application of LASER in various field.	[05]
Q - 3 (b)	1.In a common base connection, current amplification factor is 0.9. If the emitter current is 1mA, determine the value of base current.	[03]
	2. Explain Active medium and Optical resonator	[02]
Q - 4	**Answer the Following (Attempt any one).**	[05]
(i)	What is Unijunction Transistor (UJT)? Explain the Characteristic curve of Unijunction Transistor (UJT).	
(ii)	Explain Kirchhoff's Laws for junction and loop using appropriate diagram.	

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