GBCS Scheme

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USN	1	17	PHY12/22
	<u></u>	First/Second Semester B.E. Degree Examination, June/July	2018
		Engineering Physics	
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Tir	me:	3 hrs. Max. I	Marks: 100
	N	ote: 1. Answer any FIVE full questions, choosing one full question from each n	nodule.
		2. Physical constants: $C = 3 \times 10^{9} \text{ m/s}$, $h = 6.63 \times 10^{-34} \text{ JS}$, $K = 1.38 \times 10^{-9} \text{ JS}$	$10^{-23}J/K$
		$m = 9.11 \times 10^{-31} \text{kg}$, $e = 1.6 \times 10^{-19} \text{C}$, $NA = 6.02 \times 10^{26} \text{kmol}$.	ŀ
		Module-1	
1	a.	Define a black body Deduce Wien's law and Rayleigh Jeans law from Pl	anks law of
		Radiation.	(07 Marks)
		Set – up One dimensional time independent Schrodinger wave equation.	(06 Marks)
	c. d.	Explain the energy distribution in the spectrum of Black body. An electron is bound in one dimensional potential well of width 0.12nm. Find	(03 Marks)
	u.	values in the ground state and also in first two excited states.	u the energy (04 Marks)
		ground state and also in this two excited states.	(04 Marks)
		OR	
2	a.,	State Heisenberg's Uncertainty Principle. Show that free electrons cannot exist	
		hucleus.	(07 Marks)
$\mathcal{J}_{\mathcal{L}}$	(B)	Define Phase Velocity and Group Velocity. Derive the relation between them. Write a note on Compton effect.	(06 Marks)
المري	ىرى d.	A particle of mass 0.65MeV/C^2 has free energy 120MeV. Find its deBroglie	(03 Marks)
		[Where 'C' is speed of light].	(04 Marks)
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_		Module-2	•
3	a. L	What is Fermi Factor? Discuss the variation of Fermi factor with temperature.	(07 Marks)
	b. c.	What is Superconductivity? Explain Type – I and Type – II superconductors. Define: i) Mean collision time ii) Relaxation time iii) Wrift velocity.	(06 Marks)
	d.	Find the probability that an energy level at 0.2eV below fermi level being	(03 Marks)
		temperatures 300K and 1000K.	(04 Marks)
		OR OR	Ť
4	a.	Derive the expression for electrical conductivity by using Quantum free electron	
	b.	case of metals. Explain the failures of CFET. (Classical Free Electron Theory).	(07 Marks)
	c.	Write a note on High temperature superconductors.	(06 Marks) (03 Marks)
	d.	The electron and hole mobilities of silicon are 0.14 m ² V ⁻¹ S ⁻¹ and 0.05 m ² V ⁻¹ S ⁻¹	respectively
		at a certain temperature. If the electron density is 1.5×10^{16} electrons/m ³ then c	alculate the
		resistivity of silicon.	(04 Marks)

Module-3

Module-3
Obtain an expression for energy density of radiation in terms of Einsteins co-efficient.

(07 Marks)

Write a note on different types of optical fibers.

(06 Marks)

Mention any three applications of LASERS.

d. Calculate the Numerical aperture, V - number and and number of modes in an optical fibre of core diameter 50 µm. Refractive indices are 1.41 and 1.40 respectively at wavelength of (04 Marks)

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(03 Marks)

(04 Marks

OR

a. Explain the construction and working of CO₂ Laser with the help of energy level diagram. (07 Marks) What is Holography? With a neat diagram, explain the recording and reconstruction process of a Hologram. (06 Marks Define: i) Numerical Aperture ii) Angle of Acceptance iii) Attenuation. (03 Marks d. Find the ratio of the populations of the two states in a material that produces light o wavelength 6328 Å at 27°C. (04 Marks What are Miller Indices Derive an expression for Interplanar distances in terms of Miller (07 Marks) b. Explain Bragg's X - ray Spectrometer. (06 Marks) c. Define: i) Unit cell ii) Bravaice Lattice Primitive cell. (03 Marks) Draw the following planes in a cubic unit cell: iii) $(1 \overline{1} 2)$ (1.11) ii) (0.20) $(3\ 0\ 1).$ (04 Marks) OR Explain in brief the Seven Crystal systems, with neat diagrams. (07 Marks Explain the crystal structure of diamond. (05 Marks) Calculate APF for BCC and FCC structures. (04 Marks X - rays are diffracted in the first order from (110) plane of cubic crystal with lattice \Rightarrow constant 3.036 \mathring{A} at a glancing angle 9.6°. Calculate the wavelength of X – rays (04 Marks) Module-5 What are Shock waves? Explain the construction and working of Reddy (07 Marks What are Nano materials? Explain the Sol – gel method of synthesis of nano materials. (06 Marks Mention four applications of shock waves. (04 Marks d. Calculate the wavelength of an electron accelerated under a potential difference of 100V in SEM. (03 Marks OR Explain the principle, construction and working of Scanning Electron Microscope. (07 Marks Define Carbon Nanotubes (CNTs). Discuss pyrolysis method of obtaining CNTs. (06 Marks

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d. Distinguish between Acoustic, Ultrasonic, Subsonic and Supersonic waves.

Mention three applications of CNTs: