CBCS SCHEME - Summer Semester

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BPHYS102/202

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025
Applied Physics for CSE Stream

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Formula Hand Book is permitted.

		Module – 1	M	L	C
1	a.	Mention the characteristic properties of LASER light and discuss the interaction of Electromagnetic radiation with matter.	9	L2	CO1
	b.	Obtain an expression for Numerical Aperture and acceptance angle for an optical fibre.	6	L2	CO2
	c.	The N.A. of an optical fibre is 0.2 when surrounded by air. Determine the R.I. of its core given the R.I. of the cladding is 1.59. Also find the acceptance angle when fibre is in water. Assume R.I. of water is 1.33.	5	L3	CO1
		OR			
2	a.	Obtain the expression for energy density using Einstein's A and B coefficients.	9	L2	CO1
	b.	Discuss the types of optical fibres on the basis of Refractive Index profile, Geometry and ray diagram with neat diagrams.	6	L2	CO1
	c.	In a diffraction grating experiment the LASER light undergoes second order diffraction for diffraction angle 1.48° the grating constant d = 5.05×10^{-5}m and the distance between the grating and screen is 0.60m, find the wave lengths of LASER.	5	L3	CO1
		Module – 2			
3	a.	Set up one dimensional Schrödinger time independent wave equation for matter waves.	8	L2	CO2
	b.	State Heisenberg uncertainly principle and principle of complementarity and show that electron does not exists inside the nucleus.	7	L2	CO2
	c.	Calculate the energy of an electron in first three allowed states in an one dimensional potential well of width 0.1 nm.	5	L3	CO2
		OR			
4	a.	Derive an expression for energy Eigen function and energy Eigen value equation for a particle in an one dimensional potential well of infinite height using Schrödinger Wave equation.	10	L2	CO2
	b.	Discuss de Broglie hypothesis of wave particle dualism.	5	L2	CO2
	c.	Calculate the de Broglie wavelength associated with neutron of mass 1.674×10^{-27} k.g travelling with one tenth part of the velocity of light.	5	L3	CO2
		Module – 3			
5	a.	Discuss Moore's Law, it's end, what is qubit and mention the properties of qubits.	7	L2	CO2
	b.	Discuss C NOT gate and its operation on four different input states and write truth table.	8	L2	CO2

	c.	Given $\|\psi>=\begin{pmatrix}\alpha_1\\ \alpha_2\end{pmatrix}$ and $\|\phi>-\begin{pmatrix}\beta_1\\ \beta_2\end{pmatrix}$ Prove that $<\psi\|\phi\rangle = <\phi\|\psi>^*$	5	L3	CO2
		OR			
6	a.	State Pauli Matrices. Compute Paulimatrices operations on $\|0\rangle$ and $\|1\rangle$	8	L2	CO2
	b.	Discuss single Qubit and multiple quantum logic gates with example for each.	8	L2	CO2
	c.	Explain matric representation of 0 and 1 states and apply identity operation I to $\|0\rangle$ and $\|1\rangle$ states.	4	L2	CO3
		Module – 4			
7	a.	Describe Meissner effect and classification of super conductors using M-H graphs.	9	L2	CO3
	b.	Discuss the failure of classical free electron theory.	6	L2	CO3
	c.	Calculate the probability of an electron occupying an energy level 0.02 eV above the Fermi level at 200 K and 400 K is a material.	5	L3	CO3
		OR			
8	a.	What is Super Conductivity? Discuss BCC theory of super conductivity.	6	L2	CO3
	b.	Define Fermi, factor. Discuss the temperature variation of fermi factor with energy and temperature.	7	L2	CO3
	c.	A super conductivity T_{in} has a critical temperature of 3.7 K at zero magnetic field and critical field of 0.0306 Tesla. Find the critical field at 2 K.	7	L3	CO3
		Module – 5			
9	a.	What are frame and frames per second? Explain size and scale, weight and strength is animation.	7	L2	CO4
	b.	Discuss modeling the probability for proton decay.	8	L2	CO4
	c.	While animating a speeding up Car the total distance travelled over 5 frames is 25M. Calculate the base distance.	5	L3	CO5
		OR			
10	a.	Define Jumping Action. Discuss use parts of jump.	7	L3	CO4
	b.	Discuss Odd Rule Scenarios for calculating the distance of an object between keys is a slow in and slow out.	8	L2	CO4
	c.	On a particular place, volcanic eruption occurs once in every 100 years on an average. Calculate the probability for K = 0, 1, 2 volcanic eruption in a 100 years interval. Assuming Poisson module is appropriate. Given e = 2.718.	5	L3	CO5

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