Model Question Paper-II with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | | |

First/Second Semester B.E. Degree Examination

Applied Physics for Computer Science Stream

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02. Draw neat sketches where ever necessary.
03. **Constants :** Speed of Light 'c' = 3 $\times 10^{8}$ ms^{-1}, Boltzmann Constant 'k' = 1.38 $\times 10^{-23}$ JK^{-1}, Planck's Constant 'h' = 6.625 $\times 10^{-34}$ Js, Acceleration due to gravity 'g'= 9.8 ms^{-2}, Permittivity of free space 'ε_0'=8.854 $\times 10^{-12}$ F m^{-1}.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Obtain the expression for Energy Density using Einstein's A and B coefficients and thus conclude on $B_{12}=B_{21}$.	L2	8
	b	Describe attenuation and explain the various fiber losses.	L2	7
	c	Given the Numerical Aperture 0.30 and RI of core 1.49 Calculate the critical angle for the core-cladding interface.	L3	5
		OR		
Q.02	a	Discuss the applications of LASER in bar-code scanner and LASER Cooling.	L2	9
	b	Discuss Point to Point communication using optical fibers.	L2	6
	c	Calculate the ratio of population for a given pair of energy levels corresponding to emission of radiation 694.3 nm at a temperature of 300 K.	L3	5
		Module-2		
Q.03	a	Derive an expression for de Broglie wavelength by analogy and hence discuss the significance of de Broglie waves.	L2	6
	b	Explain the Wave function with mathematical form and Discuss the physical significance of a wave function.	L2	9
	c	Calculate the energy of the first three states for an electron in one dimensional potential well of width 0.1 nm.	L3	5
		OR		
Q.04	a	Explain Eigen functions and Eigen Values and hence derive the eigen function of a particle inside infinite potential well of width 'a' using the method of normalization.	L2	10
	b	Show that electron does not exist inside the nucleus using Heisenberg's uncertainty principle.	L2	5
	c	An electron is associated with a de Broglie wavelength of 1nm. Calculate the energy and the corresponding momentum of the electron.	L3	5
		Module-3		
Q.05	a	Discuss the working of phase gate mentioning its matrix representation and truth table.	L2	6
	b	Explain Orthogonality and Orthonormality with an example for each.	L2	6
	c	Given $\|\psi\rangle = \begin{pmatrix}\alpha_1\\ \alpha_2\end{pmatrix}$ and $\|\phi\rangle = \begin{pmatrix}\beta_1\\ \beta_2\end{pmatrix}$ Prove that $\langle\psi\|\phi\rangle = \langle\phi\|\psi\rangle^*$	L3	8
		OR		
Q.06	a	Explain the representation of qubit using Bloch Sphere.	L2	6
	b	Explain Single qubit gate and multiple qubit gate with an example for each.	L2	8

	c	Explain the Matrix representation of 0 and 1 States and apply identity operator I to $\|0\rangle$ and $\|1\rangle$ states,	L3	6
		Module-4		
Q.07	a	Enumerate the failures of classical free electro theory and assumptions of quantum free electron theory of metals.	L2	7
	b	Explain Meissner's Effect and the variation of critical field with temperature.	L2	8
	c	A superconducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.	L3	5
		OR		
Q.08	a	Explain the phenomenon of superconductivity and Discuss qualitatively the BCS theory of superconductivity for negligible resistance of metal at temperatures close to absolute zero.	L2	9
	b	Give the qualitative explanation of RF Squid with the help of a neat sketch.	L2	6
	c	Find the temperature at which there is 1% probability that a state with an energy 0.5 eV above Fermi energy is occupied.	L3	5
		Module-5		
Q.09	a	Elucidate the importance of size & scale and weight and strength in animations.	L2	8
	b	Mention the general pattern of monte Carlo method and hence determine the value of π.	L2	6
	c	Describe the calculation of Push time and stop time with examples.	L3	6
		OR		
Q.10	a	Sketch and explain the motion graphs for linear, easy ease,easy ease in and easy ease out cases of animation.	L2	8
	b	Discuss modeling the probability for proton decay.	L2	7
	c	A slowing-in object in an animation has a first frame distance 0.5m and the first slow in frame 0.35m. Calculate the base distance and the number of frames in sequence.	L3	5

*****Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome

Question		Bloom's Taxonomy Level attached	Course Outcome	Program Outcome
Q.1	(a)	L2	1	1,2,12
	(b)	L2	1	1
	(c)	L3	1	1,2
Q.2	(a)	L2	1	1,2
	(b)	L2	1	1,2,12
	(c)	L3	1	1,2
Q.3	(a)	L2	2	1,2
	(b)	L2	2	1,2,12
	(c)	L3	2	1,2
Q.4	(a)	L2	2	1,2,12
	(b)	L2	2	1,2
	(c)	L3	2	1,2
Q.5	(a)	L2	2	1,2
	(b)	L2	2	1,2
	(c)	L3	2	1,2
Q.6	(a)	L2	2	1,2,
	(b)	L2	2	1,2
	(c)	L3	2	1,2,12
Q.7	(a)	L2	3	1,2,12
	(b)	L2	3	1,2
	(c)	L3	3	1,2
Q.8	(a)	L2	3	1,2
	(b)	L2	3	1,2,12
	(c)	L3	3	1,2
Q.9	(a)	L2	4	1,2,5
	(b)	L2	4	1,2,12
	(c)	L3	4	1,2
Q.10	(a)	L2	4	1,2,5, 12
	(b)	L2	4	1,2
	(c)	L3	4	1,2