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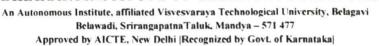
		T			
JI.		one-dimensional infinite potential well. Also, derive the expression for the normalized wave function.			
	c.	The ground state energy of an electron in an infinite potential well is 5.6 meV. If the width of the wall is doubled what is its ground state energy?	05	2	L3
		Module -3			
Q. 05		Visualize the Qubit state $ \psi\rangle$ on a 3D Bloch sphere by determining	09	3	L4
Q. 03	à.	the appropriate polar angle (Θ) and azimuthal angle (φ)			
	b.	Describe the working of the CNOT gate and mention its matrix representation and truth table.	07	2	L3
,	c,	Find the probability that we find in the qubit in the state $ 0\rangle$ and $ 1\rangle$, i. $ \psi\rangle = \frac{1+i}{\sqrt{3}} 0\rangle - \frac{i}{\sqrt{3}} 1\rangle$ ii) $ \psi\rangle = \frac{i}{2} 0\rangle + \frac{\sqrt{3}}{2} 1\rangle$	04	2	L3
	1.000	$\frac{1}{\sqrt{3}}$			4.00
Q. 06	a.	Describe the operations of the Phase gate (S-gate) and show that the	09	3	L4
	b.	S-gate can be formed by connecting two T-gates in series. Explain the Pauli matrices and apply Pauli matrices on the states, 0> and 1>.	07	2	L3
	c.	Show that the matrix $U = \frac{1}{\sqrt{5}} \begin{pmatrix} i & -2i \\ -2i & -i \end{pmatrix}$ is Unitary.	04	2	L3
		Module -4			1 1396 8 V
	a.	With a neat M-H curve distinguish between Type I and Type II superconductors based on the Messiner effect and critical Magnetic field. Also, mention examples and applications.	08	3	L4
	b.	Discuss the success of quantum free electron theory.	07	3	L3
	c.	Calculate the probability of an electron occupying an energy level of 0.02 eV above the Fermi level at 300 K and 400 K.	05	2	L3
		OR	4 1 2 1 2 1		
Q. 08	a.	Evaluate the Fermi factor based on the variation of energy value and temperature, and analyze their occupancy with a neat diagram.	08	3	L4
	b.	Explain Meissner's Effect alos discuss the variation of the critical magnetic field with the temperature of a superconductor.	07	2	L3
	c.	Find the temperature at which there is a 1% probability that a state with energy 0.05 eVabove Fermi energy is occupied.	05	2	L3
		Module -5		10.00	The second
Q. 09	a.	Describe Jumping and explain the different parts of jumping with a suitable example.	08	2	L3
	b.	Estimate the value of Pi by explaining the Monte Carlo method.	07	3	L4
	c.	The number of particles emitted randomly by a radioactive sample obeys the Poisson distribution with $\lambda = 3$. Calculate $p(x=0)$, $P(x=1)$, $P(x=2)$, $P(x=3)$.	05	2	L3
	Territor	OR	the same of the	Service of	74
Q. 10	a.	Describe the importance of Size and Scale, Weight and Strength in animations with examples.	08	2	L3
	b.	Analyze the modelling probability for proton decay.	07	3	L4
	c.	Given the base distance is 3m for the slow-in-motion. Find the distance covered between frames 2 nd and 3 rd as well as between 1 st and	05	2	L3





Maharaja Education Trust (R), Mysuru

MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE





First Semester B.E Degree Examination, February/March 2024 Applied Physics for CSE stream

Duration: 3 hrs Max. Marks: 100

Note: 1. Answer five full questions choosing one complete question from each module.

2. Formula Hand Book is permitted

3. M: Marks, L: Bloom's level, C: Course outcomes.

		3. M. Marks, L. Bloom's level, C. Course outcomes.			
		Answer any FIVE full questions, choosing at least ONE complete question from	m each Mo	ODULE	
	02.	Draw neat sketches wherever necessary			
	03.	Constants: Speed of Light 'c' = 3×10^8 ms ⁻¹ , Boltzmann Constant 'k' = 1	1.38 ×10°-	JK'',	Planck's
Note:		Constant 'h' = 6.626×10^{-34} Js, Acceleration due to gravity 'g' = 9.8 ms^{-2} , Perr	nittivity o	f free sp	sace (ε_0)
		$=8.854 \times 10^{-12} \mathrm{Fm}^{-1}$			
	V	Questions	Marks	co	L
	_	Module -1	- 20		
Q. 01	a.	Deduce the expression for the energy density of radiation in terms of	08	3	L4
	1	Einstein coefficients at thermal equilibrium conditions and thus			
		conclude on $B_{12}=B_{21}$.			
	b.		08	2	L3
		communication systems with a neat block diagram. Also, mention its			
	_	two applications.			
	c.	Calculate the attenuation coefficient of the given optical fiber of	04	2	L3
		length 500 m, given the input and output power values are 100 mW			
		and 90mW respectively.			
		OR			
Q. 02	a.	With a neat diagram compute the expression for the numerical	08	3	L4
		aperture of an optical fibre using the core, cladding, and surrounding			
		refractive indices and study the condition of propagation of signal			
	1	through it.	_		
	b.	Write a brief note on how the laser cooling system and bar code reader	08	2	L3
		operates.			
	c.	The average output power of a laser source emitting a laser beam of	04	2	L3
		wavelength 692.8 nm is 8mW, hence evaluate the number of photons			
		emitted per second by the laser source.			
	-	Module -2	a train ha	£201 1 ►302	
	a.	Discuss the wave function and its physical significance in explaining	06	2	L3
		the concept of matter waves.			
	b		09	2	L3
	1	one dimension.			
	c.	An electron has a speed of 100 m/s, the uncertainty measured in the	05	2	L3
		speed is 0.05%. Find the corresponding uncertainty in its position.		_	
197 (8.8 m)	- 14 112	OR			12.5
Q. 04	a.	Using Heisenberg's uncertainty principle show that an electron does	06	2	L3
Q. 04		not exist inside the nucleus.		- 1	Lo
	b.	Assuming time independent Schrodinger wave equation, obtain	09	2	L3
	0.	expression for Eigen energy and Eigen function for a particle in an	0,	-	
	1	expression for Eigen energy and Eigen function for a particle in an			