



165



**MAHARAJA INSTITUTE OF TECHNOLOGY
MYSORE**
Department of Physics
1st Internal Assessment
First semester



Subject Name: Applied Physics for CSE stream
Subject code: BPHYS102
Time: 02:15 PM - 03:30 PM
Total Marks: 30
Faculty: Dr. Vijaylakshmi Dayal
Lokesh N, Shamantha M S, Sahana A R

Answer any one full question
(CS Stream- J, K, L, M, N Section)

Q	Question Description	Marks	BTL	CO
1	A Demonstrate a semiconductor laser with its construction and operation using the energy level diagram.	7	L3	2
	B Compute a numerical aperture expression using the core, cladding, and surrounding refractive indices.	5	L3	2
	C A Laser has a power output of 10^{-3} watt. Calculate the number of photons emitted per second by the laser given the wavelength of the laser is 692.8 nm.	3	L3	2
OR				
2	A Using a modest diagram, describe the three different types of optical fibre rendering to their modes of propagation.	7	L3	2
	B Write a brief note on how the laser cooling system and bar code reader operate.	5	L3	2
	C Calculate the attenuation coefficient of the given optical fiber of length 1500 m given the input and output power are 100 mW and 70 mW respectively.	3	L3	2
AND				
3	A Using the time-independent Schrodinger wave equation, show that in the bound state, the energy value of a particle is discrete and quantized,	7	L3	2
	B Discuss about Wave function and its physical significance in explaining the Matter waves.	5	L3	2
	C Find the De Broglie wavelength of a proton whose energy is 3eV. Given the mass of proton = 1.67×10^{-27} kg.	3	L3	2
OR				
4	A Establish a one-dimensional time-independent Schrodinger wave equation.	7	L3	2
	B Summarize Heisenberg's uncertainty principle and demonstrate that electrons do not exist within the nucleus.	5	L3	2
	C The position and momentum of 2 keV electrons are simultaneously determined. If its position is located within 2 \AA , find the uncertainty in the determination of its momentum.	3	L3	2



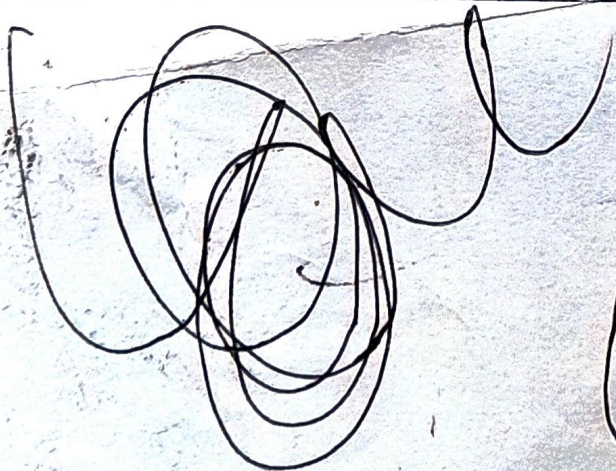
MAHARAJA INSTITUTE OF TECHNOLOGY
MYSORE
Department of Physics
2nd Internal Assessment
First semester



Subject Name: Applied Physics for CSE
Subject code: BPHYS102
Time: 02:15 PM-03:30 PM
Total Marks : 30
Faculty: Dr. Vijaylakshmi Dayal
Lokesh N, Shamantha M S

Answer two full questions
(CSE Stream- J, K, L, M and N Section)

Q	Question Description	Marks	BTL	CO
1	A Visualize the Qubit state $ \psi\rangle$ on a 3D Bloch sphere by determining the appropriate polar angle (θ) and azimuthal angle (ϕ).	10	L4	3
	B iii. Verify that the states; $ \phi_1\rangle$, $ \phi_2\rangle$, & $ \phi_3\rangle$, are orthonormal, where $ \phi_1\rangle = \frac{1}{\sqrt{2}} \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}$, $ \phi_2\rangle = \frac{1}{2} \begin{pmatrix} 1 \\ \sqrt{2} \\ 1 \end{pmatrix}$, $ \phi_3\rangle = \frac{1}{2} \begin{pmatrix} 1 \\ -\sqrt{2} \\ 1 \end{pmatrix}$. iv. Find the probability that we find in the qubit in the state $ 0\rangle$ and $ 1\rangle$ $ \psi\rangle = \frac{1}{\sqrt{3}} 0\rangle + \frac{\sqrt{2}}{3} 1\rangle$, and $ \psi\rangle = \frac{i}{2} 0\rangle + \frac{\sqrt{3}}{2} 1\rangle$	10 <i>Same Same 1</i>	L4	3
OR				
2	A Describe the working of controlled-NOT gate and Toffoli Gate mentioning its matrix representation, Circuit symbol and truth table.	10	L4	3
	B iii. Explain the T-gate and also Show that the T-gate is unitary. iv. Consider the following two kets $ \psi\rangle = \begin{pmatrix} -1+i \\ 3 \\ 2+3i \end{pmatrix}$ and $ \phi\rangle = \begin{pmatrix} 6 \\ i \\ 5 \end{pmatrix}$. Also find; $ \psi\rangle^*$ And $ \phi\rangle^*$ and, say if, $ \psi\rangle$ and $ \phi\rangle$ are orthogonal. <i>different θ</i>	10	L4	3
AND				
3	A Describe Fermi factor. Distinguish Fermi factor based on the variation of Fermi factor with temperature.	7	L3	2
	B Calculate the probability electron occupying an energy level 0.02 eV above Fermi level at 350 K.	3	L3	2
OR				
4	A Distinguish the Failures of Classical free electron theory.	7	L3	2
	B Calculate the probability electron occupying an energy level 0.02 eV below Fermi level at 300 K.	3	L3	2





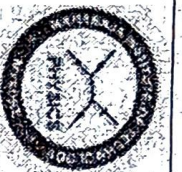
MAHARAJA INSTITUTE OF TECHNOLOGY

MYSORE

Department of Physics

3rd Internal Assessment

First Semester



Subject Name: Applied Physics for CSE

Subject code: BPHYS102

Time: 02:15 – 03:00 PM

Total Marks: 30

Faculty: Dr. Vijayalakshmi Dayal

Lokesh N, Shanantha M S, Sahana A R

Answer any two full questions

(K, L, M and N Section)

Q	Question Description	Marks	BTL	CO
1	A Based on DC Josephson effect explains construction and working of DC SQUID with neat diagram.	7	L4	3
	B The Critical temperature of Nb is 9.15 K. At 0K, the critical field is 0.196T. Calculate Critical Field at 7K.	3	L3	2
OR				
2	A With neat diagram depending on the critical magnetic field categorize Superconductors and explain. (Type I And Type II).	7	L4	3
	B The Critical field for Niobium is 1.2×10^5 A/m at 8 K and 2.3×10^5 A/m at 0K. Find the transition temperature of the element.	3	L3	2

AND

3	A	Describe Jumping and explain the different parts of jump with suitable example.	7	L3	2
	B	Analyze the Modeling probability for proton decay. The number of particles emitted randomly by a radioactive sample obeys Poisson distribution with $\lambda = 4$. Calculate $p(x=0)$, $P(x=1)$, $P(x=2)$, $P(X=3)$	10	L4	3
	C	While animating speeding up car animation, the total distance covered over 7 frames is 0.18m. Calculate the base distance by using Odd rule Multipliers.	3	L3	2

OR

4	A	Describe the general pattern of Monte Carlo method and hence estimate the value of Pi	7	L3	2
	B	Categorize the Linear motion timing, Uniform motion timing, slow in and slow out motion with a neat diagram. Given the base distance is 2m for the slow in motion. So find the distance covered between frames 3 rd and 4 th , 1 st and 5 th frame.	10	L4	3
	C	In the case of Jump action, push height is 0.6m and Jump magnification is 5. Calculate the jump height, push acceleration. Acceleration due to gravity = 9.8 m/s^2 .	3	L3	2