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MANAV RACHNA
EDUCATIONAL
INSTITUTIONS

GALAXY OF EDUCATIONAL EXPERIENCES

MANAV RACHNA UNIVERSITY

Established, vide Haryana Act no.26 of 2014
(Formerly ManavRachna College of Engineering,
NAAC Accredited 'A' Grade Institute)

EXAMINATION CELL

T3 QUESTION PAPER

DECEMBER-2021 (3^{RD}/5^{TH}/7^{TH}/9^{TH})SEM

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DEPARTMENT OF PHYSICS

"T3 Examination,June-2022"

SEMESTER	**II**	**DATE OF EXAM**	**23/06/2022**
SUBJECT NAME	**Electricity and magnetism**	**SUBJECT CODE**	**PHH107B-T**
BRANCH	**Physics**	**SESSION**	**Morning (8:30-11:30am)**
TIME	**3 hrs**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc(H) Physics**	**CREDITS**	
NAME OF FACULTY	**Dr. Shiv Kumar Dixit**	**NAME OF COURSE COORDINATOR**	

Note: All questions are compulsory.

Set A

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(a)	State Gauss law and derive an expression for determination of electric flux density (D) for infinite line charge.	5	CO1	L3	2.1.1
	1(b)	Derive an expression for electric potential of a dipole in electrostatic field.	5	CO1	L3	1.1.1
	1(c)	Derive an expression for capacitance of a coaxial capacitor.	5	CO2	L2	2.1.1
	1(d)	Define the terms linear, isotropic and homogeneous dielectrics.	5	CO2	L1	2.1.2
PART-B	Q.2 (a)	State BiotSavarts law in magnetostatic field and derive an expression to calculate magnetic field intensity (H) at a point for straight filamentary conductor of finite length.	15	CO3	L4	2.1.1
	Q.2 (b)	Define Ampere's circuit law and show that magnetostatic field is not conservative in	5	CO3	L3	2.1.3

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	nature.				
Q.3	Derive an expression for magnetic dipole moment. In a current free region of relative permeability (μ_r = 1), the magnetic scalar potential is given as $V_m = x^2y + y^2x + z$. Calculate the magnitude of magnetic flux density (B) at (1,1,1).	5+5	CO3	L3	2.1.1
Q.4	Define magnetic flux density (B) and show that $\nabla.B = 0$	10	CO3	L2	2.1.1
Q.5	(i) The electric field intensity in polystyrene (ε_r = 2.55) filling the space between the plates of a parallel plate capacitor is 10kV/m. The distance between the plates is 1.5mm. Calculate electric flux density (D) and polarization (P). (ii) Derive the relation B = μH.	10	CO4	L4	2.1.1
Q.6	Derive an expression for force between two current elements using BiotSavarts law.	15	CO4	L3	2.1.1
Q.7	Explain classification of magnetic materials based on their magnetic property and also elaborate it with the help of B-H curve.	15	CO4	L3	2.1.1

PART-C

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DEPARTMENT OF PHYSICS

"T3 Examination, June 2022"

SEMESTER	**II**	**DATE OF EXAM**	**27--06-2022**
SUBJECT NAME	**Wave Optics**	**SUBJECT CODE**	**PHH108B - T**
BRANCH	Physics	**SESSION**	**I"**
TIME	3 hrs	**MAX. MARKS**	**100**
PROGRAM	**B.Sc**	**CREDITS**	
NAME OF FACULTY	**Dr. Aditya Sharma**	**NAME OF COURSE COORDINATOR**	**Dr. Aditya Sharma**

Note: All questions are compulsory from Part A and Part B (Max. marks =10)

PART -A

S. No	Questions	Marks	C. O.	B.T.	P. I.
1	Why the interference occurs in thin films due to reflection? Prove that the path difference $\Delta = 2\mu t \cos(r)$. (t is the thickness of film and r is the refraction angle.	5	CO1	BT.4	1.1, 2.1.1
2	A film has refracting index 1.4, calculate the thickness of the film, if reflecting waves make constructive interference .	5	CO1	BT2, 3	1.2.1,

PART -B

1	Prove that intensity $I = A^2(\text{Sin}\alpha/\alpha)^2$, in a single slit diffraction.	5	CO2	BT2, BT3	1.2.1
2	Calculate the angular position of the first two minima on either side of the central maxima, if the incident wavelength is 5500 Å and slit width is 22.0×10^{-5} cm.	5	CO2	BT3	1.2.1

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(PART -B *(max. marks = 40)). Question 4 has an optional question.*

S. No	Questions	Marks	C. O.	B.T.	P. I.
1	Prove that tangent of polarizing angle is equal to the refractive index of the medium. And also prove that the intensity of emergent beam varies as the square of cosine of the angle between the planes of transmission of the analyzer and the polarizer.	10	CO3	BT1, BT3, BT4	3.1.1, 1.2.1
2	What are the Phase retardation plates? Estimate the thickness of half wave-plate.	10	CO3	BT4, 5	3.1.1, 1.2.1
3	What is Nicol Prism? How it helps to produce and analyze the polarized light? Give construction and working of Nicol and polarizer and Analyzer.	10	CO3	BT5, 4	2.2.1, 1.2.1
4	Plane polarized light, is incident on a plate of quartz cut with faces parallel to the optic axis. Calculate the thickness for which the phase difference between two rays is 60 degree, where μ_O and μ_E are 1.5442 and 1.5583. λ = 500 nm.	10	CO3	BT3, BT4	1.2.1
or	Find the thickness of a quarter and half wave plates for the wavelength of light 589 nm. μ_O and μ_E are 1.55 and 1.54.	10	CO3	BT3, BT4	1.2.1

PART -C *(max. marks = 40). Question 3 has an optional question.*

S.n	Questions	Marks	C. O	B.T.	P. I.
1	What are the spontaneous and stimulated emission processes? And, thus, estimate the Einstein's coefficients.	15	CO4	BT1, BT3, BT4	3.1.1, 1.2.1
2	Why do we need optical pumping in laser? Provide, construction and working principle of Ruby laser.	15	CO4	BT1, BT3,4	3.1.1, 1.2.1
3	In a laser, total number of Ce^{3+} ions are 2.8×10^{19}. If the laser emits radiation of wavelength 7000 Å, calculate the laser pulse.	10	CO4	BT3,3	3.1.1, 1.2.1
Or	In a CO2 laser, the energy difference between two levels is 0.12 eV. Calculate the frequency of radiation.	10	CO4	BT3	3.1.1, 1.2.1

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DEPARTMENT OF PHYSICS

"T3 Examination, JUN-2022"

SEMESTER	**II**	**DATE OF EXAM**	**01.07.2022**
SUBJECT NAME	**Mathematical Physics II**	**SUBJECT CODE**	**PHH109B-T**
BRANCH	**B.Sc. Physics (II)**	**SESSION**	**I**
TIME	**08:30-11:30**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc.**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Ananna Bardhan**	**NAME OF COURSE COORDINATOR**	**Dr. Ananna Bardhan**

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1	Show that $\int_0^{\frac{\pi}{2}} sin^p\theta\, cos^q\theta = \frac{\Gamma(\frac{p+1}{2})\Gamma(\frac{q+1}{2})}{2\Gamma(\frac{p+q+2}{2})}$. Also evaluate $\int_0^{\frac{\pi}{2}} cos^p\theta$	10	CO1	BT5	2.2.1, 2.2.2, 2.2.3, 2.2.4
PART-B	2(a)	Find the Laplace transform of $(i) f(t) = t^2 e^t \sin 4t$, $(ii) te^{at}$	05	CO2	BT5	2.2.4, 7.1.1, 7.1.2
	2(b)	Find the finite cosine transform of $f(x)$ if $(i) f(x) = \frac{\pi}{3} - x + \frac{x^2}{2\pi}$ $(ii) f(x) = \sin ax$	05	CO2	BT5	2.2.1, 2.2.2, 2.2.3, 2.2.4
PART-C	3(a)	Form a partial differential equation from: $x^2 + y^2 + (z-c)^2 = a^2$, where a is an arbitrary constant.	05	CO3	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
	3(b)	Consider the equation $z = f(x^2 + y^2)$ and form the partial differential equation.	05	CO3	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
	3(c)	Solve: $\frac{\partial^3 z}{\partial x^2 \partial y} = \cos(2x + 3y)$	10	CO3	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
	4(a)	Using the method of separation of variables, Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6e^{-3x}$	10	CO3	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
	4(b)	Find the solution of the wave equation: $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$, using method of separation of variables. (Consider the wave motion $(k > 0)$)	10	CO3	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
PART-D	Q5(a)	What do you understand by tensors? Why vectors were not sufficient to express certain physical problems? Discuss scalars, contravariant and covariant tensors.	10	CO4	BT5	2.2.4, 7.1.1, 7.1.2, 7.1.3
	Q5(b)	Define Kronecker delta symbol and hence discuss its properties.	10	CO4	BT4	2.2.1,

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		If $a_{\alpha\beta}x^{\alpha}x^{\beta} = 0$ for all values of the variables $x^1x^2 \ldots \ldots \ldots x^n$, then show that $a_{\mu\nu} + a_{\nu\mu} = 0$				7.2.1
	Q6(a)	Show that the outer product of two tensors is a tensor of rank equal to the sum of the ranks of the given tensors.	10	CO4	BT4	2.2.1, 2.2.2, 2.2.3, 2.2.4
	Q6(b)	Find an expression of work in terms of tensor analysis	05	CO4	BT4	2.2.1, 2.2.2, 2.2.3, 2.2.4
	Q6(c)	If A^{μ} *and* B^{μ} are any two vectors, one contravariant and other covariant, then prove that $A^{\mu}B^{\mu}$ is invariant	05	CO4	BT5	7.1.1, 7..2, 7.1.3, 7.2.1

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DEPARTMENT OF PHYSICS

"T3 Examination, June 2022"

SEMESTER	II	**DATE OF EXAM**	23-06-2022
SUBJECT NAME	Quantum Mechanics -II	**SUBJECT CODE**	PHH507B
BRANCH	Physics	**SESSION**	I[st]
TIME	3Hrs	**MAX. MARKS**	100
PROGRAM	M.Sc	**CREDITS**	
NAME OF FACULTY	Dr. Aditya Sharma	**NAME OF COURSE COORDINATOR**	Dr. Aditya Sharma

Note: *All questions are compulsory from Part A and Part B (Max. marks =20)*

PART -A

S. No	Questions	Marks	C. O.	B.T. Level	P. I.
1	Use the variational method to evaluate the ground state energy of a particle in the potential; $V = \begin{Bmatrix} \infty \; for\; x < 0 \\ kx \; for \; x > 0 \end{Bmatrix}$. The trail wave function is; $\psi = xe^{-\alpha x}$	5	CO1	BT,4	1.1. 2.1.1
2	Find out that which of the two trial wave functions are better suitable for evaluating ground state energy of H atom; (i) $\Psi_1 = A\,(1+\alpha r)e^{-\alpha r}$ (ii) $\Psi_2 = B\; e^{\frac{-\alpha r^2}{2}}$	5	CO1	BT, 3	1.2.1.
PART -B					
1	Establish relationship between; (i) cross-sections and (ii) kinetic energies in L and C systems.	5	CO2	BT,4	1.2.1
2	Estimate the differential cross-section if particle wave strikes with potential; $V_{(r)} = -V_0\; e^{\frac{-r^2}{a^2}}$	5	CO2	BT, 3	1.2.1

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(PART -C). *Attempt any four from Part B (max. marks = 40).*

S. No	Questions	Marks	C. O.	B.T. Level	P. I.
1	What are the Pauli Spin matrices for electron? Evaluate the values of σ_x, σ_y, σ_z in terms of matrices and thus prove that $S^2 = 3/4\hbar^2$.	10	CO3	BT1,3, BT4	3.1.1, 1.2.1
2	Write the Pauli operator associated with momentum operators (p_x, p_y and p_z). Thus, add the Pauli operators associated with Lz and Sz.	10	CO3	BT4,	3.1.1, 1.2.1
3	For the Pauli operators; find the values of; *(i)* $p_x S_x$ (ii) $x.p_x$	10	CO3	BT,4	2.2.1, 1.2.1
4	What are the identical particles? Estimate the differential cross section for identical particle scattering. Explain the direct and exchanged amplitudes for Bose and Fermi particles.	10	CO3	BT,1,4,5	2.2.1, 1.2.1
5	Derive a mathematical expression for the scattering amplitude of a scattered wave which scattered from a perfectly rigid sphere.	10	CO3	BT,4	2.2.1, 1.2.1

PART -D *(max. marks = 40).*

S. No	Questions	Marks	C. O.	B.T. Level	P. I.
1	Estimate the Hamiltonian of an electronic system, if the radiation (with semi-classical treatment) strikes to the atom. And, thus, evaluate the transition rates of absorption and emission.	10	CO4	BT3, BT4	3.1.1, 1.2.1
2	Estimate the coefficients and overall wave function of C_4H_6 molecule. Apply the Huckel model to estimate the Energy of such system.	20	CO4	BT2,3	3.1.1, 1.2.1
3	What are the selection rules for electronic transitions? Give a schematic diagram for various possible transitions (for different values of principle quantum number *n* and azimuthal quantum number *l*). *Or* Estimate the Hamiltonian of a many atomic (or electronic) system under the Born-Oppenheimer approximation. Why the electronic wave function is the function of nuclear and electronic coordinates?	10	CO4	BT1,3	2.2.1, 1.2.1

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DEPARTMENT OF PHYSICS

"T3 Examination, June-2022"

SET-A

SEMESTER	**II**	**DATE OF EXAM**	**27.06.2022**
SUBJECT NAME	Statistical Mechanics	**SUBJECT CODE**	PHH508B
BRANCH	Physics	**SESSION**	1
TIME	8.30 AM - 11.30 AM	**MAX. MARKS**	100
PROGRAM	**M.Sc**	**CREDITS**	4
NAME OF FACULTY	**Haider Abbas**	**NAME OF COURSE COORDINATOR**	**Haider Abbas**

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q.1	Resolve Gibb's paradox.	10	CO1	BT2	2.1.1
	Q.2	Derive the relation for the probability of finding a particle of the system in the grand canonical ensemble.	10	CO2	BT2	2.2.1. 2.3.1
PART-B	Q.3	Establish an expression for the most probable distribution of half integral spin particles, obeying Pauli exclusion principle.	20	CO3	BT4	2.2.1, 2.3.1,5.4.1
	Q.4	Using suitable mathematics show that when the temperature of a Bose-Einstein gas is lowered below the critical temperature, the number of particles in the ground state rapidly increases.	10	CO3	BT4	2.2.1, 2.3.1,5.4.1
	Q.5	Discuss Ising model with a suitable example.	10	CO3	BT4	2.2.1, 2.3.1,5.4.11
PART-C	Q.6	Using Landau's theory, Explain second order phase transition in a system of your choice	10	CO4	BT4	2.2.1, 2.3.1,5.4.11
	Q.7	Show that for a canonical ensemble the standard relative deviation from the mean value is of the order of $n^{1/2}$.	10	CO4	BT4	2.2.1, 2.3.1,5.4.11
	Q.8	Discuss Langevin theory for Brownian motion	10	CO4	BT4	2.2.1, 2.3.1,5.4.11
	Q.9	Show that one dimensional Ising model can not be ferromagnetic.				

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DEPARTMENT OF PHYSICS

"T3 Examination, June-2022"

(Set-1)

SEMESTER	II	DATE OF EXAM	29-06-2022
SUBJECT NAME	Solid state Physics	SUBJECT CODE	PHH509B
BRANCH	PHYSICS	SESSION	Morning
TIME	08:30 AM – 11:30 PM	MAX. MARKS	100
PROGRAM	M.Sc.	CREDITS	4
NAME OF FACULTY	Dr. Sandeep Kumar	NAME OF COURSE COORDINATOR	Dr. Sandeep Kumar

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART A&B	Q1	(a)Discuss Different forces in crystal (b) An X-ray beam of wavelength of 0.71 Angstrom is diffracted by a cubic KCl crystal of density 1.99×10^3 kgm^{-3}. Calculate the interplanar spacing for (200) planes and the glancing angle for the third order reflection from these planes. The molecular weight of KCl is 74.6 amu and Avogadro's number is 6.023×10^{26} kg^{-1} mole^{-1}.	6+4	CO1	BT1, BT2	8.1,8.2,8.3, 8.4
	Q2	The potential energy of a system of two atoms is given by the expression, $U = -A/r^2 + B/r^{10}$. A stable molecule is formed with release of 8 eV of energy when the interatomic distance is 2.8 Angstrom. Calculate A and B. Determine the force needed to dissociate this molecule into atoms and the interatomic distance at which the dissociation occurs.	10	CO2	BT2, BT3, BT4	8.1,8.2,8.3,8.4
PART-C&D	Q3(a)	Show that the average kinetic energy per electron for a three-dimensional free electron gas at 0K is $E_0 = (3/5)E_{F0}$, where E_{F0} is the Fermi energy at 0K.	14	CO3	BT4, BT5, BT6	8.1,8.2,8.3, 8.4
	Q3(b)	The atomic radius of sodium is 3.86 Angstrom. Calculate the Fermi energy of sodium at absolute energy.	6	CO3	BT2, BT3, BT4	8.1,8.2,8.3, 8.4
	Q4(a)	Discuss the formation of allowed and forbidden energy bands on the basis of Kronig-Penny model. Discuss the extreme conditions when energy levels are either discrete or continuous.	10	CO3	BT2, BT3, BT4	8.1,8.2,8.3, 8.4
	Q4(b)	What is meant by the effective mass of an electron? Show that the effective mass of an electron in a crystal is inversely proportional to the second derivative of the E-k curve. Discuss the conditions when the effective mass of an electron becomes positive, negative and infinity.	10	CO3	BT2, BT3, BT4	8.1,8.2,8.3, 8.4

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Q5(a)	What is superconductivity? Discuss the magnetic susceptibility of superconductor. Define penetration depth for a superconductor and what its value at the critical temperature?	10	CO4	BT2, BT3, BT4	8.1,8.2,8.3, 8.4
Q5(b)	How are cooper pairs formed? Explain the BCS theory of superconductivity and discuss the energy gap based on this theory.	10	CO4	BT2, BT3, BT4	8.1,8.2,8.3, 8.4
Q6	What are High Tc superconductors? Discuss D.C. and A.C Josephson's effects and explain their importance.	20	CO4	BT2, BT3, BT4	8.1,8.2,8.3, 8.4

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DEPARTMENT OF PHYSICS

"T3 Examination, July-2022" *Set-1*

Semester: II
Subject: Atomic and Molecular Physics
Branch: Physics
Course Type: Core
Time: 3 hrs.
Max.Marks: 100

Date of Exam: 1/07/2022
Subject Code: PHH510B
Session: Morning
Course Nature: Hard
Program: M.Sc.
Signature: HOD/Associate HOD

PART -A

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level	Performance Indicator
Q.1	Derive an expression for spin orbit interaction energy for one electron system.	10	CO1	BT2	1.1.1, 2.2.1,4.1.1,6.1.1

PART – B

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level	Performance Indicator
Q2.	What is Stark effect? Explain the weak field stark effect in hydrogen.	10	CO2	BT1, BT2	1.1.1, 2.2.1,4.1.1,6.1.1

PART -C

S. No	Questions	Marks	Course Outcomes	Blooms Taxonomy Level	Performance Indicator
Q3.(a)	What do you mean by a rigid rotator? Determine the rotational energy values of a molecule on the basis of this model.	16	CO3	BT2	1.1.1, 2.2.1,4.1.1,6.1.1
(b)	The $J = 1 \rightarrow J = 2$ absorption line in CO occurs at a frequency of 1.6×10^{11} Hz. Calculate the moment of inertia and the inter-nuclear separation of CO molecule. (Given: h 6.63×10^{-34} Js, N_A 6.02×10^{23})	4	CO3	BT3	1.1.1, 2.2.1,4.1.1,6.1.1
Q4(a)	Explain the experimental basis for vibrating rotator model of a molecule and hence explain the fine structure of infrared bands on the basis of this model.	15	CO3	BT1, BT2	1.1.1, 2.2.1,4.1.1,6.1.1

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(b)	Assume that the H_2 molecule behaves like a harmonic oscillator with a force constant k = 500 N/m and find the vibrational quantum number corresponding to its 5 eV energy. (Given: h = 6.63×10^{-34} Js, N_A = 6.02×10^{23})	5	CO3	BT3	1.1.1, 2.2.1,4.1.1,6.1.1

PART -D

S. No.	Questions	Marks	Course Outcomes	Blooms Taxonomy Level	Performance Indicator
Q5. (a)	Describe the principal features of the electronic band spectrum of a diatomic molecule and hence discuss the vibrational structure of electronic band system	12	CO4	BT2	1.1.1, 2.2.1,4.1.1,6.1.1
(b)	Describe an experimental arrangement to record the electronic absorption spectrum of I_2 molecule.	8	CO4	BT2	1.1.1, 2.2.1,4.1.1,6.1.1
Q.6 (a)	Discuss rotational fine structure of electronic bands and hence explain all the three P, Q, and R – branches.	14	CO4	BT2	1.1.1, 2.2.1,4.1.1,6.1.1
(b)	Explain the Franck – Condon principle which governs the observed intensity distribution in vibrational electronic band systems.	6	CO4	BT2	1.1.1, 2.2.1,4.1.1,6.1.1

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DEPARTMENT OF PHYSICS

" T3 Examination, June-2022"

SEMESTER	**II**	**DATE OF EXAM**	**27.06.2022**
SUBJECT NAME	**Elasticity Waves Heat and Thermodynamics**	**SUBJECT CODE**	**PHH122-T**
BRANCH	**Education**	**SESSION**	**II**
TIME	**12:30-03:30PM**	**MAX. MARKS**	**80**
PROGRAM	**B.Sc. B.Ed**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Ananna Bardhan**	**NAME OF COURSE COORDINATOR**	**Dr. Ananna Bardhan**

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO_2 ADDRESSED	BLOOM'S LEVEL
PART-A	Q1(A)	Differentiate between linear harmonic motion and angular harmonic motion. Discuss and deduce superposition of waves undergoing SHM.	5	CO1	BT3
	Q1(B)	Discuss stress and strain curve.	5	CO1	BT3
PART-B	Q2(A)	Discuss and derive Maxwell's distribution of molecular velocities in a perfect gas. Also, discuss and illustrate the plot for maxwell distribution function for molecular speeds at different temperatures.	10	CO2	BT4
PART-C	Q3(A)	Discuss and derive Zeroth law of thermodynamics	11	CO3	BT4
	Q3(B)	Differentiate between (i) extensive and intensive thermodynamical variables (ii) Isobaric and isochoric process	04	CO3	BT3
	Q4(A)	What do you understand by specific heat? Derive the expression $C_p - C_v = R$, where the symbols carry usual meaning.	06	CO3	BT4
	Q4(B)	Derive the relation between volume and pressure of a gas undergoing adiabatic changes.	06	CO3	BT4
	Q4(C)	Calculate the change in internal energy and state whether temperature will rise or fall when (i) A system absorbs 600 cal of heat and performs 420J work (ii) No heat is absorbed by the system but 210 J work is done on it (iii) 250 cal heat is evolved by the system and 350 J work is done on the system	03	CO3	BT5
PART-D	Q5(A)	Discuss Carnot cycle and derive an expression for efficiency of Carnot engine	12	CO4	BT4
	Q5(B)	Two Carnot engine has an efficiency of 0.5 while working between a source at 400K and sink at T_2. Calculate the efficiency of the engine, if temperature of both the source and the sink are increased	03	CO4	BT5

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		by 100K. Calculate the efficiency, if the temperature of the source and sink are reduced by 100 K.			
	Q6(A)	Discuss Carnot cycle as a refrigerator. A freezer is maintained at a temperature of -10°C and the room temperature is 30°C. To maintain the freezer temperature, heat is removed at the rate of $1200Js^{-1}$	6	CO4	BT5
	Q6(B)	Discuss change in entropy in reversible and irreversible process. In an adiabatic process, the pressure of an ideal gas as $p = p_o - \alpha V^2$, when p_o and α are positive constants. Calculate the volume at which its entropy is maximum.	9	CO4	BT5

END

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DEPARTMENT OF CHEMISTRY

"T3 Examination, JUNE-2022"

SEMESTER	II[nd]	DATE OF EXAM	29-06-2022
SUBJECT NAME	ENVIRONMENTAL SCIENCES	SUBJECT CODE	CHH137
BRANCH	B.Scs. (Physics, Chem, Math.), B. Tech (CSTI, AIML, CDA)	SESSION	I
TIME	08:30 AM to 10:30 AM	MAX. MARKS	60
PROGRAM	B.Scs. (Physics, Chem, Math.), B. Tech (CSTI, AIML, CDA)	CREDITS	4
NAME OF FACULTY	Dr. V. V. Pathak	NAME OF COURSE COORDINATOR	Dr. V.V. Pathak

*Note: **Part A& B**: All questions are compulsory. Questions will be of MCQ/short answer type, marks are indicated against the question.*

***Part C:** Attempt any two question. Questions will be of long answer type, each question carries 10 marks.*

***Part D**: Attempt any two question. Questions will be of long answer type, each question carries 10 marks.*

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1(A)	Zone containing air, water and soil is known as: (i) Atmosphere (ii) Lithosphere (iii) Biosphere (iv) Hydrosphere	1	CO1	L2	
	Q1(B)	5[th] June is observed as: (i) World forest day (ii) World Environment day (iii) World wildlife day (iv) World population day	1	CO1	L2	
	Q1(C)	The life supporting zone of the earth is: (i) Biosphere (ii) Atmosphere (iii) Thermosphere (iv) Mesosphere	1	CO1	L1	
	Q1(D)	Which of the following is an example of clean energy resources?	1	CO1	L2	

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		(i) Solar Energy (ii) Wind Energy (iii) Tidal Energy (iv) All of the above				
	Q1(E)	Why environmental science is multidisciplinary in nature.	2	CO1	L2	
	Q1(F)	Explain the term sustainable agriculture.	2	CO1	L2	
	Q1(G)	Explain the term 'overgrazing' with example.	2	CO1	L2	
PART-B	Q2(A)	How many bio geographical zones in India? (i) 5 (ii) 10 (iii) 4 (iv) 8	1	CO2	L1	
	Q2(B)	Which of the following species is categorized under endangered species? (i) Bengal Tiger (ii) Asiatic Lion (iii) Snow leopard (iv) All of the above	1	CO2	L2	
	Q2(C)	Food chain always starts with: (i) Respiration (ii) Photosynthesis (iii) Transpiration (iv) Nitrogen fixation	1	CO2	L2	
	Q2(D)	Detritus food chain starts from: (i) Green plants (ii) Grass (iii) Dead organic matter (iv) Phytoplankton	1	CO2	L1	
	2(E)	Give an account of energy flow in ecosystem.	2	CO2	L2	
	2(F)	Describe Nitrogen cycle.	2			
	2(G)	What is Allogenic succession?	2			
PART-C	Q3	What do you understand by solid waste? Explain .different methods for solid waste management.	10	CO3	L2, L3	
	Q4	Write short notes on followings: (i) Disaster Management (ii) Global Warming (iii) Ozone layer depletion (iv) Acid rain	2.5×4 =10	CO3	L3, L4	
	Q5	Define the term water pollution. What are the sources, impacts and control measures of water pollution?	10	CO3	L3	

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PART-D	Q6	Differentiate between population explosion and population growth. Explain the different methods for population control.	10	CO4	L3	
	Q7	Write short notes on following: (1) Wasteland reclamation (ii) Infectious disease (iii) Environmental Laws (iv) Population pyramid	2.5×4 =10	CO4	L3	
	Q8	Define the term 'remote sensing'. Explain the applications of remote sensing in environmental management.	10	CO4	L4	

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DEPARTMENT OF MATHEMATICS

"T3 Examination, May-2022"

SEMESTER	IV	DATE OF EXAM	01/06/2022
SUBJECT NAME	Numerical Analysis	SUBJECT CODE	MAH-411T
BRANCH	Physics	SESSION	I
TIME	9:00AM-12:00Noon	MAX. MARKS	100
B.Sc B.Ed	B.Sc (H)	CREDITS	04
NAME OF FACULTY	Ms Seema Aggarwal	NAME OF COURSE COORDINATOR	Ms Seema Aggarwal

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Using Newton's forward interpolation formula, find $f(1.6)$ for the given values x: 1, 1.4, 1.8, 2.2 f(x): 3.49, 4.82, 5.96, 6.5	5	CO1	BT2	
	1(B)	Fit a straight line to the following data: x: 1, 2, 3, 4, 6, 8 f(x): 2.4, 3, 3.6, 4, 5, 6	5	CO2	BT2	
PART-B	2(A)	Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cos x}\, dx$ by dividing the interval into 6 parts.	5	CO3	BT2	
	2(B)	The following data gives the corresponding values of θ *and* $f(\theta) = \tan\theta$ (in degrees). θ: 12°, 20°, 28°, 36°, 44° $f(\theta) = \tan\theta$: 0.213, 0.364, 0.532, 0.727, 0.966 Find the value of $\sec^2\theta$ *at* 20°.	5	CO3	BT3	
PART-C	3(A)	Apply Factorization Method to solve the following equations: $2x + y + z = 7$; $x + 2y + z = 8$; $x + y + 2z = 9$	10	CO3	BT3	
	3(B)	Solve the following system of equations by Gauss Seidel Method : $10x + 2y + z = 9$; $2x + 20y - 2z = -44$; $-2x + 3y + 10z = 22$.	10	CO4	BT3	

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PART-D

4(A)	Find the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{vmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{vmatrix}$ using power method .Take $[1\ 0\ 0]^T$ as initial eigen vector	10	CO4	BT3
4(B)	Obtain using Jacobi's method ,all the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 3 & 1/\sqrt{2} \\ 3 & 2 & 1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} & 5 \end{bmatrix}$	10	CO4	BT3
5(A)	Find the solution $y(0.1)$ to the initial value problem $\frac{dy}{dx} = -2xy^2$ given $y(0) = 1$ with h=0.1 ,using Taylor's series method of order 4.	5	CO4	BT3
5(B)	Given $\frac{dy}{dx} = xy^{\frac{1}{3}}$ and $y(1) = 1$. Find $y(1.1)$ and $y(1.2)$ using Runge-Kutta method of order 4	15	CO4	BT3
6(A)	Apply Milne's Method ,to find a solution to the differential equation $\frac{dy}{dx} = 1 + xy^2$ as $x = 0.8$, given $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$	10	CO5	BT4
6(B)	Using Euler's method , compute $y(0.5)$ for differential equation $\frac{dy}{dx} = y^2 - x^2$, with $y = 1$ when $x = 0$. Take $h = 0.05$	10	CO5	BT4

** ********** END **********

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Semester: 4
Subject Code: CDO-205
Roll No:.....
Max Marks: 50

Subject: Career Skills-I
Time: 90 Mins
DL 30/05/2022 Session-I
Branch: B.Sc Physics/Chem/Maths

NAME .....

Instructions: All questions are compulsory. Each question carries multiple options. No negative marking. Calculator is not allowed. ***Answers are to be filled in the answer table only.***

ANSWERS WRITTEN OUTSIDE THE ANSWER TABLE WON'T BE CONSIDERED.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

QUANTITATIVE APTITUDE

Q1. The average age of a family of 5 members is 20 years. If the age of the youngest member be 10 years then what was the average age of the family at the time of the birth of the youngest member?
a) 13.5 b) 14 c)15 d) 12.5

Q2. If A's salary is 20% lower than B's salary, then how much present is B's salary higher than A's?
a) 15% b) 20% c) 25% d) 33.3%

Q3. If a selling price of Rs 24 results in a 20% discount of the list price, the selling price that would result in a 30% discount of the list price is?
a)Rs 16 b) Rs 21 c) Rs 25 d) Rs31

Q4. A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are:
a) 500 b) 350 c) 650 d) 250

Q5. if the price of a book is first decreased by 25% and then increased by 20%. then the net change in the price will be :
a) 10 b) 20 c) 30 d) 45

Q6. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?
a) 3.5 years b) 4 years c) 4.5 years d) None of these

Q7. Interest obtained on a sum of Rs. 5000 for 3 years is Rs. 1500. Find the rate percent.
a) 10% b) 12% c) 15% d) 20%

Q8. Two numbers are 20% and 30% less than the third number . How much percent is the second number less than first?

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a) 12.5 % b) 15% c) 20% d) 25%

Q9. In a History examination, the average for the entire class was 80 marks. If 10% of the students scored 35 marks and 20% scored 90 marks, what was the average marks of the remaining students of the class ?

a)75 b)65 c)80 d)90

Q10. 21 pencils and 29 pens cost Rs 79. But if the number of pencils and pens were interchanged, the cost would have reduced by Rs 8. Find the cost of each pen.

a) Rs 1 b) Rs 2 c) Rs 3 d) Rs 4

Q11. Find the compound interest on Rs. 16,000 at 20% per annum for 9 months, compounded quarterly?

A.2522 B.2652 C.2700 D.2800

Q12. The present worth of Rs.169 due in 2 years at 4% per annum compound interest is

A. Rs 156.25 B.Rs 160 C.Rs.170 D.Rs.180

Q13. How much time will it take for an amount of Rs. 900 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

A. 2 years B. 3 years C. 1 year D. 4 years

Q14. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. What is the sum?

A. 650 B. 698 C. 690 D. 700

Q15. The population of a town is 40,000. It decreases by 20 per thousand per year. Find out the population after 2 years?

A. 38484 B. 38266 C. 38146 D. 38226

Q16. The selling price of an article is Rs. 500. The cost price is Rs.400. What is the gain %?

A. 20% B. 25% C. 30% D. 40%

Q17. Victor gets 92 % marks in examinations. If these are 460 marks, find the maximum marks.

A. 600 B. 900 C. 500 D. 1000

Q18. If the cost price is 25% of selling price. Then what is the profit percent.

A. 150% B. 200% C. 300% D. 350%

Q19. A man buys an item at Rs. 1200 and sells it at the loss of 20 percent. Then what is the selling price of that item?

A. Rs.660 B. Rs. 760 C. Rs. 860 D. Rs. 960

Q20. If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is?

A. 12% B. 30% C. 50% D. 60%

Q21. A, B, and C can do a piece of work in 8 days. B and C together do it in 24 days. B alone can do it in 40 days. In what time will it be done by C working alone?

a)60 days b)50 days c)65 days d)85 days

Q22. X can do a piece of work in 30 days. Y can do it in 20 days, and Z can do it in 24 days. In how many days will they all do it together?

a)8 days b)10 days c)15 days d)25 days

Q23. The ratio of two numbers is 2:3 and the sum of their cubes is 945. The difference of number is?

a)3 b)9 c)10 d)12

Q24. The marks obtained by Vijay and Amith are in the ratio 4:5 and those obtained by Amith and Abhishek in the ratio of 3:2. The marks obtained by Vijay and Abhishek are in the ratio of?

a)6:5 b)5:6 c)2:3 d)3:2

Q25. The sum of the present ages of two persons A and B is 60. If the age of A is twice that of B, find the sum of their ages 5 years hence?

a)70 b)65 c)50 d)55

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VERBAL ABILITY

26. Select the correct pair of homophones to complete the given sentence: One bow at the ____ makes many to ____ their attitude towards life.
A. altar, altar B. alter, alter C. altar, alter D. alter, altar

27. Select the correct word to complete the given sentence: She is ____ in the art of painting.
A. adept B. adopt C. adapt D. adipt

28. Fill in the blanks choosing the words with correct word order: She put on the _____ pullover.
A. yellow-soft-woolly B. woolly-yellow-soft C. soft-yellow-woolly D. All are correct

29. Fill in the blanks choosing the words with correct word order: He has got a pair of _____ cowboy boots.
A. leather-swanky-brown B. swanky-brown-leather
C. brown-swanky-leather D. All are correct

Q30. The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. But the attention of the layman, not surprisingly, has been captured by the atom bomb, although there is at least a chance that it may never be used again.
2. Of all the changes introduced by man into the household of nature, [controlled]large-scale nuclear fission is undoubtedly the most dangerous and most profound.
3. The danger to humanity created by the so-called peaceful uses of atomic energy may, however, be much greater.
4. The resultant ionizing radiation has become the most serious agent of pollution of the environment and the greatest threat to man's survival on earth.

A. 3421 B. 3124 C. 2134 D.2413

Direction (for Q.Nos. 31 - 36): Read each sentence to find out whether there is any grammatical error in it. The error, if any will be in one part of the sentence. The letter of that part is the answer. If there is no error, the answer is 'D'. (Ignore the errors of punctuation, if any).

Q31. A. The operation charges in this hospital B. are less than in the hospital
C. near my house D. No error

Q32. A. Even though the shirt is expensive B. but I wish to
C. purchase it with my money someday D. No error

Q33. A. His father promised to give him anything B. what he wants if he
C. passes in the examination D. No error

Q34. A. After listening to his advice B . I decided to not to go
c. abroad for studies D. No error

Q35. A. If I had known B. this yesterday C. I will have helped him. D. No error

Q36. A. The students were B. awaiting for the arrival
C. of the chief guest D. No error

Direction (for Q.Nos. 37 - 38): Choose the word which best expresses the meaning of the given word

Q37. MELD
A.To soothe B. Merge C. Purchase D. Enlighten

Q38. APPROBATION
A.Understanding B. Approval C. Condemn D. Justification

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Direction (for Q.Nos. 39 - 40): Choose the word which is the exact OPPOSITE to the meaning of the given word

Q39 EXPAND

A Convert B. Congest C. Condense D. Conclude

Q40. HUMILITY

A Pride B. Determination C. Gentleness D. Honesty

Direction (for Q.Nos. 41 - 43): Pick out the most effective word(s) from the given words to fill in the blank to make the sentence meaningfully complete

Q 41. Jawaharlal Nehru spent his childhood _____ Anand Bhawan.

A. in B. at C. on D. within

Q42. Government buildings are _____ on the Republic Day.

A.enlightened B. Lightened C. Illuminated D. Glowed

Q43. If you smuggle goods into a country, they may be _____ by the customs authority.

A.Possessed B. Punished C. Confiscated D. Fined

Direction (for Q.Nos. 44 – 45) In each question below, there is a sentence of which some parts have been jumbled up. Rearrange these parts which are labelled P, Q, R and S to produce the correct sentence. Choose the proper sequence.

Q44. I read an advertisement that said:

P.posh, air-conditioned Q. gentlemen of taste R. are available for S. fully furnished rooms

A. PQRS B. PSQR C. SRPQ D. PSRQ

Q45. We have to:

P.as we see it Q. Speak the truth R. there is falsehood and weakness S. even if all around us

A. RQSP B. QRPS C. QPSR D. RSQP

Direction (for Q.Nos. 46 – 47) In the following questions, each question consist of two words which have a certain relationship to each other followed by four pairs of related words, Select the pair which has the same relationship.

Q46. Mundane : Spiritual ::

A.Common : Ghostly B.Worldly : Unworldly C. Routine : Novel D. Secular:clerical

Q47. Army :Logistics::

A.War : Logic B. Teacher :Students C. Team :Individual D.Business:Strategy

Direction (for Q.Nos. 48 – 50) In questions given below out of four alternatives, choose the one which can be substituted for the given words/phrases.

Q48. Be the embodiment or perfect example of

A.Characterise B. Idolise C. Personify D. Signify

Q49. One who is not easily pleased by anything

A.Maiden B. Medieval C. Precarious D. Fastidious

Q50. One who is fond of fighting

A.Bellicose B.Aggressive C. Belligerent D. Militant

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DEPARTMENT OF PHYSICS

"T3 Examination, May-2022" **SET-B**

SEMESTER	**IV**	**DATE OF EXAM**	**27.05.2022**
SUBJECT NAME	Thermodynamics	**SUBJECT CODE**	**PHH205B-T**
BRANCH	Physics	**SESSION**	**I**
TIME	**09:00-12:00AM**	**MAX. MARKS**	**100**
PROGRAM	**B.Sc**	**CREDITS**	**4**
NAME OF FACULTY	**Haider Abbas**	**NAME OF COURSE COORDINATOR**	**Haider Abbas**

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q.1	The internal energy of a certain substance is given by the following equation u= 3.56 pv + 84, where u is given in kJ/kg, p is in kPa, and v is in m^3/kg. A system composed of 3 kg of this substance expands from an initial pressure of 500 kPa and a volume of 0.22 m^3 to a final pressure 100 kPa in a process in which pressure and volume are related by $pv^{1.2}$ = constant. If theexpansion is quasi-static, find Q, ΔU, and W for the process.	5	CO1	BT2	2.1.1
	Q.2	Show that the work done by a system by interacting only with the surroundings in a reversible process is always more than that done by it in an irreversible process between the same end states.	5	CO1	BT2	2.2.1, 2.3.1
	Q.3	Get the relation for both of the Tds equations.	5	CO2	BT3	2.2.1, 2.3.1
	Q.4	A system has a heat capacity at constant volume $C_v=AT^2$ where $A=0.042$ J/K^3. The system is originally at 200 K, and a thermal reservoir at 100 K is available. What is the maximum amount of work that can be recovered as the system is cooled down to the temperature of the reservoir?	5	CO2	BT3	2.2.1, 2.3.1
P	Q.5	Draw diagram, and discuss principle and theory of cooling due to adiabatic demagnetization.	20	CO3	BT4	2.2.1,

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						2.3.1,5.4.1
	Q.6	Derive all Maxwell's relation.	10	CO3	BT4	2.2.1, 2.3.1,5.4.1
	Q.7	Prove that C_p-C_v =R.	10	CO3	BT4	2.2.1, 2.3.1,5.4.1
PART-B	Q.8	Derive Maxwell-Boltzmann law of distribution of velocities in an ideal gas.	20	CO4	BT4	2.2.1, 2.3.1,5.4.11
	Q.9	Derive Boltzmann transport equation taking only drift variation into account.	10	CO4	BT4	2.2.1, 2.3.1,5.4.11
	Q.10	What is Joule Thomson effect ? Deduce the formula for the Joule Thomson coefficient.	10	CO4	BT4	2.2.1, 2.3.1,5.4.11

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DEPARTMENT OF PHYSICS

"T3 Examination, May-2022"

SEMESTER	4th	DATE OF EXAM	23/5/2022
SUBJECT NAME	Advanced Atmospheric Physics	SUBJECT CODE	PHH609B
BRANCH	Physics	SESSION	I
TIME	9:00AM-12:00 Noon	MAX. MARKS	100
PROGRAM	M. Sc.	CREDITS	4
NAME OF FACULTY	Dr. D. K. Sharma	NAME OF COURSE COORDINATOR	Dr. D. K. Sharma

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	Explain the artificial modification of cloud and its precipitation. Discuss the inadvertent modification.	5+5	CO1	BT3	2.2.1
PART-B	Q2	What do you mean by global electric circuit? Describe the global electric circuit act as a spherical capacitor.	10	CO2	BT3	2.2.2
PART-C	Q3	Describe the composition and structure of Sun and its interior.	20	CO3	BT1	1.1.1
	Q4	Discuss the solar cycle and how it is co-related with sunspot numbers.	20	CO3	BT4	1.2.1
PART-D	Q5	How does the ionosphere form? Sate their respective altitudes and temperature ranges of different ionospheric regions.	20	CO4	BT2	2.1.3
	Q6	Describe the propagation of electromagnetic wave in presence of magnetic field.	20	CO4	BT5	2.2.2

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DEPARTMENT OF PHYSICS

"T3 Examination, May-2022"

SEMESTER	IV	DATE OF EXAM	25-05-2022
SUBJECT NAME	Solid state physics	SUBJECT CODE	PHH206B-T
BRANCH	Physics	SESSION	I
TIME	9A.M: 12P.M	MAX. MARKS	100
PROGRAM	M. Sc	CREDITS	4
NAME OF FACULTY	Dr. Deepti Maikhuri	NAME OF COURSE COORDINATOR	Dr. Deepti Maikhuri

Note All questions are compulsory

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	Determine the Reciprocal lattice for FCC crystal. Also find the miller indices of a plane that makes intercepts 2 on a axis, parallel to b axis and 4 on c axis.	(5+5)	CO1	BT5	12.1.4 2.1.6.2 1.10.1
PART-B	Q2	Fermi energy of silver is 5eV. Assuming that Fermi energy is independent of temperature calculate the electronic specific heat and electronic thermal conductivity at room temperature. Take relaxation time at Fermi level, $\tau_f = 10^{-14}$ s.	10	CO2	BT2, BT5	12.1.4 2.1.6.2 1.10.1 1
PART-C	Q3	Obtain an expression for paramagnetic susceptibility on the basis of classical laws. Discuss its shortcoming and show that how quantum theory modified it. An atom of oxygen on being polarised produces a dipole moment of 0.5×10^{-22} Cm. If the distance of the centre of negative charge cloud from nucleus is 4×10^{-17}m, calculate the polarizability of the oxygen atom.	(7+8+5)	CO3	BT2, BT3, BT4, BT5	12.1.4 2.1.6.2 1.10.1 1
	Q4	What are paramagnetic and diamagnetic materials? Give examples. Discuss and derive the temperature variation of paramagnetic susceptibility of materials. or Give an account of Weiss theory of ferromagnetism. On the basis of this theory how will you explain curie point. Explain clearly the basic difference between paramagnetism and ferromagnetism.	(5+5+10)	CO3	BT2, BT3, BT4, BT5	12.1.4 2.1.6.2 1.10.1 1
PART-D	Q5	Obtain Clausius Mosotti equation and explain how it can be used to determine the dipole moment of a polar molecule from the dielectric constant measurements. A dielectric material has $\epsilon_r = 4.94$, $n^2 = 2.69$, where n is the refractive index. Calculate the ratio between electronic and ionic polarisabilities of this material.	(10+5+5)	CO4	BT2, BT4, BT5	12.1.4 2.1.6.2 1.10.1 1
	Q6	What is meant by polarization mechanism in Dielectrics? Discuss the different polarization mechanisms in dielectrics and explain their temperature dependence. or Describe the various dielectric polarization mechanisms. What is complex dielectric constant? How does it vary with frequency of applied field?	(10+10)	CO4	BT4, BT5	12.1.4 2.1.6.2 1.10.1 1

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	by 100K. Calculate the efficiency, if the temperature of the source and sink are reduced by 100 K.			
Q6(A)	Discuss Carnot cycle as a refrigerator. A freezer is maintained at a temperature of -10°C and the room temperature is 30°C. To maintain the freezer temperature, heat is removed at the rate of 1200Js^{-1}	6	CO4	BT5
Q6(B)	Discuss change in entropy in reversible and irreversible process. In an adiabatic process, the pressure of an ideal gas as $p = p_o - \alpha V^2$, when p_o and α are positive constants. Calculate the volume at which its entropy is maximum.	9	CO4	BT5

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DEPARTMENT OF MATHEMATICS

"T3 Examination, May-2022"

SEMESTER	IV	DATE OF EXAM	01/06/2022
SUBJECT NAME	Numerical Analysis	SUBJECT CODE	MAH-411T
BRANCH	Physics	SESSION	I
TIME	9:00AM-12:00Noon	MAX. MARKS	100
B.Sc B.Ed	B.Sc (H)	CREDITS	04
NAME OF FACULTY	Ms Seema Aggarwal	NAME OF COURSE COORDINATOR	Ms Seema Aggarwal

Note: All questions are compulsory.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Using Newton's forward interpolation formula , find $f(1.6)$ for the given values x: 1, 1.4, 1.8, 2.2 f(x): 3.49, 4.82, 5.96, 6.5	5	CO1	BT2	
	1(B)	Fit a straight line to the following data: x: 1, 2, 3, 4, 6, 8 f(x): 2.4, 3, 3.6, 4, 5, 6	5	CO2	BT2	
PART-B	2(A)	Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cos x}\ dx$ by dividing the interval into 6 parts.	5	CO3	BT2	
	2(B)	The following data gives the corresponding values of θ and $f(\theta) = \tan\theta$ (in degrees). θ: 12°, 20°, 28°, 36°, 44° $f(\theta) = \tan\theta$: 0.213, 0.364, 0.532, 0.727, 0.966 Find the value of $\sec^2\theta$ at 20°.	5	CO3	BT3	
PART-C	3(A)	Apply Factorization Method to solve the following equations: $2x + y + z = 7$; $x + 2y + z = 8$; $x + y + 2z = 9$	10	CO3	BT3	
	3(B)	Solve the following system of equations by Gauss Seidel Method : $10x + 2y + z = 9$; $2x + 20y - 2z = -44$; $-2x + 3y + 10z = 22$.	10	CO4	BT3	

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PART-D

4(A)	Find the largest eigen value and the corresponding eigen vector of the matrix $A = \begin{vmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{vmatrix}$ using power method .Take $[1\,0\,0]^T$ as initial eigen vector	10	CO4	BT3
4(B)	Obtain using Jacobi's method ,all the eigen values and eigen vectors of the matrix $A = \begin{vmatrix} 2 & 3 & 1/\sqrt{2} \\ 3 & 2 & 1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} & 5 \end{vmatrix}$	10	CO4	BT3
5(A)	Find the solution $y(0.1)$ to the initial value problem $\frac{dy}{dx} = -2xy^2$ given $y(0) = 1$ with h=0.1 ,using Taylor's series method of order 4.	5	CO4	BT3
5(B)	Given $\frac{dy}{dx} = xy^{\frac{1}{3}}$ and $y(1) = 1$. Find $y(1.1)$ and $y(1.2)$ using Runge-Kutta method of order 4	15	CO4	BT3
6(A)	Apply Milne's Method ,to find a solution to the differential equation $\frac{dy}{dx} = 1 + xy^2$ as $x = 0.8$, given $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$	10	CO5	BT4
6(B)	Using Euler's method , compute $y(0.5)$ for differential equation $\frac{dy}{dx} = y^2 - x^2$, with $y = 1$ when $x = 0$. Take $h = 0.05$	10	CO5	BT4

** ********** END **********

MANAV RACHNA UNIVERSITY

Semester: 4
Subject Code: CDO-205
Roll No:.....
Max Marks: 50

Subject: Career Skills-I
Time: 90 Mins
Dt. 30/05/2022 Session - I
Branch: B.Sc Physics/Chem/Maths

NAME: .....

Instructions: All questions are compulsory. Each question carries multiple options. No negative marking. Calculator is not allowed. ***Answers are to be filled in the answer table only.***

ANSWERS WRITTEN OUTSIDE THE ANSWER TABLE WON'T BE CONSIDERED.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

QUANTITATIVE APTITUDE

Q1. The average age of a family of 5 members is 20 years. If the age of the youngest member be 10 years then what was the average age of the family at the time of the birth of the youngest member?
a) 13.5 b) 14 c)15 d) 12.5

Q2. If A's salary is 20% lower than B's salary, then how much present is B's salary higher than A's?
a) 15% b) 20% c) 25% d) 33.3%

Q3. If a selling price of Rs 24 results in a 20% discount of the list price, the selling price that would result in a 30% discount of the list price is?
a)Rs 16 b) Rs 21 c) Rs 25 d) Rs31

Q4. A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are: _
a) 500 b) 350 c) 650 d) 250

Q5. if the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be :
a) 10 b) 20 c) 30 d) 45

Q6. How much time will it take for an amount of Rs. 450 to yield Rs. 81 as interest at 4.5% per annum of simple interest?
a) 3.5 years b) 4 years c) 4.5 years d) None of these

Q7. Interest obtained on a sum of Rs. 5000 for 3 years is Rs. 1500. Find the rate percent.
a) 10% b) 12% c) 15% d) 20%

Q8. Two numbers are 20% and 30% less than the third number . How much percent is the second number less than first?

a) 12.5 % b) 15% c) 20% d) 25%

Q9. In a History examination, the average for the entire class was 80 marks. If 10% of the students scored 35 marks and 20% scored 90 marks, what was the average marks of the remaining students of the class ?

a)75 b)65 c)80 d)90

Q10. 21 pencils and 29 pens cost Rs 79. But if the number of pencils and pens were interchanged, the cost would have reduced by Rs 8. Find the cost of each pen.

a) Rs 1 b) Rs 2 c) Rs 3 d) Rs 4

Q11. Find the compound interest on Rs. 16,000 at 20% per annum for 9 months, compounded quarterly?

A.2522 B.2652 C.2700 D.2800

Q12. The present worth of Rs.169 due in 2 years at 4% per annum compound interest is

A. Rs 156.25 B.Rs 160 C.Rs.170 D.Rs.180

Q13. How much time will it take for an amount of Rs. 900 to yield Rs. 81 as interest at 4.5% per annum of simple interest?

A. 2 years B. 3 years C. 1 year D. 4 years

Q14. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. What is the sum?

A. 650 B. 698 C. 690 D. 700

Q15. The population of a town is 40,000. It decreases by 20 per thousand per year. Find out the population after 2 years?

A. 38484 B. 38266 C. 38146 D. 38226

Q16. The selling price of an article is Rs. 500. The cost price is Rs.400. What is the gain %?

A. 20% B. 25% C. 30% D. 40%

Q17. Victor gets 92 % marks in examinations. If these are 460 marks, find the maximum marks.

A. 600 B. 900 C. 500 D. 1000

Q18. If the cost price is 25% of selling price. Then what is the profit percent.

A. 150% B. 200% C. 300% D. 350%

Q19. A man buys an item at Rs. 1200 and sells it at the loss of 20 percent. Then what is the selling price of that item?

A. Rs.660 B. Rs. 760 C. Rs. 860 D. Rs. 960

Q20. If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is?

A. 12% B. 30% C. 50% D. 60%

Q21. A, B, and C can do a piece of work in 8 days. B and C together do it in 24 days. B alone can do it in 40 days. In what time will it be done by C working alone?

a)60 days b)50 days c)65 days d)85 days

Q22. X can do a piece of work in 30 days. Y can do it in 20 days, and Z can do it in 24 days. In how many days will they all do it together?

a)8 days b)10 days c)15 days d)25 days

Q23. The ratio of two numbers is 2:3 and the sum of their cubes is 945. The difference of number is?

a)3 b)9 c)10 d)12

Q24. The marks obtained by Vijay and Amith are in the ratio 4:5 and those obtained by Amith and Abhishek in the ratio of 3:2. The marks obtained by Vijay and Abhishek are in the ratio of?

a)6:5 b)5:6 c)2:3 d)3:2

Q25. The sum of the present ages of two persons A and B is 60. If the age of A is twice that of B, find the sum of their ages 5 years hence?

a)70 b)65 c)50 d)55

VERBAL ABILITY

26. Select the correct pair of homophones to complete the given sentence: One bow at the ____ makes many to ____ their attitude towards life.
A. altar, altar B. alter, alter C. altar, alter D. alter, altar

27. Select the correct word to complete the given sentence: She is ____ in the art of painting.
A. adept B. adopt C. adapt D. adipt

28. Fill in the blanks choosing the words with correct word order: She put on the _____ pullover.
A. yellow-soft-woolly B. woolly-yellow-soft C. soft-yellow-woolly D. All are correct

29. Fill in the blanks choosing the words with correct word order: He has got a pair of _____ cowboy boots.
A. leather-swanky-brown B. swanky-brown-leather
C. brown-swanky-leather D. All are correct

Q30. The four sentences (labelled 1, 2, 3, 4) below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequencing of the order of the sentences and key in the sequence of the four numbers as your answer:

1. But the attention of the layman, not surprisingly, has been captured by the atom bomb, although there is at least a chance that it may never be used again.
2. Of all the changes introduced by man into the household of nature, [controlled]large-scale nuclear fission is undoubtedly the most dangerous and most profound.
3. The danger to humanity created by the so-called peaceful uses of atomic energy may, however, be much greater.
4. The resultant ionizing radiation has become the most serious agent of pollution of the environment and the greatest threat to man's survival on earth.

A. 3421 B. 3124 C. 2134 D.2413

Direction (for Q.Nos. 31 - 36): Read each sentence to find out whether there is any grammatical error in it. The error, if any will be in one part of the sentence. The letter of that part is the answer. If there is no error, the answer is 'D'. (Ignore the errors of punctuation, if any).

Q31. A. The operation charges in this hospital B. are less than in the hospital
C. near my house D. No error

Q32. A. Even though the shirt is expensive B. but I wish to
C. purchase it with my money someday D. No error

Q33. A. His father promised to give him anything B. what he wants if he
C. passes in the examination D. No error

Q34. A. After listening to his advice B . I decided to not to go
c. abroad for studies D. No error

Q35. A. If I had known B. this yesterday C. I will have helped him. D. No error

Q36. A. The students were B. awaiting for the arrival
C. of the chief guest D. No error

Direction (for Q.Nos. 37 - 38): Choose the word which best expresses the meaning of the given word

Q37. MELD
A.To soothe B. Merge C. Purchase D. Enlighten

Q38. APPROBATION
A.Understanding B. Approval C. Condemn D. Justification

Direction (for Q.Nos. 39 - 40): Choose the word which is the exact OPPOSITE to the meaning of the given word

Q39 EXPAND

A.Convert B. Congest C. Condense D. Conclude

Q40 HUMILITY

A.Pride B. Determination C. Gentleness D. Honesty

Direction (for Q.Nos. 41 - 43): Pick out the most effective word(s) from the given words to fill in the blank to make the sentence meaningfully complete

Q.41. Jawaharlal Nehru spent his childhood _____ Anand Bhawan.

A. in B. at C. on D. within

Q42. Government buildings are _____ on the Republic Day.

A.enlightened B. Lightened C. Illuminated D. Glowed

Q43. If you smuggle goods into a country, they may be _____ by the customs authority.

A.Possessed B. Punished C. Confiscated D. Fined

Direction (for Q.Nos. 44 – 45) In each question below, there is a sentence of which some parts have been jumbled up. Rearrange these parts which are labelled P, Q, R and S to produce the correct sentence. Choose the proper sequence.

Q44. I read an advertisement that said:

P.posh, air-conditioned Q. gentlemen of taste R. are available for S. fully furnished rooms

A. PQRS B. PSQR C. SRPQ D. PSRQ

Q45. We have to:

P.as we see it Q. Speak the truth R. there is falsehood and weakness S. even if all around us

A. RQSP B. QRPS C. QPSR D. RSQP

Direction (for Q.Nos. 46 – 47) In the following questions, each question consist of two words which have a certain relationship to each other followed by four pairs of related words, Select the pair which has the same relationship.

Q46. Mundane : Spiritual ::

A.Common : Ghostly B.Worldly : Unworldly C. Routine : Novel D. Secular:clerical

Q47. Army :Logistics::

A.War : Logic B. Teacher :Students C. Team :Individual D.Business:Strategy

Direction (for Q.Nos. 48 – 50) In questions given below out of four alternatives, choose the one which can be substituted for the given words/phrases.

Q48. Be the embodiment or perfect example of

A.Characterise B. Idolise C. Personify D. Signify

Q49. One who is not easily pleased by anything

A.Maiden B. Medieval C. Precarious D. Fastidious

Q50. One who is fond of fighting

A.Bellicose B.Aggressive C. Belligerent D. Militant

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DEPARTMENT OF PHYSICS

"T3 Examination, May-2022"

SEMESTER	VI	DATE OF EXAM	24/05/2022
SUBJECT NAME	Computationnl Condensed Matter Physics	SUBJECT CODE	PHH311B-T
BRANCH	Physics		
TIME	9:00 A.M-12:00 Noon	SESSION	I
PROGRAM	B. Sc (II)	MAX. MARKS	100
NAME OF FACULTY	Dr. Deepti Maikhuri	CREDITS	4
		NAME OF COURSE COORDINATOR	Dr. Deepti Maikhuri

Note: Read the question paper carefully.

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	Determine the Huckel secular determinant for butadiene. Show that the Huckel molecular orbitals of butadiene are orthonormal.	10	CO1	BT3	1.2 1.4 1.1
PART-B	Q2	Obtain the partition function for a system of two half spin electrons in a two-energy level system with zero ground state energy and excited state energy E. Consider the ground state to be non-degenerate and excited state as doubly degenerate.	10	CO2	BT3	1.2 1.4 1.1
PART-C	Q3	What is meant by 6-31G** notation of a Basis set? Describe how a double-zeta basis set can be used to overcome the problems encountered in describing the 2p orbitals on the C atom in HCN by using only a STO-3G basis set? or What is basis set? What is their significance in computational physics? Describe different types of basis sets in detail. How are improved basis sets obtained?	20	CO3	BT2, BT4	4.1 1.6 2 1. 10 1 1
	Q4	How DFT reduces the 3n dimensional many body problem to 3D problem. Discuss in detail the DFT theory.	20	CO3	BT3, BT4	4 1 1.6 2 1. 10 1 1
PART-D	Q5	What is the general form of an atomic orbital in STO-6G basis set? Describe the general procedure for constructing the functional forms of 1S and 2S orbitals for a C atom in the 5-31G basis set. or For butadiene (C_4H_6), set up an input file for the simulation of vibrational properties, considering arbitrary coordinates x, y, z of carbon and hydrogen. Define explicitly the meaning of each term.	20	CO4	BT4, BT5	4 1 1.6 2 1. 10 2 1
	Q6	For Butane (C_4H_{10}), set up an input file for running geometry optimized restricted Hartree Fock calculation using the 5-31G basis set.	20	CO4	BT4, BT5	4 1 1. 6 2 1.10 2 1

END

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DEPARTMENT OF PHYSICS

"T3 Examination, May-2022"

SEMESTER	6th	DATE OF EXAM	26/5/2022
SUBJECT NAME	Atmospheric Physics	SUBJECT CODE	PHH310B-T
BRANCH	Physics	SESSION	I
TIME	9:00AM-12:00 Noon	MAX. MARKS	100
PROGRAM	B. Sc. (H)	CREDITS	4
NAME OF FACULTY	Dr. D. K. Sharma	NAME OF COURSE COORDINATOR	Dr. D. K. Sharma

Note: All questions are compulsory.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	Q1	Describe the four major layers of the atmosphere	10	CO1	BT3	2.2.1
PART-B	Q2	Explain the various types of non-ionizing radiations and their effects.	10	CO2	BT1, BT3	2.2.2
PART-C	Q3	What is thermal pollution? State and explain the various sources/ causes of thermal pollution.	20	CO3	BT2	1.1.1
	Q4	Discuss in detail the various types of atmospheric pollutions and their sources and removal process.	20	CO3	BT4	1.2.1
PART-D	Q5	Describe the elements of weather and discuss the vertical and horizontal motion of air.	20	CO4	BT2	2.1.3
	Q6	Explain the Global Climate model and discuss a zero-dimensional greenhouse model.	20	CO4	BT5	2.2.2

********** END **********

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(FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING)

Declared as Deemed Private University under section 3 of the UGC act 1956

DEPARTMENT OF PHYSICS

"T3 Examination, "May 2021 - 2022"

Semester: VI th
Subject: ELECTRONIC DEVICES
Branch: PHYSICS
Course Type: CORE
Time: 180 Minutes
Max.Marks: 100

Date of Exam: 30/05/2022
Subject Code: PHH 306B-T
Session: Morning
Course Nature: Hard
Program: B.Sc Physics
Signature: HOD:

This paper has eight questions. All questions are compulsory

PART -A

S. No	Questions	MM	CO	BT level	PI
Q1.	Define and explain the static and dynamic resistances of diode.	5	CO1	L2	3.1
Q2.	Why is Zener diode used as a voltage regulator?	5	CO1	L2	4.2

PART – B

S. No	Questions	MM	CO	BT level	PI
Q3.	What are different biasing conditions of BJT? Give a comparison table.	5	CO2	L3	1.2, 3.2, 6.1
Q4.	Explain quiescent point in reference to the BJT amplifier. What is its significance?	5	CO2	L3	3.2, 5.3

PART -C

S. No	Questions	MM	CO	BT Level	PI
Q5. (a)	How is drain current controlled in JFET? Why the JFET channel is never controlled at the drain end?	10	CO3	L3	4.1, 10.1
(b)	Describe the JFET parameters. For an N-Channel JFET, I_{DSS} = 8.7mA, V_p=-3V, V_{GS}= -1V. Calculate the drain current and transconductance.	10	CO3	L4	3.1, 8.2
Q6. (a)	Draw and explain the diagram for the construction of E-MOSFET. Explain the operation of MOSFET in different modes.	10	CO3	L4	7.1, 10.3
(b)	Draw the output and transfer characteristics of MOSFET and explain. For a common source n-channel MOSFET amplifier, determine the values of V_{GS}, I_D, V_{DS} and output voltage for $I_{D(ON)}$=4mA at	10	CO2	L4	5.1, 7.2

.	$V_{GS(ON)}$=8V, V_{GST}= 4V, g_m=2000μS.				

PART –D

S. No	Questions	MM	CO	BT Level	PI
Q7. (a)	Compare various levels of integrations of fabrication technologies of integrated circuits. Also state the types of existing fabrication technologies.	10	CO4	L3	4.1, 10.1
(b)	Describe the advantages of CMOS fabrication technologies.	10	CO4	L4	3.1, 8.2
Q8.	Give short notes on following in reference to semiconductor fabrication technology (a) Thermal oxidation (b) Diffusion mechanics (c) Ion Implantation (d) Epitaxy	20	CO4	L4	7.1, 10.3

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DEPARTMENT OF PHYSICS

"T3 Examination, MAY-2022"

SEMESTER	**VI**	**DATE OF EXAM**	**31.05.2022**
SUBJECT NAME	**Relativity and Quantum Mechanics**	**SUBJECT CODE**	**PHH331-T**
BRANCH	**PHYSICS**	**SESSION**	**I**
TIME	**09:00 AM-12:00 Noon**	**MAX. MARKS**	**80**
PROGRAM	**B. Sc. B. Ed.**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Anshuman Sahai.**	**NAME OF COURSE COORDINATOR**	**Dr. Anshuman Sahai.**

Note: Attempt all questions ***[SET B]***

Q.NO.		QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-A	1(A)	Show that the motion of one projectile as seen from another projectile will always be a straight line motion	5	CO1	BT4	
	1(B)	A ball has velocity (4i-5j+10k)m/sec relative to a train moving with velocity (3i+4j)m/sec relative to an observer on the ground. Calculate the velocity of the ball relative to the ground.	5	CO1	BT4	
PART-B	2(A)	Derive the relation between group velocity and particle velocity and show that for a moving body travels with the same velocity as the body itself.	5	CO2	BT3, BT4	
	2(B)	Compare the de-Broglie wavelength of a dust particle of mass 10^{-10} kg drifting with a speed of 5nm/sec and an electron having KE of 150eV.	5	CO2	BT4	
PART-C	3	Derive time independent Schrodinger's equation.	15	CO3	BT2	
	Q4(A)	Write down the Schrodinger wave equation for a particle in one dimensional infinitely deep potential well. Solve it to obtain normalized wave function and show that the eigen values are discrete.	10	CO3	BT2, BT3, BT5	
	4(B)	Solve : $[x, p_x]$ and $[x, p_z]$	2.5×2	CO3	BT4	
PART-D	Q5 (A)	Derive the relation of Fermi-Dirac & Maxwell-Boltzmann distribution function along with their assumptions and limitations.	20	CO4	BT2	
	5(B)	Consider a system consisting of two particles which can exists in three different energy states. Calculate the number of ways in which the three particles can be distributed in Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distribution states.	10	CO4	BT4	

END

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DEPARTMENT OF PHYSICS

"T3 Examination, June-2022"

SEMESTER	**VI**	**DATE OF EXAM**	**02-06-2022**
SUBJECT NAME	**Atomic and Molecular Physics**	**SUBJECT CODE**	**PHH432-T**
BRANCH	**Education**	**SESSION**	**Morning**
TIME	**09:00 AM – 12:00 PM**	**MAX. MARKS**	**80**
PROGRAM	**B.Sc. B.Ed.**	**CREDITS**	**4**
NAME OF FACULTY	**Dr. Sandeep Kumar**	**NAME OF COURSE COORDINATOR**	**Dr. Sandeep Kumar**

Note: All questions are compulsory.

	Q.NO.	QUESTIONS	MARKS	CO ADDRESSED	BLOOM'S LEVEL	PI
PART-AB	Q 1(A)	Using Bohr theory, Calculate the radius of the first orbit of the electron moving around the nucleus.	7	CO1	BT1, BT2	
	Q 1(B)	The wavelength of the second member of Balmer series of hydrogen is 4861 Angstrom. Calculate the wavelength of the first member.	3		BT1	
	Q2	Describe Stern-Garlach Experiment in detail.	10	CO2	BT2	
PART-C	Q3(A)	Discuss the origins of the various types of molecular spectra.	10	CO3	BT2, BT3, BT4	
	Q 3(B)	Write down the expression for the energy of a rigid rotator of a diatomic molecule and draw the diagram of rotational energy levels.	10	CO3	BT4, BT5	
	Q 3(C)	Find the vibrational energy of a diatomic molecule when the potential energy is given by $U = 1/2k(r - r_e)^2$, where k is a constant.	10	CO3	BT1, BT2, BT4	
PART-D	Q4(A)	Write down the differential form of Maxwell's equations with their physical significances. Explain displacement current.	10	CO4	BT1, BT2, BT4	
	Q4(B)	Discuss the reflection of a plane wave at normal incidence and Calculate the reflection and transmission coefficient.	10	CO4	BT1, BT2, BT4	
	Q4(C)	An EM wave travels in free space with the electric field component $E_x = 10e^{j(6\times10^8 t - \beta z)}$ V/m. Determine (i) ω and λ, (ii) The magnetic field component. (iii) Poynting vector.	10	CO4	BT1, BT2, BT4	

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