राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)

भौतिक विज्ञान विभाग

<u>Teaching Plan</u>
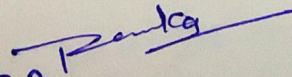
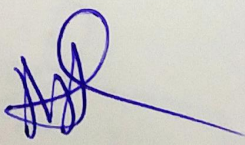Academic Session: Month: Class: M. Sc. 2nd Semester
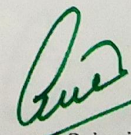
Date	Subject/Paper	Topic(s) Taught
06/02/2023		Basic introduction to the Subject.
13.02.2023		Interaction of radiation with matter (for elastic and en elastic scatterings of x-ray).
14.02.2023	LCC10. Condensed Matter Physics	Concept of reciprocal lattice point, calculation of reciprocal lattice point of SC, BCC, and FCC lattices, Application of reciprocal lattice point in diffraction technique.
21.02.2023		Different types of bonding in solids, covalent, metallic, Vander Waal, hydrogen bonding & ionic bonding
20.03.2023		Madelung constant of ionic crystals, cohesive energy.
21.03.2023		Concept of dispersion relation, quantization of lattice vibrations normal modes & normal coordinates,
31.03.2023		longitudinal and transverse modes of vibration,
03.04.2023		modes of vibration of monatomic and diatomic lattices. Density of states (Phonons).
10.04.2023	Test.	Theory of specific heat of solids : classical theory , Einstein theory and Debye theory .
11.04.2023		Theory of metals : Classical theory , free electron theory and
17.04.2023		F-D distribution function , Hall effect.
18.04.2023		

Date:- 01/02/23   Sign. of Teacher   Sign. of HOD   Sign. of Principal

राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)

भौतिकं विज्ञान विभाग

Teaching Plan

Academic Session: Month: Class: M. Sc 2nd Semester

Date	Subject/Paper	Topic(s) Taught
24.04.2023		Point defects (Schottky & Frankel Defects) Imperfections
27.04.2023	LCC10. Condensed	Line defects (Edge& Screw dislocations)
08.05.2023	Matter Physics	Burger vector & Burger Circuit.
22.05.2023		Role of dislocation in plastic deformation and crystal growth
24.05.2023		Elementary idea of super conductivity nearly zero resistivity
25.05.2023		Meissner effect, Tc, Hc type I, & II, superconductors
26.05.2023		BCS theory
		ferri, ferro, and anti ferromagnetism.

Date:- 01/02/2023   Sign. of Teacher   Sign. of HOD   Sign. of Principal

राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)
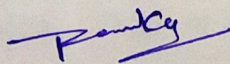
भौतिक विज्ञान विभाग
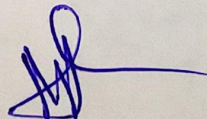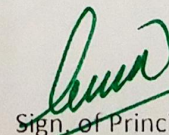
<u>Teaching Plan</u>

Academic Session: Month: Class: M. Sc. 4th Semester

Date	Subject/Paper	Topic(s) Taught
08/02/2023		*Basic introduction to the subject*
15/02/2023		Solution of ordinary linear differential equations with constant
22/02/2023		coefficients. Operation modes of analog computers, repetitive
15/03/2023		operation of computers, Time scaling, amplitude scaling,
23/03/2023		Generation of functions, Simulation of time varying systems.
05/04/2023	LCC15(b)	Boolean algebra, Canonical forms of Boolean, functions,
06/04/2023	Advanced	Simplification of Boolean functions (K-map, Tabulation
	Electronics-IV	method), don`t care conditions.
10/04/2023		Digital logic families: Adders & Subtractors, Magnitude
		comparator, Code converters: Parallel adders, Encoders,
13/04/2023		Decoders, Multiplexers, Demultiplexers,
15/04/2023		Parity bit generator and checker, Read only memory (PROM, EPROM),
19/04/2023		P.L. Digital to Analog and Analog to Digital converters.
20/04/2023		Sequential logic- Memory element, RS, JK, JKMS
26/04/2023		T type and Edge triggered Flip flop; Registers; Shift register;
03/05/2023		Counters— synchronous and Synchronous; The memory unit;
08/05/2023		Semiconductor Random Access Memory; Inter-register transfer;
22/05/2023		Arithmetic; Logic and Shift Micro-operation; Fixed point and floatation point data.

Date:- 04/02/2023   Sign. of Teacher   Sign. of HOD   Sign. of Principal

Academic Session: 2023-24   **Class: B. Sc. 1ˢᵗ Semester(NEP)**

Date	Paper	Topic(s) Taught
10.08.23		Introduction to Mechanics and Waves &Oscillations
11.08.23		Vector algebra. Scalar and vector products, scalar and vector triple
12.08.23		products.
16.08.23		Derivative of a vector with respect to a parameter, Line, surface and
17.08.23		volume integral of a vector function. Del operator, gradient, divergence and curl, applications of divergence and curl
18.08.23		Gauss divergence theorem, Stokes curl theorem and Green's theorem and their applications.
19.08.23	Mechanics	Test
21.08.23	& Theory	Gravitational field and potential, Gravitational potential energy.
22.08.23	of Waves	Gravitational field Intensity and potential due to a ring,
24.08.23	and	a spherical shell, solid sphere and circular disc
25.08.23	Oscillations	inertial and gravitational mass, gravitational self-energy, gravitational
01./09/23		self-energy of a uniform solid sphere, Inverse square law of forces
02.09.23		Kepler's laws of planetary motion and their derivation.
06.09.23		
08.09.23		Test
09.09.23		
11.09.23		Frames of reference. Concept of inertial and Non-inertial frames of
12.09.23		references.
13.09.23		Work energy theorem,
18.09.23		Conservative and non-Conservative forces Linear restoring force.
19.09.23		Gradient of potential, Conservation of energy for the particle;
20.09.23		Energy function, Concept of Centre of mass, translator and rotator
21.09.23		motion.
23.09.23		Equation of motion for rotating rigid bodies, Angular momentum and
25.09.23		torque
26.09.23		Laws of conservation of total energy, total linear momentum and total
27.09.23		angular momentum along with their examples
30.09.23		
18.09.23ᴸ		Test
10.10.23		

राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)
भौतिक विज्ञान विभाग
Teaching Plan

Date	Subject/Paper	Topic(s) Taught
03.10.23		Dynamics of rigid body and Moment of Inertia and Properties of matter Moment of inertia.
04.10.23		
05.10.23		
06.10.23		Theorem of parallel and perpendicular axes, Moment of Inertia of a rod, lamina, ring, disc
09.10.23		
10.10.23		spherical shell and solid sphere, kinetic
12.10.23		
13.10.23		Energy of rotation, basic concepts about elasticity, Hook's law, Young's modulus,
14.10.23		
16.10.23		
17.10.23		Bulk modulus, modulus of rigidity, poisson ratio, relation
18.10.23		connecting various elastic constants, bending moment.
19.10.23		Viscosity, Equation of continuity of flow, Bernoulli's theorem, Posieuille's formula, Stokes's law,
20.10.23		Surface tension and its molecular interpretation
	Mechanics & Theory of Waves and Oscillations	Test
25.10.23		Simple Harmonic Motion (S.H.M.),differential equation of S.H.M. and its Solution.
26.10.23		energy of harmonic oscillator, Lissajous' figures for equal
27.10.23		Frequencies ratio and 2:1 frequencies ratio,
28.10.23		damping forces, damped harmonic oscillator . differential
30.10.23		equation of damped harmonic oscillator and its solution,
31.10.23		power dissipation in a damped harmonic oscillator, relaxation time, quality factor, simple and compound pendulum.
1.11.23		forced or driven harmonic oscillator, its differential equation,
2.11.23		amplitude resonance, velocity resonance,
3.11.23		Sharpness of resonance, wave motion, particle and wave velocity, differential equation of wave motion,
		Fourier theorem. Fourier analysis of square and saw tooth waves.
28.11.23		Test

Date: - 10/08/2023   Sign. of Teacher   Sign. of HOD   Sign. of Principal

(Dr. Renuka Chauhan)

प्राचार्य

राधेहरि राजकीय स्ना0 महाविद्याल

काशीपुर-244713 (उत्तराखण्ड)

राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)
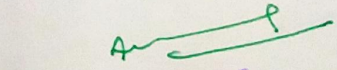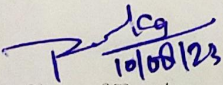
भौतिक विज्ञान विभाग

Teaching Plan

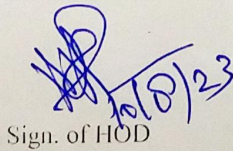Session: 2023-24   Class: M. Sc. 1st Sem

Subject/Paper	Topic(s) Taught
LCC1. Mathematical Physics	Introduction of basic Mathematical Physics Series solution of differential equations, Legendre, Bessel, and Hermite differential equation Laguerre differential equation and related polynomial. physical integral form of polynomials and their orthogonality relations. Generating Function and recurrence relation. Curvilinear Coordinates and various operators in circular, cylindrical and spherical co-ordinate systems Classification of Tensors, Rank of a Tensor, covariant and contra-variant tensors Symmetric and anti-symmetric Tensors, Kronecker delta symbol. Contraction of Tensor, metric Tensor and Tensor densities, covariant differentiation and Geodesic equation Test

2023   Sign. of Teacher   Sign. of HOD   Sign. of Principal

(Dr. Renuka Chauhan)

राधेहरि राजकीय स्ना० महाविद्यालय
काशीपुर-244713 (उत्तराखण्ड)

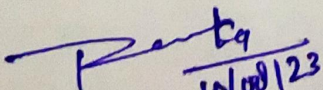राधेहरि राजकीय स्नातकोत्तर महाविद्यालय काशीपुर (ऊधम सिंह नगर)

भौतिक विज्ञान विभाग
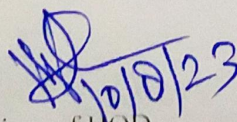
Teaching Plan

Session: 2023-24   Class: M. Sc. 1ˢᵗ semester

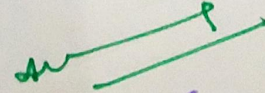| Subject/Paper	Topic(s) Taught
LCC1. Mathematical Physics	Function of complex variable, Cauchy's Riemann differential equation.
	Cauchy's integral theorem, residues and Cauchy's residues theorem, singularities,
	Evolution of residues and definite integral. .
	Fourier integral and Fourier Transform,
	Fourier integral theorem, finite and infinite integral,
	Laplace transform of elementary function
	Dirac delta & Green's function
	Solution of simple differential equations
	Test
	Revision

/08/2023   Sign. of Teacher 10/08/23   Sign. of HOD 10/8/23   Sign. of Principal प्रचार्य

(Dr. Renuka Chauhan)

राधेहरि रीजकीय स्ना0 महाविद्या

काशीपुर-244713 (उत्तराखण्ड
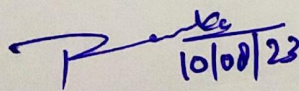
Teaching Plan

Academic Session: 2023-24

Class: M. Sc. 3rd Semester
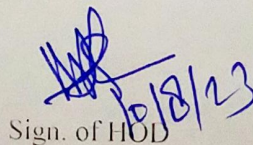
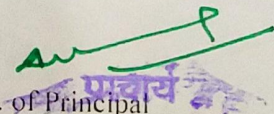| Date	Subject/Paper	Topic(s) Taught
09.09.23		Introduction to LCC11(b)
14.09.23		Classification of IC's, Fabrication of IC's & components,
23.09.23		Basic monolithic integrated circuit technology, processes used in
25.09.23		monolithic technology, active & passive components
30.09.23		metal semiconductor contact, thick & thin film IC's, hybrid IC's,
06.10.23	LCC11(b)	charge coupled devices (CCD), advantages & limitations of
13.10.23	Advanced	integrated circuits
14.10.23	Electronics-I	Test
		Basic operational Amplifier, Inverting & Non inverting OP-AMP,
		Common Mode Rejection Ratio (CMRR), Summing Amplifier,
		voltage follower, current to voltage, voltage to current converter
		Integrator, Differentiator, Log – Antilog Amplifier, Circuit type of OP – AMP 741,
		Operational Amplifier parameters, effects of offset, frequency response and stability
		Comparators, Discriminators, sample & hold circuits, Zero crossing detector, precision rectifier, waveform generators
		OP -AMP as astable, monostable and bistable multivibrator, regenerative comparator (Schmitt trigger), IC 555 timer.
		Test
		Revision

Date: - 10/08/2023   Sign. of Teacher   Sign. of HOD   Sign. of Principal

10/08/23   10/8/23

(Dr. Renuka Chauhan)

राधेहरि रॉजकीय स्ना0 महाविद्यालय
काशीपुर-244713 (उत्तराखण्ड)

Radhey Hari Government P.G. College, Kashipur

Department of Physics

Academic Session: 2023-24   **Class:** B. Sc. 1st Semester

Subject/Paper Name: Mechanics & Theory of Waves and Oscillations

Name of Teacher: Dr. Renuka Chauhan

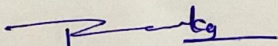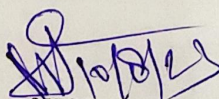| Topic(s) Taught	No. of lectures		
	Offline	Online	Total lectures
Introduction to Mechanics and Waves &Oscillations	01		01
Vector algebra. Scalar and vector products, scalar and vector triple products,	02		02
Derivative of a vector with respect to a parameter,	01		01
Line, surface and volume integral of a vector function.	01		01
Del operator, gradient, divergence and curl, applications of divergence and curl	01		01
Gauss divergence theorem, Stokes curls theorem and Green's theorem and their applications.	02 01		02 01
Test	01		01
Gravitational field and potential, Gravitational potential energy,	02		02
Gravitational field Intensity and potential due to a ring,	02		02
a spherical shell, solid sphere and circular disc	01	01	02
inertial and gravitational mass, gravitational self-energy, gravitational self-energy of a uniform solid sphere, Inverse square law of forces	01 02	.	01 02
Kepler's laws of planetary motion and their derivation.	02	01	03
Test	01		01
Frames of reference, Concept of inertial and Non-inertial frames of references,	01		01
Work energy theorem,	01		01
Conservative and non-Conservative forces Linear restoring force, Gradient of potential, Conservation of energy for the particle;	01 01	01	01 02
Energy function, Concept of Centre of mass, translator and rotator motion,	02	01	03

Date: 10/08/23   Sign. of Teacher   Sign. of HOD   Sign. of Principal

Topic			
Equation of motion for rotating rigid bodies, Angular momentum and torque	02		02
Laws of conservation of total energy, total linear momentum and total angular momentum along with their examples	01 02	01	01 03
Test	01		01
Dynamics of rigid body and Moment of Inertia and Properties of matter Moment of inertia,	02	01	03
Theorem of parallel and perpendicular axes, Moment of Inertia of a rod, lamina, ring, disc	02	0	02
spherical shell and solid sphere, kinetic	01		01
Energy of rotation, basic concepts about elasticity, Hook's law, Young's modulus,	02 01		02 01
Bulk modulus, modulus of rigidity, poisson ratio, relation	02		02
connecting various elastic constants, bending moment,	01	01	02
Viscosity, Equation of continuity of flow, Bernoulli's theorem, Posieuille's formula, Stokes's law,	01 01	01 01	02 01
Surface tension and its molecular interpretation	01	01	01
Test	01		01
Simple Harmonic Motion (S.H.M.),differential equation of S.H.M. and its Solution ,	01	01	02
energy of harmonic oscillator, Lissajous' figures for equal Frequencies ratio and 2:1 frequencies ratio,	02 01		02 01
damping forces, damped harmonic oscillator ,	01		01
differential equation of damped harmonic oscillator and its solution,	02		02
power dissipation in a damped harmonic oscillator,	01		01
relaxation time, quality factor, simple and compound pendulum,	02		02
forced or driven harmonic oscillator, its differential equation, amplitude resonance, velocity resonance,	02		02
Sharpness of resonance, wave motion, particle and wave velocity, differential equation of wave motion,	01 02		01 02
Fourier theorem. Fourier analysis of square and saw tooth waves.	02		02
Test	01		01

Date: 10/08/23   Sign. of Teacher   Sign. of HOD   Sign. of Principal

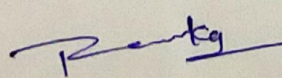# Radhey Hari Government P.G. College, Kashipur

Department of Physics

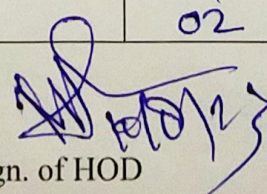**Academic Session:** 2023-24   **Class:** M. Sc. 3rd Semester

Subject/Paper Name: LCC11(b) Advanced Electronics-I

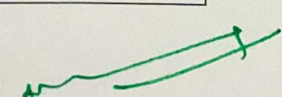**Name of Teacher: Dr. Renuka Chauhan**

Topic(s) Taught	No. of lectures		
	Offline	Online	Total lectures
Introduction to LCC11(b)	01	—	01
Classification of IC's, Fabrication of IC's & components,	02	—	02
Basic monolithic integrated circuit technology,	02	—	02
processes used in monolithic technology, active & passive components	02	—	02
metal semiconductor contact, thick & thin film IC's,	02	—	02
hybrid IC's, charge coupled devices (CCD),	02	—	02
advantages & limitations of integrated circuits	02	—	02
Test	01	01	02
Basic operational Amplifier, Inverting & Non inverting OP-AMP,	02		02
Common Mode Rejection Ratio (CMRR), Summing	01	01	02
Amplifier, voltage follower, current to voltage, voltage	02		02
to current converter	01		01
Integrator, Differentiator, Log – Antilog Amplifier,	02		02
Circuit type of OP – AMP 741,	01		01
Operational Amplifier parameters, effects of offset,	02		02
frequency response and stability	01		01
Comparators, Discriminators, sample & hold circuits,	02		02
Zero crossing detector, precision rectifier, waveform generators	02		02
OP -AMP as astable, monostable and bistable	02		02
multivibrator, regenerative comparator (Schmitt	02		02
trigger), IC 555 timer.	02		02
Test	01		01
Revision	02		02

Date: 10/08/23   Sign. of Teacher   Sign. of HOD   Sign. of Principal

RADHEY HARI GOVERNMENT PG COLLEGE KASHIPUR (US NAGAR)   AISHE CODE: C-2191
TEACHING PLAN-DEPARTMENT OF Physics
SESSION:2024-25

CLASS : M. Sc.   SEMESTER: 3rd

NAME OF PAPER : LEC5. Introduction to Nanoscience and Nanotechnology

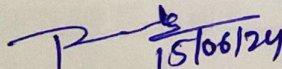| Month	Week	TOPICS	NO OF Lectures	Remarks
			4	online
June	3	**Introduction and Synthesis Methods of Nanomaterials**	4	online
	4	Carbon age–New form of carbon (From Graphene sheet to CNT),		
July	1	Introduction to nanomaterials, evolution of nanoscience, general properties of nanomaterials	4	online
	2	role of size in nanomaterials, semiconducting nanoparticles, nanoclusters, quantum wells,	4	online
	3	conductivity and enhanced catalytic activity compared to the same materials in the macroscopic state.	4	offline
	4	Synthesis of nano structured materials, sol-gel processing, Mechanical alloying and mechanical milling,	4	offline
August	1	Inert gas condensation technique, Nanopolymers, Bulk and nano composite materials, top down and bottom up approaches.	4	offline
	2	One-, two- and three-Dimensional nanostructured materials.	4	offline
	3	Influence of Nano size on mechanical, optical, electronic, magnetic and chemical properties of quantum dots and quantum wires, electronic transport in quantum wires and carbon nano tubes (CNT)	4	offline
	4	types of CNT, magnetic behavior of nano particles, surface chemistry of Tailored monolayer, self assembling	4	offline
September	1	Evolution of band structure and Fermi surface. Superparamagnetic behavior on nanoparticles	4	offline
	2	Metals (Au, Ag) - Metal oxides (TiO2, CeO2, ZnO) - Semiconductors (Si, Ge, CdS, ZnSe) - Ceramics and Composites	4	offline
	3	**Characterization Methods** Optical Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy	4	offline
	4	HRTEM, Atomic Force Microscopy, Scanning Tunneling Microscopy	4	offline
October	1	Optical Absorption and Emission Spectroscopy	4	offline
	2	Thermogravimetric Analysis, Thermomechanical Analysis	4	offline
	3	X-Ray Diffraction	4	offline
	4	Super conducting quantum interference devices.	4	offline
November	1	Vibrating Sample magnetometer	4	offline
	2	Raman and FTIR Spectroscopy	4	offline
	3	**Applications of Nanomaterials** Molecular electronics and nanoelectronics,	4	offline
	4	Quantum electronic devices,	4	offline
December	1	Carbon Nano Tube based transistor and Field Emission Display, Biological applications	4	offline
	2	Biochemical sensor, medical applications and Membrane based water purification. Biological systems- DNA and RNA - Lipids	4	offline
	3	Test	4	offline
	4	Revision	4	Online

SIGN OF TEACHER   15/06/24

SIGN OF HOD

PRINCIPAL

RADHEY HARI Government PG College Kashipur (US Nagar)   AISHE CODE: C-2191
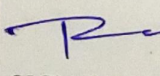## Teaching Plan- Department OF Physics
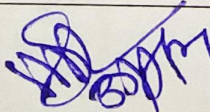
CLASS : M. Sc. Semester: 3rd   **SESSION:2024-25**

NAME OF PAPER : LCC11(b) Advanced Electronics-I

Month	Week	TOPICS	NO OF Lectures	Remarks
July	1	Introduction to LCC11(b)	4	online
	2	Classification of IC's	4	online
	3	Fabrication of IC's & components	4	offline
	4	Basic monolithic integrated circuit technology	4	offline
August	1	processes used in monolithic technology	4	offline
	2	active & passive components	4	offline
	3	metal semiconductor contact	4	offline
	4	Test	4	offline
September	1	thick & thin film IC's	4	offline
	2	hybrid IC's, charge coupled devices (CCD)	4	offline
	3	advantages & limitations of integrated circuits	4	offline
	4	Test, Basic operational Amplifier	4	offline
October	1	Inverting & Non inverting OP-AMP,	4	offline
	2	Common Mode Rejection Ratio, Summing Amplifier	4	offline
	3	voltage follower, current to voltage ,voltage to current converter	4	offline
	4	Integrator, Differentiator, Log – Antilog Amplifier, Circuit type of OP – AMP 741,	4	offline
November	1	Operational Amplifier parameters, effects of offset	4	offline
	2	frequency response and stability, Comparators	4	offline
	3	Discriminators, sample & hold circuits,	4	offline
	4	Zero crossing detector, precision rectifier, waveform generators	4	online
December	1	OP -AMP as astable, monostable and bistable multivibrator,.	4	online
	2	regenerative comparator (Schmitt trigger), IC 555 timer	4	offline
	3	Test	4	offline
	4	Revision	4	online

SIGN OF TEACHER   15/06/24

SIGN OF HOD

PRINCIPAL

RADHEY HARI GOVERNMENT PG COLLEGE KASHIPUR (US NAGAR)   **AISHE CODE: C-2191**
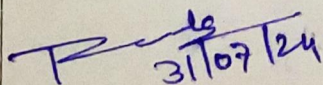
Teaching Plan-Department of Physics

CLASS : M. Sc. Semester: 1ˢᵗ   **SESSION:2024-25**

NAME OF PAPER : LCC2 Classical Mechanics

MONTH	Week	TOPICS	NO OF Lectures	Remarks
August	1	Constraints and generalized coordinates, D Alembert's principle	4	offline
	2	Lagrange equations for holonomic and non holonomic systems and their applications	4	offline
	3	conservation laws of linear momentum, energy and angular momentum	4	offline
	4	Test	4	offline
September	1	Hamiltonian equations of motion and their physical significance	4	offline
	2	Hamilton's principle, principle of least action	4	offline
	3	canonical transformations	4	offline
	4	Hamilton-Jacobi theory, Poisson brackets, properties of Poisson bracket	4	offline
October	1	Poisson's Theorem, Lagrange bracket	4	offline
	2	Motion of a rigid body, body and space Reference system	4	offline
	3	angular momentum and Inertia tensor,	4	offline
	4	Principle axes- Principle moments of Inertia	4	offline
November	1	spinning tops, Euler angles, Infinitesimal rotations	4	online
	2	Action and angle variables,	4	online
	3	phase integral, small oscillations	4	offline
	4	Kepler's laws of Planetary motion and their deduction	4	offline
December	1	scattering in a Central field	4	online
	2	Rutherford scattering cross section	4	offline
	3	Test	4	offline
	4	Revision	4	online

31/07/24

SIGN OF TEACHER   **SIGN OF HOD**   **PRINCIPAL**