

SCIM GOVERNMENT COLLEGE

DEPARTMENT OF PHYSICS

Mechanics & Waves and oscillations

Programme: B.Sc
Course: CORE

Year: I
Credits: 4

Semester: I
Hours : 4

COURSE OBJECTIVES (CO)-MECHANICS

CO1- TO UNDERSTAND THE BASIC PROPERTIES OF MATTER AND ITS APPLICATIONS
CO2- UNDERSTAND THE INERTIAL & NON INERTIAL FRAME OF REFERENCES
CO3- TO UNDERSTAND THE CONCEPT OF LENGTH CONTRACTION
CO4- TO KNOW THE DIFFERENT TYPES OF WAVE MOTION MAINLY SHM
CO5- TO LEARN THE PRINCIPLES OF ULTRASONIC PRODUCTION AND ITS APPLICATION
CO6- TO LEARN ABOUT THE FUNDAMENTALS OF VERBAL AND MATHEMATICAL CONCEPTS OF WAVES & OSCILLATIONS

COURSE CONTENTS

Content	CO	HOURS
UNIT I: Mechanics of Particles: Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation. Mechanics of Rigid bodies: Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of the equinoxes	1,2,3	12
UNIT II: Motion in a Central Force Field: Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS),	1,3	12

weightlessness, Physiological effects of astronauts		
UNIT III: Relativistic Mechanics: Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation.	1,2	12
UNIT IV: Undamped, Damped and Forced oscillations: Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor. Coupled oscillations: Coupled oscillators - introduction, Two coupled oscillators, Normal coordinates and Normal Modes.	4,6	12
UNIT V: Vibrating Strings: Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics. Ultrasonic's: Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR	5	12

Assessment / Evaluation Methods:

Assessment Tool	Weightage (Marks)
Sessional1	15
Sessional2	
Assignment	5
Seminar	5
Final Examination	75
Total	100

PROGRAM OBJECTIVES(PO)- B.SC

PO1: Apply the knowledge of mathematics, fundamentals of physical and chemical sciences specialization to the solution of scientific problems .

PO2: Problem analysis: Identify, formulate, review research literature, and analyze elementary to complex level scientific problems reaching substantiated conclusions using first principles of mathematics, physical and chemical sciences.

PO3: Design solutions for complex scientific problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Create, select, and apply appropriate techniques, resources, and modern scientific and IT tools including prediction and modeling to complex scientific activities with an understanding of the limitations.

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the scientific process

PO7: Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary setting

PO10: Communicate effectively on complex engineering activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Demonstrate knowledge and understanding of the scientific principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

PO1: should be able to understand the concepts at advanced level of Mathematics ,Physics ,Chemistry & computer science ,their applications in the field of scientific research and other relevant areas.

PO2: Should have an ability to apply sound theoretical knowledge of mathematics, physical chemical sciences & computer sciences and usage of modern tools for solving real world problems.

PO3: Should have the capability to analyze, comprehend, design & develop the solutions for a variety of scientific both theoretical and applicative problems and thus demonstrating professional ethics & human values concern for societal well being.

Mid-I QUESTIONS

Question	Course Objective	Bloom's Taxonomy level
DEFINE THE TERMS IMPACT PARAMETER&SCATTERING CROSS SECTION	co-1	Remembering(R)
DISTINGUISH B/W INERTIAL AND NON INERTIAL FRAME OF REFERENCES	co-2	Understanding(U)
EXPLAIN THE LENGTH CONTRACTION	co-3	Analysing(An)

Mid-II QUESTIONS

Question	Course Objective	Bloom's Taxonomy level
DEFINE SIMPLE HORMONIC MOTION.WRITE THE EQ FOR IT	co-4	Remembering(R)
COMPARE THE LONGITUDINAL AND TRANSVERSE WAVES	co-6	Understanding(U)
DESCRIBE THE ONE METHOD OF PRODUCING ULTRASONICS	co-5	Analysing(An)

S.No	Assignment topics	Bloom's Taxonomy level
•	DEDUCE THE EXPRESSION FOR THE TORQUE OF THE SYSTEM OF PARTICLES	Creating(C)
•	SHOW THAT CENTRAL FORCES ARE CONSERVATIVE IN NATURE	Creating(C)
•	Draw the neat diagram of Gyroscope	Apply(Ap)
•	HOW SONAR WORKS.EXPLAIN	Understanding(U)
•	WHAT IS SATELLITE .WHAT ARE DIFFERENT TYPES OF SATELLITES	Remembering(R)

S.No	Seminar topics	Bloom's Taxonomy level
•	EVALUATE THE NEWTON'S FIRST LAW FROM SECOND LAW	Evaluate (E)

•	DERIVE AN EXPRESSION FOR ENERGY OF AN OSCILLATOR	Evaluate (E)
•	How you can demonstrate the variation of mass with velocity	Analysing(An)
•	WHAT IS MEANT BY RESONANCE.	Remembering(R)
•	EXPLAIN NORMAL MODES AND NORMAL COORDINATES OF COUPLED OSCILLATOR	Understanding(U)

Table 1: Mapping of course outcomes with program outcomes (CO/ PO&PSO Matrix)

CO /PO/ PSO	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2
CO 1	3	3	3			3	3
CO 2	3	3	3			3	3
CO 3	3	3	3			3	3
CO4	3	3	3			3	3
CO5	3	3	3			3	3
CO6	3	3	3			3	3

Note: 1-Weak correlation 2-Medium correlation 3-Strong correlation


Table 2: CO Attainments (Direct and Indirect)

CO	DIRECT	INDIRECT	Total CO Attainment
CO1	49.72	70.5	50.12
CO2	47.95	67.78	49.94
CO3	47.50	69.44	49.69
CO4	43.96	63.33	45.90
CO5	48.06	72.67	50.52
CO6	43.65	75.00	47.50
Total CO Attainment = 90% of Direct CO Attainment + 10% of Indirect CO Attainment			

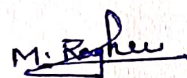
Table 3: PO and PSO Attainments (Direct and Indirect)

	PO1	PO2	PSO1	PSO2
	3	3	3	3
CO1	50.12	50.12	50.12	50.12
CO2	49.94	49.94	49.94	49.94
CO3	49.69	49.69	49.69	49.69
CO4	45.90	45.90	45.90	45.90

C05	50.52	50.52	50.52	50.52
C06	7.50	7.50	7.50	7.50
PO Attainment	42.28	42.28	42.28	42.28


 Course Coordinator:
 Department of Physics
 S.C. CH. GOVT. COLLEGE
 TANUKU - 534211
 West Godavari District
 Andhra Pradesh

It is observed that the physics department
 has attained the outcomes only 42.28%. Hence
 it is hereby intimated that it should be improved
 in attaining the CO's, PO's & PSO's. So that take necessary
 measures.


 M. Rajeev

programme coordinator
 B.Sc (MPC, MPCs)

SCIM GOVT.COLLEGE,TANUKU,W.G(Dt.)																			
Name of the subject: Mechanics Waves and oscillations																			
semester: I																			
DIRECT CO ATTAINMENT																			
I-SESSIONAL MARKS (2022-23)						II - SESSIONAL MARKS (2022-23)			Quiz and Assignment Marks					End examination Marks					
S.No	Roll No	Total	Q1	Q2	Q3	S.No	Roll No	Total	Q1	Q2	Q3	S.No	Roll No	Quiz Assignment	S.NO	Regd.No	M AR KS	GRA E	
1	22392710100 1	15	5	5	5	1	223927101001	15	5	5	5	1	223927101001	10	1	223927101001	65	B+	
2	22392710100 2	13	5	4	4	2	223927101002	13	5	5	3	2	223927101002	10	2	223927101002	65	B+	
3	22392710100 3	10	3	4	3	3	223927101003	10	3	2	5	3	223927101003	10	3	223927101003	65	B+	
4	22392710100 3	14	5	4	5	4	223927101004	14	4	5	5	4	223927101004	10	4	223927101004	65	B+	
5	22392710100 4	12	4	4	4	5	223927101005	12	3	4	5	5	223927101005	10	5	223927101005	53	C	
6	22392710100 5	15	5	5	5	6	223927101006	15	5	5	5	6	223927101006	10	6	223927101006	65	B+	
No. of students attempted the question (COUNT)		6	6	6	No. of students attempted the question (COUNT)		6	6	6	COUNT		6	COUNT		6				
Total No. of marks obtained for the question (SUM)		27	26	26	Total No. of marks obtained for the question (SUM)		25	26	28	SUM		60	SUM		378				
AVERAGE MARKS		4.50	4.33	4.33	AVERAGE MARKS		4.17	4.33	4.67	AVERAGE MARKS		10.00	AVERAGE MARKS		63.00				
CO ATTAINMENT from I sessional		0.90	0.87	0.87	CO ATTAINMENT from II sessional		0.83	0.87	0.93	CO ATTAINMENT from Quiz &		1.0000	CO ATTAINMENT from End		0.63				

[illegible]