University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK1DSCPHY103**				
Course Title	**INTRODUCTION TO MECHANICS AND ENERGY RESOURCES**				
Type of Course	**DSC**				
Semester	**I**				
Academic Level	**100 - 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 Hrs	-	2 Hrs	5 Hrs
Pre-requisites					
Course Summary	Knowledge about basic ideas of physical quantities, vectors, gravitation, rotational motion, energy resources and sound waves.				

BOOKS FOR STUDY:

1. Principles of physics: Halliday and Resnick, tenth edition
2. Non-conventional energy sources: G D Rai, Khanna publishers 2008

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**Physical quantities and vectors (Book 1)**	**9**	
	1	Measuring things, the international system of units	1	1
	2	Significant figures	1	1

	3	Vectors and scalars, components of a vector	1	1
	4	Unit vectors	1	1
	5	Addition of vectors	1	1
	6	Multiplication of vectors	2	1
	7	Vectors and the laws of physics	2	1
II	**Gravitation (Book 1)**		**9**	
	8	Newton's law of gravitation, gravitation and principle of superposition	2	2
	9	Gravitation near earth's surface, gravitation inside earth	2	2
	10	Gravitational potential energy	1	2
	11	Planets and satellites, Kepler's laws	2	2
	12	Satellite orbits and energy	2	2
III	**Energy resources (Book 2)**		**9**	
	13	Various forms of energy, renewable and conventional energy systems	2	3
	14	Solar energy, applications, merits and demerits	2	3
	15	Wind energy, applications, merits and demerits	2	3
	16	Biomass energy, merits and demerits	1	3
	17	Nuclear energy, fission and fusion and nuclear reactors	2	3
IV	**Rotational motion (Book1)**		**9**	
	18	Rotational variables, rotation with constant angular acceleration	2	4
	19	Relating the linear and angular variables	2	4
	20	Kinetic energy of rotation	1	4
	21	Calculating the rotational inertia	2	4

	22	Torque	1	4
	23	Newton's second law of rotation	1	4
V*	**Sound waves (Book 1)**		**9**	
	24	Sound waves, speed of sound waves, travelling sound waves	2	5
	25	Interference	2	5
	26	Intensity and sound level, sources of musical sound	2	5
	27	Beats, Doppler effect, supersonic speeds, shock waves	3	5

DETAILED SYLLABUS: PRACTICALS

Part A – At least 5 Experiments to be performed		**CO No**
Sl No	**Name of Experiment**	
1	Melde's string- frequency of tuning fork	6
2	Kater's pendulum-Acceleration due to gravity	6
3	Fly Wheel	6
4	Sonometer-frequency of A.C	6
5	Kundt's tube-determination of velocity of sound.	6
6	Symmetric bar pendulum – g	6
7	Compound Bar Pendulum – Asymmetric - g	6
8	Comparison of least counts of measuring instruments.	6
9	Evaluation of errors in simple experiments.	6
Part B* – At least One Experiment to be performed		
10	Program to find the dot product and cross product of vectors	6
11	Program to find the moment of inertia of regular bodies about various axes of rotation.	6

COURSE OUTCOMES

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Classify a physical quantity as a vector or scalar, identify number of significant figures in a value and practise problems involving vectors.	R, U, Ap	PSO-1,2
CO-2	Define Newton's law of gravitation and Kepler's laws and describe the principles behind the orbiting of planets and satellites.	R, U	PSO-1,2
CO-3	Identify the differences between conventional and renewable energy sources and classify an energy source as conventional or renewable	R, U	PSO-1,2,3
CO-4	Recognize and distinguish between variables in linear motion and rotational motion	R, U	PSO-1,2
CO-5	Identify types and properties of sound waves and describe characteristics of sound waves	R, U	PSO-1,2
CO-6	Describe and demonstrate simple experiments	U, Ap	PSO-7

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: INTRODUCTION TO MECHANICS AND ENERGY RESOURCES

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO / PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
CO-1	Classify a physical quantity as a vector or scalar, identify number of significant figures in a value and practise	PO 1,3,4, 5,6,8 / PSO-1,2	R, U, Ap	F, C	L	-

	problems involving vectors.					
CO-2	Define Newton's law of gravitation and Kepler's laws and describe the principles behind the orbiting of planets and satellites.	PO 1,3,4, 5,6,8 / PSO-1,2	R, U	F, C	L	-
CO-3	Identify the differences between conventional and renewable energy sources and classify an energy source as conventional or renewable	PO 1,2, 3,4,5,6,8 / PSO-1,2,3	R, U	F, C	L	-
CO-4	Recognize and distinguish between variables in linear motion and rotational motion	PO 1,3,4, 5,6,8 / PSO-1,2	R, U	F, C	L	-
CO-5	Identify types and properties of sound waves and describe characteristics of sound waves	PO 1,3,5,6,8 / PSO-1,2	R, U	F, C	L	-
CO-6	Describe and demonstrate simple experiments	PO 1,2, 4,5,8 / PSO-7	U, Ap	F, C		P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	2	1	-	-	-	-	-	2	-	2	2	2	2	-	2
CO-2	2	2	-	-	-	-	-	2	-	3	2	2	2	-	3
CO-3	2	1	2	-	-	-	-	2	2	2	2	2	2	-	3
CO-4	2	1	-	-	-	-	-	2	-	2	3	2	2	-	2
CO-5	2	2	-	-	-	-	-	2	-	2	-	2	2	-	2
CO-6	-	-	-	-	-	-	3	2	2	-	3	2	-	-	2

Correlation Levels:

Level	-	1	2	3
Correlation	Nil	Slightly / Low	Moderate / Medium	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

CO No	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO-1	✓	-	-	✓
CO-2	-	✓	-	✓
CO-3	-	✓	-	✓
CO-4	-	✓	-	✓
CO-5	✓	-	-	-
CO-6	✓	-	-	-