University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK2DSCPHY100**				
Course Title	**FOUNDATION COURSE IN PHYSICS-II**				
Type of Course	**DSC**				
Semester	**II**				
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	This course discusses the basic concepts required to learn advanced physics courses. The concept of error and precision emphasises the importance of numbers when expressing the magnitude of a quantity. Discussion on waves basic features of waves and its expression. Basic concepts of fluids helps us to understand application level problems like venturi meter and aeroplane wings. The discussion on elasticity gives an idea about different elastic moduli.				

BOOKS FOR STUDY:

1. Principles Of Physics 10th Edition, Robert Resnick Jearl Walker, David Halliday, Wiley, 2014.
2. Sear and Zemansky's University Physics With Modern Physics, Hugh D Young, Roger A Freedman, Addison -Wesley, 13TH EDITION, 2012.
3. College Physics 2e, PAUL PETER URONE, ROGER HINRICHS, Openstax, 2022
4. Elements of Properties of Matter: D.S. Mathur, S. Chand Publications,2014

BOOKS FOR REFERENCE:

1. Mechanics: J. C. Upadhyaya and Ram Prasad, S. Chand Publications, 2017
2. Mechanics: H. S. Hans and S. P. Puri, TMH, 2ndEdn.
3. Properties of matter: Brijlal and Subramaniam, S. Chand & Co.,2004
4. Principles of Physics: P.V. Naik, PHI, 2010
5. Principles Of Physics 10th Edition, Robert Resnick Jearl Walker, David Halliday, Wiley, 2014.

WEB REFERENCE

1. https://www.owlnet.rice.edu/~labgroup/pdf/Error_analysis.htm
2. https://faraday.physics.utoronto.ca/PVB/Harrison/ErrorAnalysis/

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**PRECISION IN PRACTICE (Web 1, Web 2)**	**9**	
	1	Significant figures (Web 1)	1	1
	2	Absolute and relative error (Web 1)	1	1
	3	Systematic error (Web 1)	1	1
	4	Random error, estimating random errors (Web 1)	1	1
	5	Propagation of errors (Web 1)	2	1
	6	Precision and accuracy (Web 2)	2	1
	7	Error bars and graphical representation (Web 2)	1	1
II		**PHYSICAL WORLD OF WAVES (Book1: Chapter 16)**	**9**	
	8	Types of waves – Mechanical, Electromagnetic and matter waves, Transverse and longitudinal waves	1	2
	9	Amplitude, phase, wavelength, wave number, period , frequency, angular frequency, phase constant, Speed of a travelling wave	2	2
	10	Wave Speed on a stretched string, energy and power of a wave travelling along a string	2	2

	11	Wave equation	1	2
	12	The principle of Superposition of waves	1	2
	13	Standing waves and resonance(qualitative idea)	2	2
III	**FLUID STATICS (Book 3: Chapter 11)**		**6**	
	14	Cohesion and adhesion of liquids, surface tension - pressure inside a bubble, capillary action	4	3
	15	Pressure in the body: Blood pressure, pressure in eye, Pressure Associated with the Lungs, Other Pressures in the Body: Spinal Column and Skull- Bladder Pressure- Pressures in the Skeletal System	2	3
IV	**FLUID DYNAMICS (Book 2: Chapter 12 and Book 3: Chapter 12)**		**12**	
	16	Fluid flow-streamline and turbulent flow, continuity equation (Book 2: Chapter 12)	2	3
	17	Bernoulli's equation -derivation, venturi meter, lift on an aeroplane wing (Book 2: Chapter 12)	4	3
	18	Viscosity and Laminar Flow; Poiseuille's Law, Motion of an Object in a Viscous Fluid (Book 3: Chapter 12)	4	3
	19	Molecular Transport Phenomena: Diffusion, rate and direction of diffusion, Osmosis and Dialysis - Diffusion across Membranes (Book 3: Chapter 12)	2	3
V*	**BEAUTY OF DEFORMATION AND RESTORATION (Book1, Book4)**		**9**	
	20	Condition for equilibrium, Centre of Gravity (Book1: Chapter 11)	1	4
	21	Stress, Strain, and Elastic Moduli- Hook's law, Tensile stress and strain, Bulk Stress and Strain, Shear Stress and Strain (Book1: Chapter 11)	2	4
	22	bending of beams, bending moment, cantilever, Beams supported at its ends and loaded in the middle (Book 4: Chapter 12)	3	4

	23	Twisting couple on a cylindrical rod or wire, work done in twisting a wire, torsion pendulum (Book 4: Chapter 12)	3	4

DETAILED SYLLABUS: PRACTICALS

Part A – At least 5 Experiments to be performed		**CO No**
Sl No	**Name of Experiment**	
1	Uniform bending—Y- optic lever method	4
2	Non-uniform bending-Y-Optic lever & telescope	4
3	Rigidity modulus –Static torsion	4
4	Torsion pendulum I- By Torsional oscillations.	4
5	Torsion pendulum I- By Equal masses.	4
6	Viscosity-Continuous flow method using constant pressure head.	3
7	Viscosity-Variable pressure head arrangement	3
8	Surface tension-Capillary rise.	3
Part B* – At least One Experiment to be performed		
9	Evaluation of errors in simple experiments.	1
10	Experiment to demonstrate random error, by taking dimensions of a small rectangular object using Vernier calliper and evaluate the volume of the object	1
11	Comparison of least counts of measuring instruments.	1
12	Uniform Bending- determination of Y using pin and Microscope	4
13	Determination of the viscosity of fluid using Stoke's method.	3

COURSE OUTCOMES

No.	**Upon completion of the course the graduate will be able to**	**Cognitive Level**	**PSO addressed**
CO-1	Discuss the basics of error analysis and use it in expressing physical quantities.	U, Ap	1, 2, 7

CO-2	Identify the basic concepts of waves and its mathematical expression to understand periodic wave motion	R, U	1, 2
CO-3	Observe physical concepts of fluids in rest and motion, to relate them with real world examples	R, U	1, 2, 7
CO-4	Cite Hook's law and apply it to calculate the elastic moduli of beams and rods.	U, Ap	1, 2, 7

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

Name of the Course: FOUNDATION COURSE IN PHYSICS-II

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

CO No.	**CO**	**PO/ PSO**	**Cognitive Level**	**Knowledge Category**	**Lecture (L)/ Tutorial (T)**	**Practical (P)**
CO-1	Discuss the basics of error analysis and use it in expressing physical quantities.	PSO 1, 2, 7/ PO 1, 2	U, Ap	F, C, P	L	P
CO-2	Identify the basic concepts of waves and its mathematical expression to understand periodic wave motion	PSO 1, 2, 7/ PO 1, 2	R, U	F, C	L	
CO-3	Observe physical concepts of fluids in rest and motion, to relate them with real world examples	PSO 1, 2, 7/ PO 1, 2	R, U	F, C, P	L	P
CO-4	Cite Hook's law and apply it to calculate the elastic moduli of beams and rods.	PSO 1, 2, 7/ PO 1, 2	U, Ap	F, C, P	L	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	2	-	-	-	-	2	1	1	-	-	-	-	-	-
CO-2	3	1	-	-	-	-	-	2	2	-	-	-	-	-	-
CO-3	3	2	-	-	-	-	3	2	2	-	-	-	-	-	-
CO-4	3	2	-	-	-	-	3	3	3	-	-	-	-	-	-

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	-	✓	-	-