



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc.

SEMESTER: I

SUBJECT NAME: Physics-I

SUBJECT CODE: 4SC01PHY1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester								
Th	Tu	Pr	Total		Theory				Practical				Total Marks
					Sessional Exam		University Exam		Internal		University		
					Marks	Hrs	Marks	Hrs	Pr	TW			
4	0	0	4	4	30	1.5	70	3	--	--	--	100	

Objectives:- The objective of this course is that the students can learn about

- Newton's Law of Gravitation, Kepler's laws of planetary motion, satellites, vector analysis and ordinary differential equations, Oscillations and laws of motion, torque and angular momentum and moment of inertia, elasticity, Young's modulus, bulk modulus, modulus of rigidity, various types of oscillations, spatial theory of relativity, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, multimeter, transformer.
- This subject is equally valuable in other subject of sciences.

Prerequisites:- Before studying this paper, all students should have basic knowledge of Newton's law of motion, conservation of energy, gravitational law, electricity and electricity of at least 10+2 level.

Course outline:-

Sr. No.	Course Contents	Hours
1	<p>Vector Analysis Vector algebra, Scalar and vector products, Derivatives of a vector with respect to a parameter.</p> <p>Ordinary Differential Equations 1st order homogeneous differential equations, 2nd order homogeneous differential equations with constant coefficients.</p> <p>Gravitation Newton's Law of Gravitation, Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant), Kepler's Laws (statement only), Satellite in circular orbit and applications, Geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS).</p>	15
2	<p>Laws of Motion Frames of reference, Newton's Laws of motion, Dynamics of a system of particles, Centre of Mass.</p> <p>Momentum, Energy and Rotational Motion Conservation of momentum, Work and energy, Conservation of energy, Motion of rockets, Angular velocity and angular momentum, Torque, Conservation of angular momentum.</p>	15



C. U. SHAH UNIVERSITY

3	Elasticity Hooke's law, Stress-strain diagram, Elastic moduli, Relation between elastic constants, Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Work done in stretching and work done in twisting a wire, Twisting couple on a cylinder, Determination of Rigidity modulus by static torsion, Torsional pendulum, Determination of Rigidity modulus and moment of inertia, q , η and σ by Searle's method. Oscillations Simple harmonic motion. Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Damped oscillations.	15
4	Special Theory of Relativity Constancy of speed of light, Postulates of Special Theory of Relativity, Length contraction, Time dilation, Relativistic addition of velocities. Electromagnetic Induction Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field, transformer. Circuit Analysis & Network Theorems Network terminology, Network analysis by mesh currents (two & three mesh network) Circuit analysis by Node-pair voltages (one & two node pair voltage method), Constant voltage source, Constant current source, Maximum power transfer Theorem, Voltage divider theorem, Thevenin's theorem, Norton's theorem, Superposition theorem, Chassis and ground, Multimeter, transformer.	15

Learning Outcomes:- After the successful completion of the course, students will be able to learn about Newton's Law of Gravitation, Kepler's laws of planetary motion, satellites, vector analysis and ordinary differential equations, Oscillations and laws of motion, torque and angular momentum and moment of inertia, elasticity, Young's modulus, bulk modulus, modulus of rigidity, various types of oscillations, spatial theory of relativity, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Multimeter, transformer.

Books Recommended:-

1. 'Conceptual Physics', **Paul G. Hewitt**, *Pearson Publication*
2. 'Engineering Physics', **R. K. Gaur and S. L. Gupta**, *Dhanpat Rai and Sons*.
3. 'Modern Physics', **R. Mrugeshan and K. Sivaprasath**, *S. Chand and Comp.*
4. 'Principles of Electronics', **V. K. Mehta and Rohit Mehta**, *S. Chand and Company*.
5. 'Modern Physics', **B. L. Theraja**, *S. Chand and Company*.
6. 'Modern Engineering Physics', **A. S. Vasudeva**, *S. Chand and Company*.
7. 'Engineering Physics', **G. Vijayakumari**, *Vikas Publishing Co.*
8. 'University Physics', **Sears, Zeemansky and Young**, *Addison Wesley*.
9. 'Physics', **Resnick, Halliday and Walker**, *Wiley*.
10. 'Oscillations, Waves, Acoustics and Optics', **R. L. Saihgal**, *S. Chand and Company*.
11. 'Atomic Physics', **J. B. Rajam**, *S. Chand and Company*.
12. 'Elements of Electronics', **M. K. Bagde and S. P. Shingh**, *S. Chand and Company*.
13. 'Introduction to Solid State Physics', **C. Kittel**, (8th Edition) *Wiley Eastern Ltd.*
14. 'Solid State Physics', **S. O. Pillai**, *New Age International Pub.*



C. U. SHAH UNIVERSITY

15. 'Engineering Physics', **M. N. Avadhanulu and P. G. Kshirsagar**, *S. Chand and Company*.
16. 'Mechanics Berkeley Physics course, Vol.1, **Charles Kittel et al.**, *Tata McGraw Hill*, (2007).
17. 'Engineering Mechanics', **Basudeb Bhattacharya**, 2nd Ed., *Oxford University Press*.
18. 'University Physics', **Ronald Lane Reese**, *Thomson Brooks/Cole*, (2003).

E-Resources:-

1. <http://pms.iitk.ernet.in/wiki/index.php/Physics>
2. [www.wikipedia encyclopedia](http://www.wikipedia.org)
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org.physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopedia of Science (D. K. Multimedia).
3. Physics Encyclopedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopedia Britannica-2008.



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc.

SEMESTER: I

SUBJECT NAME: Physics Practical-I

SUBJECT CODE: 4SC01PPR1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester								
Th	Tu	Pr	Total		Theory				Practical				Total Marks
					Sessional Exam		University Exam		Internal		University		
					Marks	Hrs	Marks	Hrs	Pr	TW			
0	0	6	6	3	--	--	--	--	20	10	70	100	

Objectives:- The objective of this course is that the students learn the technique to find length or diameter using measuring instruments, to determine 'K' and 'g' by various pendulums, to calculate moment of inertia of flywheel, rectangle disc, to make series and parallel circuits and prove different theorems etc. More generally, the students will improve their ability to think critically, to analyze a real problem and solve it using a practical knowledge of Physics.

Prerequisites:- Before performing these practicals, students have basic knowledge of instruments which are used and also fundamental knowledge of principles related these theories.

Course outline:-

Sr. No.	Course Contents
1	Measurement of length (or diameter) using Vernier caliper, screw gauge and travelling microscope.
2	To determine 'g' by bar pendulum.
3	To determine the moment of inertia of a flywheel.
4	To determine the elastic constants of a wire by Searl's method.
5	To study the motion of a spring and calculate (a) spring constant (b) value of 'g'.
6	To determine the height of a building using a sextant.
7	Determine of 'g' by simple pendulum.
8	To determine moment of inertia of disc and modulus of rigidity by torsion pendulum.
9	To study of a transformer.
10	To verify the Thevenin and Norton theorem.
11	To verify the superposition and maximum power transfer theorem.
12	To determine the self-inductance by Maxwell's bridge.
13	To use a multimeter for measuring (a) Resistances (b) AC and DC Voltages (c) DC current and (d) Checking electrical fuses.
14	To study moment of inertia of rectangular body and law of perpendiculars by Bifilar suspension.
15	To study Law resistance by projection method.

* 15% of new experiments can be introduces AND/OR replaced as per the need, with the permission of the Head.

Learning Outcomes:- After the successful completion of the course, students will be able to Calculate the moment of inertia of different object, Find out unknown temperature,



C. U. SHAH UNIVERSITY

Design different circuits, Verify ohm's law by tangent galvanometer, Find specific heat of liquid, Calculate young's modulus of wire, Draw graphs related to these practical, Analyze differential equations.

Books Recommended:-

1. 'B. Sc. Practical Physics', **C. L. Arora**, *S. Chand and Company Ltd.*
2. 'Advanced Practical Physics', **M. S. Chauhan and S. P. Sing**, *Pragati Prakashan.*
3. 'Experimental Physics', **University Granth Nirman Board**, (Gujarati Medium).
4. 'Physics through experiments Vol. I & II', **B. Saraf et al.**, *Vikas Publishing House.*
5. 'Advanced Practical Physics', **S. L. Gupta and V. Kumar**, *Pragati Prakashan.*
6. 'An advanced course in practical Physics', **D. Chattopadhyay and P. C. Rakshit**, *New Central Book Agency Pvt. Ltd.*
7. 'Electronic Laboratory Primer', **Poorna Chandra and Sasikala**, *S. Chand and Company Ltd.*
8. 'Advanced Practical Physics for Students', **B. L. Wosnop and H. T. Flint**, *Asia Publishing House.*
9. 'Advanced Level Physics Practicals', **Michael Nelson and Jon M. Ogborn**, 4th Ed., *Heinemann Educational Publishers.*
10. 'Engineering Practical Physics', **S. Panigrahi and B. Mallick**, *Cengage Learning India Pvt. Ltd.*
11. 'A Text Book of Practical Physics', **Indu Prakash and Ramakrishna**, 11th Ed., *Kitab Mahal.*
12. 'A Laboratory Manual of Physics for Undergraduate Classes', **D. P. Khandelwal**, *Vani Publication.*
13. 'Basic Electronics: A Text Lab Manual', **P. B. Zbar, A. P. Malvino and M. A. Miller**, *McGraw Hill.*

E-Resources:-

1. <http://pms.iitk.ernet.in/wiki/index.php/Physics>
2. www.wikipedia.org
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org.physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopedia of Science (D. K. Multimedia).
3. Physics Encyclopedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopedia Britannica-2008.