



C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc.

SEMESTER: II

SUBJECT NAME: Physics-II

SUBJECT CODE: 4SC02PHY1

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...

- Basics of basics of vector analysis such as gradient, divergence, curl and their significance, basics of wave motion, production of X-rays and practical application of X-rays, Miller indices and some crystal structures: NaCl, CsCl, basics of fluids and their properties, temperature measurement, thermocouple, Newton’s law of cooling, specific heat, diodes and transistors and their characteristics and applications.

Prerequisites:- Students should have basic knowledge of nuclear physics, vector analysis, wave motions, crystallography, fluids, lasers and electronics at least 10+2 level.

Course outline:-

Sr. No.	Course Contents	Hours
1	<p>Vector Analysis Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).</p> <p>Wave Motion Transverse waves on a string, Travelling and standing waves on a string, Normal Modes of a string, Melde’s experiment, Group velocity, Phase velocity, Plane waves, Spherical waves, Wave intensity.</p>	15
2	<p>Basic Elements of Crystallography and X-rays Introduction, Type of Solid, Periodic arrays of Atoms, Translation vector, Lattice points, Space lattice, Basis, Crystal structures, Unit cell and Primitive cell, Crystallography, Seven crystal systems, Bravais lattices in three dimensions, Miller indices of Crystal planes, Atomic Radius and Packing factor, Some Crystal structures: NaCl, CsCl, Diamond.</p> <p>Introduction of X-rays, Properties and characteristics of X-rays, Production of X-rays, Origin of X-ray, X-ray Spectrum, Bragg’s Spectrometer, X-ray Diffraction, Bragg’s Law.</p>	15



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3	Temperature Heat, temperature, temperature measurements, platinum resistance thermometer, thermocouple, specific heat, Newton's law of cooling, specific heat measurement by cooling method. Fluids Surface Tension: Synclastic and anticlastic surface, Excess of pressure, Application to spherical and cylindrical drops and bubbles, variation of surface tension with temperature, Jaegar's method, Viscosity, Rate flow of liquid in a capillary tube, Poiseuille's formula, Determination of coefficient of viscosity of a Liquid, Variations of viscosity of a liquid with temperature lubrication.	15
4	Semiconductor Diodes p- and n- type semiconductors, Barrier formation in pn-junction diode, qualitative idea of current flow mechanism in forward and reverse biased diode, pn-junction and its characteristics, static and dynamic resistance, principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell. Transistors Introduction to transistor structure, working action of transistor, Relation between currents in a transistor and parameters, transistor amplifying action, transistor configurations, Transistor characteristics, common emitter configuration, current relations, relation between alpha and beta, Input and output common emitter characteristics.	15

Learning Outcomes:- After the successful completion of the course, students will be able to have knowledge about vector analysis such as gradient, divergence, curl and their significance, basics of wave motion, production of X-rays and practical application of X-rays, Miller indices and some crystal structures: NaCl, CsCl, basics of fluids and their properties, temperature measurement, thermocouple, Newton's law of cooling, specific heat, diodes and transistors and their characteristics and applications.

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.*
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.



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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 will be able to perform Melde's experiment, to study resonator, to calibrate resistance temperature device, to study the variation of thermo emf, to study V-I characteristics of different diodes and transistors and to study the dispersive power of prism etc.

Prerequisites:-

Students should have basic knowledge different component. Also they should have basic knowledge of at least 10+2 level.

Course outline:-

Sr. No.	Course Contents
1	To study Melde's experiment.
2	Verify Poiseuille's Law
3	To calibrate resistance temperature device using null method /off balance bridge.
4	Newton's law of cooling and measurement of specific heat of liquid.
5	Calibration of thermometer using thermocouple or RTD and determination of unknown temperature.
6	To determine the temperature coefficient of resistance by platinum resistance thermometer.
7	To study the variation of thermo emf across two junctions of a thermocouple with temperature.
8	To study the characteristic of CE transistor.
9	To determine the frequency of an electrically maintained tuning fork by Melde's experiment and to verify λ^2 -T law.
10	To study the PN junction diode characteristic and calculate resistance. And to study LED Characteristic.
11	To study the PN junction diode as a half wave/ Full wave and Bridge rectifier.
12	To study the V-I characteristic of Zener diode.
13	To study the characteristic of a Photo diode.
14	To study Zener diode as a voltage regulator.
15	Determination of Surface tension by Jaegar's method
16	Determination of coefficient of Viscosity by Searle,s 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 unknown wavelength and wavelength of sodium light, Have knowledge of



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series and parallel connection of capacitor and inductor, Design different circuits, Use different types of diode and transistor in its application, Know about transformer, 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.