C. U. SHAH UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: II**

SUBJECT NAME: Physics-II **SUBJECT CODE: BSCPHC201**

Teaching & Evaluation Scheme:-

Teaching Scheme(hrs)			Evaluation Scheme								
			Theory					Practical (Marks)			
Th	Pr	Total	Sessional Exam		University Exam		Total	External	Internal	Total	Total
			Marks	Hrs	Marks	Hrs					
4	0	4	30	1.5	70	3	100	--	--	--	100

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

- Wave motion and Differential equation of a wave motion, Doppler effect in light and its applications.
- Natural and Artificial Radio activity, General Properties of Radioactive Radiation.
- Properties of sound.
- Dispersion, Fermat's Principle, Law of reflection & Law of refraction.
- Interference, Conditions for interference of light.
- Determination of wave length of Sodium light using Newton's rings.
- Thermal Conductivity of gas.
- Crystallography,Miller indices,and Some Crystal structures:–NaCl, CsCl.
- Semiconductor Diode,special purpose diode, and transistor theory.
- Production of X-rays, and practical application of X-rays.

Prerequisites:-

Students should have basic knowledge of Waves, Optics, Heat, Crystallography, Electronics & Modern Physics of at least 10+2 level.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Nuclear Structure, Nuclear Transformations & Radioactivity:** Nuclear composition, Nuclear Structure, Nuclear magnetic resonance(NMR), applications of NMR, Stable nuclei, Radiometric dating, nuclear decay, Binding Energy, The strong interaction, Liquid drop model, Atomic Number, Atomic mass,Isotops, Isomers, Isobars, Radioactivity, Units of Radioactivity,Natural and Artificial Radio activity, Chain Reaction, Properties & applications of Alpha, Beta & Gamma Radiation, Beta Disintegration, Conservation of energy during beta-rays, Radioactive Disintegration & its Laws, Decay Constant, Half-life Period, Average life, Uranium-Actinium &Thorium radioactive Series.	10
2	**X-rays : Laws, Production & applications:** Introduction, Properties and characteristics of X-rays, Production of X-rays, Origin of X-ray, X-ray Spectrum, X-rays Intensity Measurement, Wave nature of X-ray, Laue Spot & it applications , Bragg's Spectrometer, X-ray Diffraction, Bragg's Law, Crystal Structure, Compton effect, Properties & applications of X-rays.	06
3	**Waves :** Wave motion, amplitude, period, frequency, and wavelength, Differential equation of wave motion, Velocities of Particles & waves, Velocity of sound in air & water and Laplace's correction, velocity of sound in isotropic solids, velocity of transverse waves along a stretched string, Laws of transverse vibrations of strings, Verifications of Laws of vibrations, Melde's experiment, Vibrations of air columns, Organ pipe, Doppler effect in light and its applicationsdefinition of resonance with examples, Resonator.	08
4	**Optics :** Properties of Light, Dispersion , Dispersive Power, Fermat's Principle, Law of reflection& Law of refraction from Fermat's Principle, Spectrometer with LCM, Interference,Conditions for interference of light , Types of Interference,Fresnel's Bi-prism,Lloyd's Single Mirror, Interference in thin films , Newton's rings , Determination ofwave length of Sodium light using Newton's rings. Concepts of Diffraction, Concepts of Polarization.	06
5	**Basic Elements of Crystallography:** 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,Bravaislattices in three dimensions, Miller indices of Crystal planes, Atomic Radius and Packing factor, Some Crystal structures:NaCl, CsCl&Diamond .	07

6	**Basics of Solid State Electronics :** Semiconductor diode & its V-I characteristics, Alternating & Direct currents, Use of diodes in rectifiers,Half wave rectifier, Efficiency & performance of half wave rectifier, Full-wave rectifier, Centre-tap full wave rectifier, Full wave bridge rectifier, Efficiency & performance of full-wave rectifier, Ripple factor, Filters, How to get better DC, Filter circuits, Types of filter Circuits, Shunt capacitor filter, Series inductor filter, Choke - input LC filter, The CLC or PI filter.	08
7	**Types of Diodes:** Types of diodes, Signal diodes, Power diodes, Zenerdiode,Voltage regulation Stebilizers, Zener effect, Avalanche effect, Varactor diodes, Principle-Construction-Working-Applications-Merits-Demerits of Light emitting diode, Principle-Construction-Working-Applications-Merits-Demerits ofPhoto diode, Optoisolator.	06
8	**Transistors Theory:** Introduction to Transistor structure, Working action of Transistor, Relation between currents in a transistor & parameters, Transistor amplifying action, Transistor configurations, Transistor characteristics,Common-Emitter configuration, current relations, relation between alpha and beta, Input and output Common Emitter characteristics, Basic Common Emitter amplifier circuit, DC load line, Operating point, Cut off and saturation points, Common base configuration, Characteristics of common base connection,Common collector connection, Comparison of transistor connections.	09

Learning Outcomes:-

After the successful completion of the course, students will be able to have knowledge about

- Wave motion and find velocity of sound in air.
- Technique of production of ultrasonic and its application.
- Determine the wavelength of sodium light.
- Understand crystal structures.
- Different types of diodes, transistors and its application.
- X-rays and application.
- Radio activity and properties of different radioactive rays.

Books Recommended:-

1. 'Conceptual Physics', **Paul G. Hewitt** , *Pearson Publication*
2. 'Engineering Physics',**R.K.Gaur, S.L.Gupta,***DhanpatRai Publication.*
3. 'Modern Physics',**R.Mrugeshan&KiruthingaSivaprasath**,*S.Chand Comp.*
4. 'Principles of Electronics',**V.K.Mehta&Rohit Mehta**,*S.Chand Company.*
5. 'Modern Physics'**, B.L. Theraja**, *S.Chand& Company Ltd.*
6. 'Modern Engineering Physics',**A.S. Vasudeva**, *S.Chand Company.*
7. 'Engineering Physics', **G.Vijayakumari**, *Vikas Publication.*
8. 'University Physics',**Sears, Zeemansky and Young**,*NarosaPublising.*
9. 'Physics',**Halliday and Resnick**,*John Wiley*.
10. 'Oscillations, Waves, Acoustics and Optics',**R.L.Saihgal**, *S.Chand Co.*
11. 'Atomic Physics',**J.B.Rajam**,*S.Chand& Company Ltd.*
12. 'Elements of Electronics',**M.K.Bagde&S.P.Shingh**,*S.Chand& Company Ltd.*
13. 'Introduction of Solid State Physics',**C.Kittle.**
14. 'Engineering Physics', **M.N. Avadhanulu&P.G. Kshirsagar**,*S.Chand& Company Ltd .*
15. 'The Word of Science',**Paraguon,***U.K*
16. 'A Text Book of Quantum Mechanics',**Methue&Venktesn.**

E-Resources :-

1. www.wikipedia encyclopedia
2. www.physic.about.com
3. www.physic.org
4. www.Physicsclassroom.com
5. www.howstuffwork.com
6. www.colorado.edu/physics/2000
7. www.ndrs.org. physic.com
8. www.physlinc.com
9. www.fearophysic.com
10. www.hyperphysics.com

***CD Rom for e-leaning*:**

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

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COURSE: B.Sc. **SEMESTER: II**

SUBJECT NAME: Physics Practical-II **SUBJECT CODE: BSCPHP201**

Teaching & Evaluation Scheme:-

Teaching Scheme(hrs)			Evaluation Scheme								
			Theory					Practical (Marks)			
Th	Pr	Total	Sessional Exam		University Exam		Total	External	Internal	Total	Total
			Marks	Hrs	Marks	Hrs					
0	6	6	--	--	--	--	--	30	20	50	50

Objectives: -The objective of this course is that the students will be able…

- To perform melde's experiment.
- To study resonator.
- To determination of unknown wavelength and dispersive curve of prism.
- The verification of Series &Parallel connection of capacitor and inductor.
- To Determine V-I characteristics of different diodes and transistors.
- To study transformer.

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	Melde's Experiment.
2	Study of Resonator.
3	Calibration of Spectrometer & determination of unknown wavelength.
4	Dispersive curve of a prism.
5	Newton's rings, Determination of λ using sodium light.
6	Determination of the capacity 'C' of Capacitor. (verification of Series & Parallel connection of capacitor)
7	Determination of self inductance 'L' of inductor (verification of series & Parallel connection of inductor)

8	Deflection magnetometer.
9	Study of a Transformer.
10	P-N Junction diode characteristics, Calculate dynamic resistance.(using PCB).
11	P-N Junction diode as Half Wave / Full Wave Rectifier.
12	P-N Junction diode as Bridge Rectifier.
13	V-I characteristics of Zener diode. (using PCB).
14	Zener diode as voltage regulator.
15	Characteristics of Photo diode.
16	Characteristics of Common Emitter Transistor. (input& output).
17	Law resistance by Potentiometer.

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 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. 'Practical Physics'**,C.L.Arora**, *S. Chand Comp.* Ltd., *New Delhi.*
2. 'Advanced Practical Physics',**M.S.Chauhan& S.P.Sing,***PragatiPracation, Meerut.*
3. 'Experimental Physics', **University GranthNirman Board**, (Gujarati Medium).
4. 'Physics through experimentsVol. I & II',**B. Sarafetlal.**
5. 'Advanced Practical Physics',**S.L.Gupta and V.Kumar,***PragatiPrakashan, Meerut.*
6. 'An advanced course in practical Physics',**D. Chattopadhyay and P. C.Rakshit**, *New Central book agency Pvt. Ltd.*

E-Resources:-

1. www.physic.about.com
2. www.physic.org
3. www.Physicsclassroom.com
4. www.howstuffwork.com
5. www.colorado.edu/physics/2000
6. www.ndrs.org. physic.com
7. www.physlinc.com
8. www.fearophysic.com
9. www.hyper physics.com